Ethnography of Peasant Engagement in Food Systems

PhD Thesis of

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"I chose to be a farmer because farming has many benefits. You do not have to buy food, you get food from your *shamba* and you get money from the *shamba*. And you are your own boss, you are very free. Nobody asks you 'why are you late?', 'where have you been yesterday?'. You are only controlled by the work. This is why I have chosen to be a farmer. I became a farmer when I got the land here. I could not be a farmer without land."

a local peasant

Picture in the front page taken by the author

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Content

Figures

Acronyms

ACT	African Conservation Tillage Network
AGRUCO	Agroecología Universidad Chochabamba
CDE	Centre for Development and Environment, University of Bern
CETRAD	Centre for Training and Integrated Research on Arid and Semi-Arid Lands Development
CGIAR	Consultative Group on International Agricultural Research
CPR	Common Pool Resources
FAO	Food and Agricultural Organisation of the United Nations
FIAN	FoodFirst Information and Action Network
FoodSAF	Food Sustainability Assessment Framework
GRAIN	Genetic Resources Action International
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
JICA	Japan International Cooperation Agency
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizer Development Centre
ILO	International Labour Organisation
ISA	Institute of Social Anthropology, University of Bern
KENDAT	Kenya Network for Dissemination of Agricultural Technologies
KNBS	Kenya National Bureau of Statistics
KSH	Kenyan Shilling
M-*Pesa*	mobile phone based money transfer service
Oxfam	Oxford Committee for Famine Relief
PCPB	Pest Control Products Board of the Kenyan Government
SNV	Stichting Nederlandse Vrijwilligers
Syngenta Foundation	Syngenta Foundation for Sustainable Agriculture
UNCTAD	United Nations Conference on Trade and Development
Unicef	United Nations Children's Fun
WFP	World Food Programme of the United Nations
WHO	World Health Organisation
WP	Work Packages of the research project Towards Food Sustainability
WRUA	Water Resource User Association
WTI	World Trade Institute, University of Bern

Swahili and Kikuyu Words used in the Thesis

ardhi	Swahili for land (the "*Ardhi House*" is the National Ministry of Lands)
githeri	Kikuyu for a dish made of maize and beans
harambee	Swahili for "all pull together" (a *harambee* is an event to raise money from the community)
jua kali	Swahili for under the hot sun. Used for outside workshops or manufacturing areas as well as products that are most likely produced there.
kenieji	Kikuyu for a dish made of maize, beans, mashed potato and greens
Kilimo Salama	Swahili for safe farming (*Kilimo Salama* is a commercial crop insurance for peasants)
Maili Saba	Swahili for Seven Miles (a place seven miles from Nanyuki along the road to Isiolo and Meru)
matatu	Swahili for minibus
mbarî	Kikuyu for a group of people of the same descendants
Nyumba Kumi	Swahili for ten houses (the lowest administrative unit including ten households)
panga	Swahili for machete knife
pesa	Swahili for money
posho	Swahili for enabling. *Posho* mills are small engine powered local mills that are common in Kenya.
sacco	Swahili for a legally registered co-operative
shamba/mashamba	Swahili for field/fields or plot/plots
sukuma wiki	Swahili for colewort, a common side dish in the study area
ugali	Kikuyu or Swahili for a dish made of maize flour
uwezo	Swahili for capability, ability ("uwezo" is a product line of Syngenta with small packages of agro-chemicals to allow poor peasant to buy them)

Local Measuring Unites[1]

Distance

1 mile ..... 1609,34 meters

1 foot ..... 0,31 meters

Surface

1 acre ..... 4047 square meters
0,4 hectares

1 acre at the Mwireri Settlement Scheme[2] ..... 3035 square meters
0,3 hectares

Weight

1 tin ..... 20 kilogram

1 bag ..... 90 kilogram

1 bag of fertilizer or seeds ..... 50 kilogram

1 bag of potatoes ..... 100 kilogram

Volumes

1 cup ..... 0,4 litres

1 bottle ..... 2 litres

1 cherry can ..... ~ 25-35 litres

Currencies

100 Kenyan Shilling (KSH) ..... 0,95 Swiss Franc or 0,82 Euro[3]

[1] Local measuring unites have not always been used as precisely as they are described here.

[2] In the Mwireri Settlement Scheme, ¼ of the land acquired was deducted as public land. Therefore, if a peasant acquired a plot of 1 acre, he or she received only ¾ of an acre but described the plot as being 1 acre large.

[3] At the time of research

1. Introduction

Today, 815 million people – more than 10% of the world's total population – suffer from hunger, and two billion are overweight or suffer from micronutrient deficiencies (FAO et al. 2017). Moreover, producing, processing, distributing and consuming food causes severe ecological problems that destroy the very basis for these activities. In addition, these activities have great social impacts. Thus, production and procurement of food affects not only those who eat food (see Ericksen 2008, Nellermann et al. 2009, iPES Food 2015).

It is widely acknowledged that a comprehensive and transdisciplinary approach is needed to combat hunger and malnutrition, as well as negative ecological and social impacts related to activities for food production, procurement and consumption. The concept of *food system sustainability* provides such a comprehensive approach that can be applied in transdisciplinary research. In the literature, *food systems* are generally described as systems that are responsible for the flow of goods that covers the food needs of one or more consumer groups (Ericksen 2008). Such flows of goods are called *food value chains.* They start where food is produced, pass to where food is processed and distributed and end where food is utilized or disposed. *Food value chains* are embedded in ecological, social, economic, ideological, institutional, ontological, cultural and political systems. These systems affect how *food value chains* operate and are an integral part of a food system. However, food systems do not only provide food for one or more consumer groups, they have a broad range of ecological, social, economic and institutional outcomes at each step of the *food value chain*. With these outcomes, food systems also affect the embedding systems in which the *food value chain* is embedded. (Ericksen 2008, Colonna at al. 2013, Tendall et al. 2015).

These outcomes can be assessed against various dimensions of sustainability. Sustainability in its wider sense is a normative concept of intra- and intergenerational equity. In the context of food systems, the requirements for intra- and intergenerational equity are conflictive, contested, and contain many uncertainties (Aiking and de Boer 2004). To address complex problems, uncertainties and controversies, transdisciplinary research aims to include different scientific disciplines from natural sciences and humanities, as well as knowledge, experience and perspectives from non-academic actors at an equal level (Hirsch Hadorn et al. 2006). A broad range of authors called for such transdisciplinary approaches in food system research, after recognizing that traditional disciplinary approaches have failed to solve problems of hunger, malnutrition, as well as negative social and ecological impacts of food provision (Ericksen 2008, Colonna et al. 2013, iPES Food 2015, Tendall et al. 2015).

The research project called "Towards Food Sustainability. Reshaping the Coexistence of Different Food Systems in South America and Africa" is such a transdisciplinary project. The project combines different disciplinary approaches and aims to include non-academic actors for analysing food systems, their

sustainability outcomes, and ways to improve them. The project analyses selected food systems in Bolivia and Kenya. My PhD thesis is part of this research project, embedded in a sub-project that looks at actors, institutions and power-relations. As part of this sub-project, I look at food system engagement of peasants in a region north-western of Mount Kenya. This region includes a broad range of agro-ecological zones and different forms of agricultural production. Export-oriented horticultural and floricultural production coexists with large-scale wheat and beef production, small-scale horticultural production, as well as pastoralism. These different agro-ecological zones and types of agricultural production allow for myriad forms of engagement in food systems.

On the basis of different peasant theories, I describe peasants as members of a group of rural people with the ability to perform agricultural production to cover their subsistence needs, at least partially. Peasants' economic activities – all activities related to covering the subsistence needs – are influenced by individual decisions that are affected by ecological factors, their culture and their specific interactions with others and the global world. To describe peasants this way, I combine theories of Marx (1962 [1867]), Chayanov (1966 [1925]), Steward (1955), Wolf (1957), Rostow (1960), Boserup (1965), Foster (1965), Rappaport (1968), Lipton (1982 [1968]), Frank (1969), Wallerstein (1974), Meillassoux (1975), Barlett (1977), Ellis (1988), Cancian (1989), and Roseberry (1989). The interplay between peasants' decisions, the ecological factors, their culture and interactions can be best studied with theories that put institutions at the centre of research. Institutions are rules and regulations that structure all sorts of interactions and economic activities. Theories describing institutions are subsumed under the label New Institutionalism (see North 1990, Ostrom 1990, Ensminger 1992, Ribot and Peluso 2003, Haller 2013). I use this theoretical approaches with a special social anthropological and ethnographic focus.

By taking an actor-oriented inductive ethnographic approach, I scrutinise actor-specific social and economic outcomes of different food systems in which peasants participate. Such an actor-specific approach enables me to study not only outcomes of different food systems, but also their interplay with other food and non-food systems. Moreover, it gave me the opportunity to analyse actors' strategies and practices to deal with these outcomes and interplays, as well as actors' abilities to affect food systems and their outcomes. Last but not least, it enabled me to include the knowledge of the actors, and their perspectives, concerns and expectations with regard to food system sustainability.

To accomplish my research goals, I did more than six months of in-depth social anthropological field research in the region north-western of Mount Kenya, where I lived with the peasants, whom I included in my research. Moreover, I interviewed a great number of actors from national as well as international governmental, private and charity projects and programmes that affect peasants' engagement in food systems. In addition, I collaborated closely with Master and PhD students from

our research project as well as with researchers from other projects. This collaboration consisted of a collectively developed research design, mutual support for practical matters during the research, exchange of important insights, and publishing co-authored scientific publications.

In the next chapter, I elucidate different theoretical concepts that are combined in Food Sustainability Approaches to grasp problems related with hunger, food provision, access to food and food utilisation. On this basis, I develop an own definition of Food Sustainability that includes cultural, physiological, political, economic and ecological aspects at various levels, intra- and intergenerational equity, uncertainties and unpredictabilities, as well as the role of participation and power relations in the negotiation of definitions. In the last section of this chapter, I describe the concept of food systems to analyse the previous defined Food Sustainability as food system sustainability.

In chapter three, I describe transdisciplinary research as an approach that can be used to analyse this encompassing and comprehensive concept of food system sustainability. Thereby, I pay special attention to the participation of different actors in this research approach. Following this general description of transdisciplinary research, I line out how the research project, of which my thesis is part of, analyses food system sustainability of selected food systems in Bolivia and Kenya in a transdisciplinary manner. Moreover, I describe my own research on peasant engagement in food systems in the region north-west of Mount Kenya and which position my research has within the research project.

In chapter four, I describe peasants' economic activities as the product of individual decisions that are influenced by ecological conditions, cultural features and their interaction with the global world. To describe peasants' economic activities in this way, I combine neoclassical micro economic approaches, evolutionary theories, cultural-ecological perspectives, cultural-relativist explanations, world-system theories, and neo-Marxist ideas.

In chapter five, I use theories that put institutions at the centre of research to describe how peasants' economic activities are influenced by individual decisions, ecological factors, their culture and their specific interactions with others and the global world. These theories are subsumed under the label New Institutionalism. Such an approach is actor-oriented and puts institutions at the centre of research.

In chapter six, I describe the ethnographic methods I applied to carry out my research and recount how I carried out my research in the region north-west of Mount Kenya.

In chapter seven and eight, I describe the study area in the region north-west of Mount Kenya and Mwireri, the village where I carried out my research. These two chapters provide an overview of the

ecological and social environment in which food systems in this area are embedded. Thereby, I pay special attention to land-use patterns and local characteristics of Mwireri.

In chapter nine, I describe the small-scale peasant crop and livestock production of people living in the vicinity of Mwireri. This description enables a detailed analysis of selected characteristics of the peasants' production in the ensuing chapters: chapter ten describes in detail how peasants got access to land, chapter eleven focuses at material inputs required for peasant production, chapter twelve looks at knowledge, know-how and information used for peasant production, chapter thirteen explains how work force and access to agricultural services is organised, and chapter fourteen and fifteen look at the utilisation of farm products and the use and management of money of peasants.

This detailed analysis of peasants' activities provides the basis for the discussion of peasants' engagement in food systems in the region north-west of Mount Kenya in chapter sixteen. Thereby, I discuss the findings of my analysis with regard to my research question and I provide on how this feeds into the discussion on food system sustainability.

2. From Hunger Mitigation to Food System Sustainability

According to the FAO, hunger or undernourishment describes the situation of a person who is not able to get enough food to meet the minimum dietary energy requirements for a healthy and active life.[4] Hunger over extended periods becomes a treat to human health and development, especially for children. Directly and indirectly, hunger puts a great threat to the well-being of affected individuals, households, communities, regions and countries. The provision of food is not an individual act and lack of food does not only affect individuals. Thus, hunger and the fight against it have occupied societies ever since. However, sustained periods of hunger and associated crisis in smaller or larger groups of people always accompanied the history of mankind.

The FAO, IFAD, Unicef, WFP and WHO estimate in their 2017 report on the State of Food Security in the World that today globally 815 million people suffer from hunger.[5] Most of these people live in developing countries, whereby the percentage of undernourished people is significantly higher in rural areas compared to urban places. Moreover, people with little economic means suffer the most from hunger. The number of hungry people in the world reduced significantly since the early 1990s despite the ongoing increase in the total world population. However, this general reduction happened uneven. Especially in the highly populated Eastern and South-Eastern Asian countries as well as the Latin American and Caribbean countries the number of hungry people reduced by more than half. But in Sub-Saharan Africa and Western Asian countries, today more people suffer from hunger compared to the early 1990s. Moreover, the latest report of 2017 reveals a renewed rise in the general number of undernourished people worldwide (FAO et al. 2015, FAO et al. 2017). It is generally agreed that hunger is not caused by a lack of food produced worldwide but by an uneven distribution of this food and its access. Therefore, Jean Ziegler, Special Rapporteur on the Right to Food from 2000 to 2008, equals starvation with murder (2011: 13).

Today, not only hunger but generally malnutrition and health impacts as well as negative ecological and social impacts are problems associated with food provision. Malnutrition is caused by deficiencies or excess. Malnutrition as well as contamination of food cause individual health impacts. In addition

[4] According to the FAO, undernourishment describes a consumption of food below the minimum most people need for a healthy and active life. Depending on age, sex and region, this minimum is between 1650 and 1900 kilocalories per day per person (see FAO et al. 2001).

[5] International organisations such as the United Nations, FAO, WHO, ILO etc. generally operate with comparable figures and statistics to conceive the world and the topics with which they deal. These figures and statistics are not beyond doubt. It is criticised that they only show what these organisations want to see, that they ignore aspects that might not be captured in figures easily and that the data basis with which they operate is poor in some countries (see Jerven 2013). Nevertheless, such figures provide an insight to their perception of the world that greatly influence policies and international actions. These perceptions however can and have to be counterchecked in specific contexts.

to the nutrient deficiencies leading to hunger, malnutrition also encompasses micronutrient deficiencies and overweight or obesity. Micronutrient deficiencies describe an insufficient supply of vitamins and minerals that had been discovered for being important for an active and healthy life. Micronutrient deficiencies are caused by undiversified diets and micronutrient poor foods. The FAO and WHO estimates that in addition to the 815 million people suffering from undernourishment today, 2 billion are afflicted by micronutrient deficiencies – especially iron, vitamin B12 and A, and folate deficiencies (FAO 2013, WHO 2017). At the other hand, overweight and obesity are defined by the WHO as "abnormal or excessive fat accumulation that may impair health" [6]. Overweight and obesity are caused by "an increase of energy-dense foods that are high in fat and an increase in physical inactivity" (WHO 2016). In 2014, more than 1.9 billion or 39% of the adult world population were overweight, of whom 600 million or 13% in total were obese (WHO 2016). Both, micronutrient deficiencies as well as overweight and obesity come from imbalanced diets. Micronutrient deficiencies can be prevented through dietary diversification or supplementation of these micronutrients in foods (WHO 2017). Overweight and obesity are caused by people's choices of foods and engagement in physical activates. At an individual level, people can change food habits and their engagement in physical activities. These individual decisions are shaped by the broader environment (e.g. the availability of comparatively cheap energy-dense food combined with insufficient availability of cheap healthy food) (WHO 2016). According to Ericksen (2008), further topics related with food that are increasingly recognized are health impacts and nutritional outcomes of contaminated food and water as well as modern food processing. As such, malnutrition and individual health impacts are topics related with nutrient and micronutrient deficiencies, surplus nutrient intake as well as contamination of food.

In addition to individual health issues and their societal impacts, negative ecological and social impacts associated with food provision gradually moved to the centre of attention. Agriculture is a main producer of climate change relevant greenhouse gases through production, processing and transportation of food. Moreover, expansion of agricultural production transforms landscapes and is associated with soil degradation, fresh water depletion, biodiversity reduction, and the pollution of soils, water and the atmosphere through the application of agro-chemicals, etc. (FAO 2012, Koohafkan et al. 2011, Godfray et al. 2010, Smil 2000, de Fraiture et al. 2010, Liverman and Kapadia 2010, McMichael et al. 2007, Pretty et al. 2005, Matson et al. 1997, Nellermann et al. 2009). Generally, there is a trend towards commercialisation and privatisation of food production and distribution. Agricultural and development policies, such as state led transformation of agricultural production or the promotion

[6] Overweight and obesity are calculated with the Body Mass Index that compares body weight compared to the body height. Overweight is a Body Mass Index of 25 or above, Obesity is a Body Mass Index of 30 and above (WHO 2016).

of private investments in large-scale production have economic and social impacts (land grabbing, increase in power imbalances, lack of participation, etc.). Last but not least, according to the International Labour Organisation (ILO), 1.1 billion people work in the agriculture and as such agriculture is the basis of livelihoods for a great share of the world population (ILO 2014).[7] External factors that transform this source for livelihoods have great social impacts (see, for example, Baird 2011).

2.1 Food Aid and Agricultural Transformation Programmes

Already governments of first state-like organizations and other authorities were concerned about preventing or providing relief from food crisis. Food crisis could put a great threat to their legitimacy and result in food riots. For example, Roman leaders cared much about grain supply in their cities to consolidate their power. Nevertheless, food crises occurred regularly through the time. Large hunger crisis in the recent history were the Great Famine in Ireland 1845-52, a famine in the Soviet Union 1932-33, in Bengali 1943-44, in China 1958-61, in Iran 1962 and in Ethiopian 1983-85, just to mention some (Gráda 2009). During most famines the national government or colonial government organized relief. With the adoption of the Universal Declaration of the Human Rights in 1948 also a right to food is guaranteed. On this basis, the United Nations created several organisations, such as the Food and Agricultural Organisation of the United Nations (FAO) or the United Nations World Food Programme (WFP) to combat hunger crisis and to promote the Right to Food. In the 1962 famine in Iran, international help was organised for the first time by the newly founded WFP.[8] In 1984, footages of the hunger crisis in Ethiopia on BBC caused broader awareness about food crisis in Western countries that only had experienced such crisis more than a century ago. This resulted in first large privately organized relief programmes – for example “Band Aid” or “United Support of Artists”. Most of the international programmes consisted of emergency or long term food assistance or food aid known from the spectacular airdropping of food in Ethiopia. Although such programmes continue to exist, food delivery today is generally organized in less spectacular ways, e.g. through school feeding programmes. Recently, some of these programmes started to hand out cash to allow people to buy food if food is available but not affordable to people.[9] This kind of assistance follows the rational of

[7] Not only agriculture but also pastoralism, fishery or hunting and gathering activities are food producing activities that can provide income for people.

[8] See <www.wfp.org/history>, accessed July 5, 2017.

[9] For example, today the WFP distributes more than 2 million metric tons of food every year, mainly in emergency settings. In 2015, USAid distributed 1.2 million metric tons of food, mainly grown in the US. The European Union spends nearly one-third of its annual humanitarian aid budget on emergency food assistance, in kind and cash or food vouchers (see: World Food Programme <www.wfp.org>; USAid <www.usaid.gov>; European Civil Protection and Humanitarian Aid Operations <http://ec.europa.eu/echo/what/humanitarian-aid/food-assistance_en>, all accessed July 5, 2017).

providing food to mitigate most urgent crisis. The programmes were able to reduce casualties of food crisis but they are criticised for mainly serving geo-political agendas of donor countries and not contributing to prevent such crisis. The handing out of food reduced prices for food but also undermined local production and markets by dumping food prices. This enhances the risk for further crisis (Lentz 2015, Friedmann 1987).

Alongside food assistance programmes, international organisations started programmes to transform agricultural production in famine prone countries to reduce food scarcity and prevent food crisis. These agriculture-focussed transformation programmes aimed to increase national agricultural output and productivity. Such programmes followed the rational that hunger must be addressed by producing more food (Lang and Barling 2012). They were based on technical agricultural research targeting the development of high yielding varieties, the manufacturing and marketing of inexpensive nitrogen fertilizer and agro-chemicals, the application of irrigation technologies, and the development of infrastructure. From the Economic Development perspective of Rostow (1960, see chapter 4.2), these technology transfers can be seen as a contribution to a broader economic development in these countries. Programmes with this production-innovation narrative are today subsumed under the term Green Revolution. These production-oriented programmes mainly targeted Asian and South-American countries. Since the 1990s, this Green Revolution has shifted from state driven and controlled programmes towards provision and control of capital and biotechnology by private companies and non-governmental philanthropic organisations, such as Rockefeller and Gates Foundation. Nevertheless, in some international research organisations in this field, such as the Consultative Group on International Agricultural Research (CGIAR), state funding and influence remain important up to the present day.[10] In the early 2010s the term “New Green Revolution” became popular to describe a new wave of private investment in agricultural production, especially also in African countries, and the dissemination of licenced genetically modified crops, especially in South American and Asian countries. Especially the initial Green Revolution has increased food output at a rate that exceeded population growth in targeted developing countries (Thompson and Scoones 2009, see also Smil 2004, Lipton and Longhurst 1989). Despite the achievements made possible with these production technology innovations, it is criticised the Green Revolution has “neither increased food availability for the poor […] nor improved the lot of many poor farmers and farmworkers” (Thompson and Scoones 2009: 389, see also Drèze and Sen 1989, Evenson and Gollin 2000). Moreover, the increased use of chemical pesticides, herbicides and fungicides as well as the conversion of natural ecosystems and diversified agriculture to monocrop agriculture and large ranches has created significant environmental problems (Thompson and Scoones 2009, Pretty et al. 2009). Last but not least, the appropriation of land and

[10] CGIAR is an important international research organisation in the field of agricultural sciences (see: CGIAR <www.cgiar.org>, accessed July 5, 2017).

resources for this kind of production has sometimes resulted in the expropriation of former users of these lands and resources (Thompson and Scoones 2009). Especially land appropriation by private investors for the New Green Revolution was critically explored in the Land Grab Debate (see, for example, De Schutter 2011, Anseeuw et al. 2012, Scoones et al. 2013, Marfurt et al. 2016, Borras et al. 2012). In sum, these authors point at problems associated with this attempt to increase production and question the assumption that increased production of food results directly into increased availability of food for those in need. They argue that lack of food is rather caused by its poor distribution and accessibility and not by insufficient production.

New innovative concepts addressing food related issues aim not only at providing food or enhancing food production but try to look at this issue in a broader picture. Thereby, they take into account issues related to food distribution and accessibility, health, environmental integrity, economic viability, equity, governance and power relations. The most influential concepts are presented in the next section.

2.2 Comprehensive Concepts to Address Food Related Issues

Different concepts have been drafted to analyse food issues and to develop strategies and programmes to deal with these issues. Food Security and the Right to Food are the dominant concepts in this discourse. Food Sovereignty and Food Regimes are concepts that point at weaknesses of the first two concepts. Finally, the concept of Food Sustainability aims at bringing together availability, accessibility and utilization of food with health and cultural aspects related to food, social and environmental integrity of food production and provision as well as economic and equity aspects related to food by considering power relations.

Food Security and The Right to Food

The concepts of Food Security and the Right to Food dominate global discourses on food provision and policy. As mentioned before, the Right to Food has its origin in the Universal Declaration of the Human Rights of 1948 that states “everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, […]” (Art.25 §1). The Right to Food describes state obligations to ensure everyone’s right to food or Food Security for everyone. However, what this means has been contested and changed over time. The concept Food Security was first discussed and defined at the World Food Conference of the United Nations in 1974. At this time, the concept addressed the availability of food to feed the world population. This definition is in line with the idea of the Green Revolution to enhance food production and as such global food availability.

In 1983, the FAO suggested a redefinition of the concept of Food Security that included stable access of vulnerable people to food (FAO 1983). This definition aimed to balance between the supply of food

that was at the centre of attention so far and access to food. As such, it also partially included the objection that enhanced production of food made possible by the Green Revolution did not improve poor people's access to food (Thompson and Scoones 2009). In addition, this definition emphasizes on the importance of stability of access at all times, also under adverse environmental, political or economic conditions (McCalla 1999). Building on this premise, the following definition of Food Security was adopted at the well-known World Food Summit of 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" (FAO 1996).

The emphasis of access to food enlarges the former narrow focus on food production. Access does not only depend on availability of food but also on financial, social or political power to allocate food. As such not only production but also the conditions under which people access food have to be considered. Therefore, states have to ensure not only sufficient production of food but also stable access to food in order to fulfil the Right to Food. As such, state obligations reach from not preventing to strengthening people's myriad ways to access and utilization food – but not primarily food provisions by the states.[11]

With the requirement of access at all times, the definition emphasizes on the importance of stability of access, also under adverse conditions. For a further analysis of this aspect, Food Security can be linked with the concept of Resilience. This concept describes the ability of an individual or group to cope with or adapt to stresses and disturbances, such as ecological, socio-economic or political pressure and to learn and prepare for future stresses and disturbances (Berkes et al. 2008, Speranza et al. 2014).

In addition to the main goal of addressing hunger by securing access, quality aspects of food with regard to health are considered by the definition of 1996. As such, not only the prevention of undernourishment, but also the prevention of malnutrition and the promotion of food safety become aspects of Food Security. As mentioned above, health impacts and nutritional outcomes of contaminated food and modern food processing are increasingly recognized. Therewith not only availability and accessibility but also utilization of food become aspects of food security (Ericksen 2008).

In the General Comment of the United Nations Committee on Economic, Social and Cultural Rights of 1999 and in the final report on the transformative potential of the Right to Food written by the former

[11] Only if individuals or groups fail to provide food for themselves, the state has an obligation to directly provide them with food (Economic and Social Council 1999).

Special Rapporteur on the Right to Food, Olivier de Schutter in 2014, further additional aspects of Food Security and the Right to Food are emphasised: Access to food must not prevent access of other current or future generations or interfere with the enjoyment of other Human Rights. Moreover, food has to be acceptable within a given culture. This additional aspects of Food Security and the Right to Food encompass notions of equity, sustainability and so-called non nutrient-based values of food and its consumption. To consider these aspects of the Right to Food, de Schutter aimed to balance power within organisations that deal with such issues by including representatives from the global south and the civil society.

Last but not least, Ericksen (2008) emphasizes that insights from the livelihoods approach[12] have shown that access to adequate food is only one of several objectives of people. With regard to poverty and vulnerability, people might accept hunger or eating food that does not meet the above mentioned quality aspects in order to preserve other economic, social or ecological assets. Moreover, agriculture or other forms of food production (livestock keeping, fishing, hunting and gathering) might not always be the primary source of income for rural households but the production of own food can be an important buffer against food and income failures.

With the World Food Summit of 1996 the debate on Food Security and the Right to Food moved away from food availability towards stability of access to food as well as quality and utilization of food. The narratives changed from the Green Revolution's idea of enhancing general food production towards securing food access for those in need. Thereby, access depends not only on availability of food, as an outcome of food production and distribution, but also on financial, social and political power to allocate food. These powers might depend on activities related to food but can also depend on other economic, social or political pursuits. Quality of accessible food is a further aspect of Food Security. Quality describes health impacts and nutritional outcomes of food consumption or utilisation as well as cultural acceptance of food, so called non-nutrition based values. Moreover, with the concept of Food Security, questions related to equity and sustainability are addressed. Despite the importance of adequate food for human health, people also have other needs in times of scarcity (e.g. to preserve economic opportunities, social relations or the ecological environment). Although not all actors dealing with food issues share a definition of Food Security and the Right to Food that include all these aspects, the concepts are used by a growing number of international organisations and governments (FAO, IFAD, World Bank, Oxfam, FIAN, etc., see Golay and Büsci 2012). With the Millennium Development

[12] Livelihoods and Sustainable Livelihoods Approaches aim at looking holistically and from different disciplinary perspectives at how (poor) people make a living. They look at how economic, ecological, political and social factors and processes constrain or contribute to their endeavours to make a living and which impacts their endeavours have on these factors and processes. For sustainable livelihoods, people depend on natural resources as they depend on other assets for survival, such as financial, social or physical assets. All these assets act as buffers against biophysical, social or economic shocks (Scoones 2009).

Goals (2000) and the Sustainable Development Goals (2015), most states acknowledged such an encompassing definition of Food Security and reaffirmed their will to fulfil their obligations with regard to the Right to Food. Nevertheless, programmes of the United Nations to address food crisis, such as the 2007-2008 price spike, still depend to a great extent on food aid, and production oriented programmes, neglecting partially the other aspects of Food Security (Lang and Barling 2012).

In the aftermath of the 1996 Food Security Definition, numerous analysis and reports on the global challenges of food security were made by international organisations and scientists (see, for example, IAASTD 2009, UNCTAD 2013, FAO et al. 2015, FAO et al. 2017, Smil 2000, Ericksen 2008, Nellermann et al. 2009). These reports provide a wide amount of data but vary greatly in scope, methods, findings and policy recommendations (Lang and Barling 2012). However, the concept of Food Security did not stay uncriticised. The definition of Food Security by global actors is criticised as a top-down implementation of a concept that leaves little space for local definitions. Moreover, it is criticised that this concept still obscures power relations and does not pay sufficient attention to historical and ongoing trajectories in power relations.

Food Sovereignty

La Via Campesina criticises parts of the concepts of Food Security and the Right to Food proposed by the United Nation Organisations. According to La Via Campesina and others (e.g. Lang and Barling 2012, Patel 2009, Windfuhr and Jonsén 2005), these concepts neglect the role of power to shape food production systems, generally food policies and specific rules and regulations that structure activities and negotiation processes of these systems. Therefore, they do not prevent the current transformation of control over food production and consumption form people living therefrom to those earning money with it – or to "corporations that place profit before people" (La Via Campesina 2007). By neglecting power relations or the political-economy and political-ecology of food, the United Nations concepts of Food Security and the Right to Food tend to overlook the negative impacts of these rising power transformations and imbalances. Oliver de Schutter included the governance issue partially in the Right to Food by including more representatives from the global south and the civil society in the FAO Committee on the Right to Food (Lang and Barling 2012). With the concept of Food Sovereignty La Via Campesina and others[13] aim to include the role of power and the right of peoples, nations and

[13] La Via Campesina presents itself as the legitimate representative of those who produce food, peasants, farmers, rural women, farm workers etc. (Desmarais 2008). Other organisations lobbying for the concept of Food Sovereignty are FIAN, GRAIN, Friends of the Earth and others (Windfuhr and Jonsén 2005).

states to "determine their own food producing systems and policies that provide […] good quality, adequate, affordable, healthy, and culturally appropriate food" (La Via Campesina 2007)[14].

With the concept of Food Regimes Harriet Friedmann (1987), Harriet Friedmann and McMichael (1989) and others already looked at power relations that shape food producing systems and food policies from an anti-capitalist perspective. According to them, global colonialism led to a first global Food Regime by which power to organize food production and distribution was transferred from those producing and consuming food to the colonial empires. With the end of colonialism, this power was handed over to newly formed nation states and those supporting these states (e.g. through the Green Revolution). In the late twentieth century, agriculture and the states in general "became increasingly subordinated to capital". Capital owners got the power to organize and reorganize agriculture. They transformed agriculture and agricultural policies to become more market conform. Thereby, they "undercut the state policies directing agriculture to national ends, such as food security [or] the preservation of rural/peasant communities" (Friedmann and McMichael 1989: 95, see also McMichael 2009). As such, the power to shape food regimes was first appropriated by states and in the global south by colonial authorities. With independence of colonies, newly formed national governments were handed over this power. Later on, capital owners acquired dominance in shaping food regimes. Despite the power of some actors to shape food regimes, they never turned out exactly as envisaged by them. In addition to adherents of this concept, others also point at the paramount or increasing power position of capital owners or multinational agro-chemical and food companies (see Tansey and Worsley 1995, Lang et al. 2009, Coleman et al. 2004, Gereffi et al. 2005, Burch and Lawrence 2007, Bairling et al. 2009, Thompson and Scoones 2009, Ericksen 2008).

New concepts of a Moral Economy, Fair Food or Food Justice aim at reducing negative impacts in current food regimes (e.g. improve access to healthy and culturally appropriate food, reduce negative ecological impacts or prevent extreme low salaries for labourers). If they are well implemented, they can have positive effects on food security, the ecological or social performance, or equality in power relations. However, some concepts are not holistic and only address certain aspects of food producing systems[15] and do not necessarily aim at returning the power to those who lost it (see Marsden et al. 2010).

[14] Food Sovereignty should not be confused with Food Autarky or Food Self-Sufficiency. These concepts describe the production of sufficient food in a territory to feed the people living within this territory. These people thus do not depend on food imports.

[15] e.g. the Organic Farming label of the European Union almost exclusively addresses ecological aspects of food production (see: Organic Farming. <www.organic-farming.europa.eu>, accessed January 4, 2018) or the Fairtrade label of Max Havelaar only addresses working conditions (see: Max Havelaar. <www.maxhavelaar.ch>, accessed January 4, 2018)).

As shown by La Via Campesina and others, the historical trajectories and power relations that promoted a transformation towards food production of so called “corporate food regimes” are omitted in Food Security and Right to Food theories. The transformation of power in corporate food regimes towards private companies has manifold negative impacts for peasants, rural women, farm workers and consumers because they lose power to define the food regimes on which they depend to those earning money with them. Despite producing food that might be accessible, healthy, and culturally accepted, corporate food regimes lead to land, knowledge and control concentration, trade liberalisation, or ecological degradation because they are transformed to serve those who earn money with them.

Conceptually, Food Security and the Right to Food focus on features of food and its production, provision and consumption, such as malnutrition, food safety, cultural acceptance, equity and sustainability. In addition, Food Sovereignty also focus on agency or power to control the processes that lead to these features of food. In other terms, the two first concepts address access and availability to specific food and associated rights while the later also addresses agency or the power to control processes that lead to availability and access to specific food and associated rights. The concept of Food Regimes explains how the control over food production and consumption had been wrested from those living from food production and consumption to national governments and profit-seeking companies.

Food Sustainability

The concept of Food Sustainability aims to look more holistically at food issues including all aspects discussed above. It is indivisibly linked to the idea of Sustainable Development. Since the publication of the Brundtland Report in 1987 the concept of Sustainable Development is widely known and generally accepted. According to this report, Sustainable Development “meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development 1987: Art. 3). This definition of Sustainable Development, as it is further outlined in this report, “links the environment’s ability to meet present and future human needs with theories of social justice – both within and between generations – as a basis for ecological, economic and social aspects of suitability” (Aiking and de Boer 2004: 359). However, sustainability does not mean the maintenance of a static situation of natural systems but the preservation of the adaptability and resilience of these systems. This concept links an agreed upon normative target with scientific system knowledge. Initially, the concept was mainly used to address the handling of the ecological environment that had been seen as the basis of all social and economic development. As such, this concept was used to postulate a development that is more ecologically sound. However, this environmental bias had been criticised by representatives of underdeveloped countries as an “’environmental’ agenda of developed countries” inhibiting the “’development’ agenda

of many poor countries" (Aiking and de Boer 2004: 360). With an increased focus on intra-generational equity this critic is addressed. On an international level, the Millennium Development Goals (2000) and the Sustainable Development Goals (2015) also consider the development agenda of poor countries. However, such initiatives mainly target development at the global level and the level of the state. With this focus, such initiatives can result in the formulation of development that does not consider the interests and needs of various interest groups at the local level. Therefore, the definition of food sustainability should consider development agendas of rich and poor countries and the heterogeneous interests and needs of various local interest groups (see, Haller et al. 2018). To ensure a real participation of various weak interest groups, constitutionality approaches as described in chapter 3 have to be applied.

Food Security, Right to Food, Food Sovereignty, Food Sustainability

Food Security and Right to Food

The Right to Food describes states' obligation to ensure Food Security. Food Security considers availability of and accessibility to food. Moreover, it includes quality of food with regard to health and cultural issues. Last but not least, newer definitions include aspects of equity and sustainability.

Food Sovereignty

Food Sovereignty addresses power issues with regard to the formulation of regulations for food provision, access and utilisation. This concept defines the right to control these processes related to food provision. The concept of Food Regimes shows how this right had been wrested from those producing and consuming food to governments and private corporate companies.

Food Sustainability

Food Sustainability brings together ecological, economic and social aspects of food. With the concept of Food System Sustainability, aspects like environmental integrity, economic viability or social equity and governance of food can be addressed and discussed through a transdisciplinary research approach. This also allows for a negotiation of the normative definition of Food Sustainability.

Today the term Sustainable Development is defined in myriad ways focusing on one or another aspect situated at a local, regional, national or global level. With regard to indigenous rights, cultural aspects and spiritual cosmovisions are added to the ecological, social and economic dimensions of Sustainable Development (see, for example, Delgado et al. 2010, Verschuuren et al. 2014). From a political economy and power relation analysis perspective, the importance of equity, democratic participation or participatory negotiation for Sustainable Development is emphasized. Thereby, as mentioned above, it is important that not only the rich and poor countries or large influential organisations can participate in the formulation of goals and the crafting of strategies to reach these goals. Interests and needs of various weak interest groups at the local level have to be considered as well (see, for example, Cook and Kothari 2001, Galvin and Haller 2008, Haller et al. 2015, Haller et al. 2018, iPES Food 2015). Environment agencies still highlight the importance of ecological aspects (see, for example, IPCC 2014,

Nellermann et al. 2009). And large agro-industrial companies us the definition of sustainability as "ecologically sound, economically viable and socially acceptable" to highlight their contribution to Sustainable Development (Kloppenbuerg et al. 2000: 185). Especially with the broad definition of Sustainable Development in the Sustainable Development Goals of the United Nations (2015) everybody can highlight an aspect where he or she contributes to Sustainable Development and two actors talking about Sustainable Development do not necessarily talk about the same thing. Nevertheless, Sustainable Development as defined in the Brundtland Report is a concept that is useful to combine agreed upon normative targets with scientific and non-scientific system and transformation knowledge as it is called for in transdisciplinary research approaches (see Hirsch Hadorn et al. 2006).

Since the rise of the concept of sustainability, food and sustainability are inextricably linked in accompanying debates (Aiking and de Boer 2004). With regard to the ecological dimension of sustainability, food provision has large ecological impacts and depends greatly on the ecological environment (Nellermann et al. 2009). Food production and distribution activities and networks have specific rules and regulations that are embedded in broader institutional settings. The formulation and implementation of these rules and regulations depend on power relations that provide specific actor-groups with more or less participation possibilities (Ensminger 1992, Haller 2013, Haller et al. 2015). From an economic and social perspective, food supply chains provide opportunities for large international companies as well as individual local actors to engage in economic activities as producer, trader, processor, distributor or vendor. Such economic activities provide a basis of individual livelihoods, capital accumulation of companies and tax revenues of states. However, power imbalances generally thwart equal benefit and risk-sharing of such economic activities, leading to exploitation that prevent the developing of resilient livelihoods and therewith successful poverty reduction. Moreover, food production, distribution and consumption are shaped by cultural practices and spiritual comsomovisions. At the mean-time, they also shape these features (Delgado et al. 2010, Verschuuren et al. 2014). Last but not least, adequate food is needed by present and future generations for a healthy life free of hunger and malnutrition (FAO et al. 2017).

Combining these aspects of Food Sustainability, is achieved Food Sustainability when:[16]

- All people today and in the future have stable access to and can utilize adequate food that meet their cultural preferences and needs for a healthy life free of hunger, malnutrition or other adverse health impacts related to nutrition.

[16] This definition of Food Sustainability is similar to the definition used by the research project "Towards Food Sustainability", of which my Thesis is part of, but has a more detailed focus on power relations and participation of different interest groups (see chapter 3.1).

- Activities related to the provision and utilization of food do not interfere with the enjoyment of other Human Rights or other livelihood objectives that might be valued higher than access to and utilize of adequate food.
- Benefits from economic activities related to the provision and utilize of food are shared equally (including capital holders, labourers and independent workers as well as states and governments).
- Activities related to the provision and utilize of food do not reduce the ability of the ecological environment to be used for food provision and utilization in the future. Moreover, current access to natural resources has to be shared equally among different interest groups.
- Activities and negotiations related to the provision and utilize of food do not result in enhanced power imbalances between different interest groups and the concentration of decisive power over how these activities are carried out and how food policies are formulated in the hands of few (absolute politicians, religious leaders or capital owners).
- Due to these wide range of the aspects attached to Food Sustainability and the many uncertainties and unpredictabilities the various goals entail, all people affected by production, distribution and processing of food or consuming the food must be able to participate in the weighting of the different goals and the formulation of rules and regulations that shape access to resources and the activities and outcomes related to the production, distribution, processing and consumption of this food.
- Last but not least, which aspects Food Sustainability contains has to be negotiated in a participatory process by all actors affected by this definition. Thereby, the participation process has to ensure that all affected actors can be identified and given space to participate in the negotiation. Participation does not equal equality and can easily favour those with the loudest voice. Special attention has to be paid to weaker interest groups (see chapter 3)

This compiled definition of Food Sustainability is a normative target that includes all the aspects that I addressed previously in this chapter and that appeared of importance. To consider the requirements of transdisciplinary research (see chapter 3), this normative target has to be open for participatory re-negotiation by all actors and interest groups affected by this definition.

Moreover, the normative target of Food Sustainability as defined here has to be linked with transformative knowledge on how to reach such an ambitious goal. Transformative knowledge in turn depends on system knowledge that analyses the current state of Food Sustainability. Systems

knowledge and especially the transformative knowledge might be contested as well and as such have to include different scientific and non-scientific perspectives through a transdisciplinary process. In the next chapter I describe various approaches to generate and structure systems knowledge on food systems.

2.3 Food System Sustainability

The last chapter has shown which aspects or dimensions Food Sustainability includes. This chapter deals with Food System approaches to analyse Food Sustainability. Different concepts of Food Systems have been developed to consider the multidimensionality of Food Sustainability. Such comprehensive concepts of Food Systems apply inter- or transdisciplinary Systems Theories[17]. Thereby, Food Systems are generally described as systems that are responsible for the flow of goods from food production through food processing and distribution to food consumption or utilization of food (for a detailed description of these processes see Ericksen 2008). Some authors add input provision or waste management and nutrient recycling to this food provision chain (see, for example, iPES Food 2015). Others further distinguish between distribution and acquisition or consumption and digestion (see, for example, Sobal et al. 1998, Tendall et al. 2015, Gillespie and van den Bold 2017). To consider these additional aspects, the flow of goods of a food system can be described as consisting of input provision, production, processing, distribution and access, consumption and digestion, as well as waste management and nutrient recycling (see figure 1).

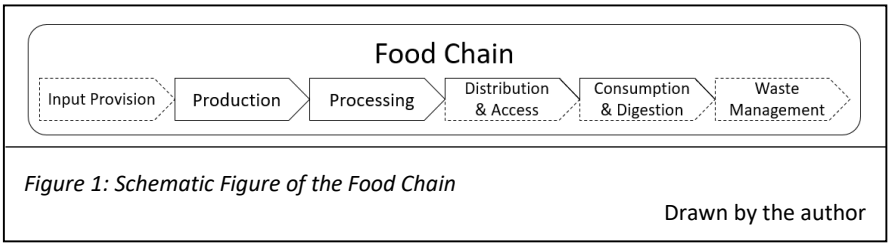


Figure 1: Schematic Figure of the Food Chain

Drawn by the author

The activities causing this material flow or food chain are subsumed by Rastoin and Ghersi (2010) under the term *operational subsystem* (*sous-système d'opération*). According to Rastoin and Ghersi a food system does not only consist of activities, but also of institutions and information. Thus, they further distinguish a so called *decision subsystem* (*sous-système de decision*) that encompasses public and private institutions that guide actors' decisions for activities in the *operational subsystem*. As this is actually more about institutions guiding decisions, I call this subsystem *institutional subsystem*. Furthermore, according to Rastoin and Gheris, an *information subsystem* (*sous-système d'informacion*) describes knowledge and information required to carry out food system activities. With regard to

[17] Systems theories conceptualize a topic as a set of interrelated and interdependent parts or subsystems that function together as a collective unit that is more than the sum of its parts. Systems are demarcated from their environment by a clear cut but permeable boundary. Systems theories aim at combining different disciplinary perspectives (Boulding 1956, Lilienfeld 1978). The use of system theories to conceptualize a topic is not uncontested. Various authors criticise that the definition of a system is generally perceived as an unpolitical scientific process. However, the definition of system parts and boundaries has political implications and the perception that the definition of a system is a scientific process should not hide the fact that the framing of a topic is highly political as well (see Bollig 2014).

ecological aspects of food system sustainability, an *agro-ecological subsystem* should be added to these three subsystems proposed by Rastoin and Ghersi. The *agro-ecological subsystem* describes ecological processes. The prefix "agro" highlights that these ecological processes are greatly affected by human activities.

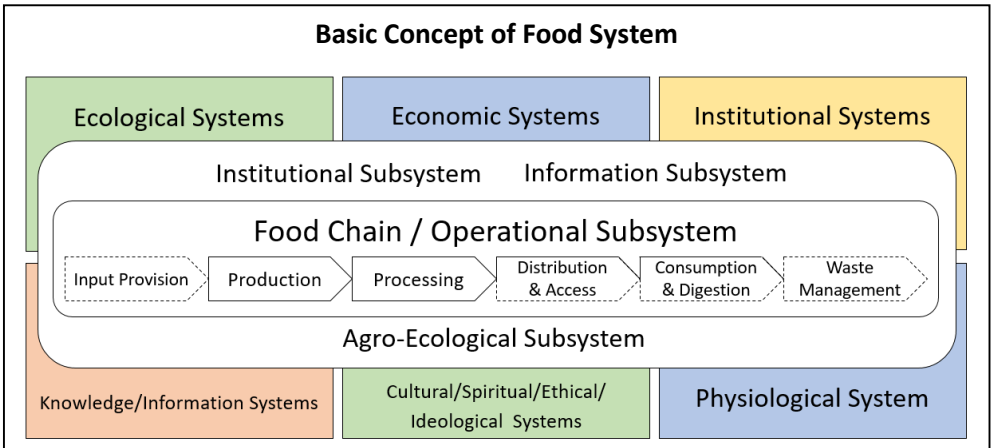


Figure 2: Schematic Figure of the Basic Concept of Food Systems
Depending on the author, the number or definition of Systems in which the food system is embedded is different. It is important to note that all systems are interlinked with and affect each other. Drawn by the author

Various authors describe the four subsystems (or generally food systems) as embedded in a broader social and ecological environment that consist of different variables, spheres or systems. Depending on the concept, the embedding environment consists of a simple social and bio-physical sphere or more complex embedding systems.[18] Systems of the embedding environment are linked with each other through local, regional and global processes. Moreover, these systems are interlinked with the food system. As such, food systems, or components of it, are part of these embedding systems but they do not constitute the entirety of these systems. For example, the Agro-Ecological Subsystem of a Food System consist of specific ecological processes. These ecological processes are part of broader Ecological Systems (e.g. breeding crops, irrigating the land or producing waste is part of the Agro-Ecological Subsystem, biodiversity, the provision of water and impacts on broader water availability, or the absorption of waste are only parts of embedding Ecological Systems). Another example are rules and regulations structuring interactions in Food Systems. They are part of the Institutional Subsystem of a Food System that is influenced by rules and regulations of broader Institutional Systems (e.g. the

[18] E.g.: Ericksen (2008) distinguishes between a bio-geo-physical and human environment in which a food system is embedded; Sobal et al. (1998) also distinguish between a bio-physical and a social environment with specific features. Rastoin and Ghersi (2010) do not describe an embedding environment as such but describe various variables that enter and leave a food system; Colonna et al. (2013) distinguish between four different contexts or systems in which a Food System is embedded: ecological, social, political and economic spheres; and in the iPES Food Report (2015) the authors focus on policies influencing food systems.

negotiation of conditions of employment (rules and regulations of a labour-arrangement) depends on power relations that are influenced by labour laws which are part of broader Institutional Systems).

For the concept of food systems shown in figure 2 I draw mainly on the concept of Colonna et al. (2013) who distinguish four embedding systems. I enlarged this concept to six embedding systems to include aspects mentioned by other authors that are not considered by Colonna et al. (2013):

- Ecological Systems encompass all aspects of the ecological environment, such as ecosystems, climate, soil, water regimes, biodiversity, etc., including agro-ecological systems, but not only (see Nellermann et al. 2009, Ericksen 2008). The constitution of ecological systems is greatly affected by their perceptions. A molecular biologist might highlight other aspects than a system ecologist, an agronomist, a farmer or an animist that understands the nature as permeated by spiritual beings.
- Economic Systems include global trade and credit systems as well as non-market oriented economic systems, e.g. economies on the basis of corporate kinship groups. Such non-market oriented economic systems do not follow the rational of microeconomic behaviour as described in neoclassical micro-economic models and thus, they do not follow directly the logics of the capitalist market. Non-market oriented economic systems are rather embedded in the social and cultural system in which they operate (see Plattner 1989, for further elaborations, see chapter 4).
- Institutional Systems include all forms of rules, regulations and norms from local informal rules to national and international laws.[19] Thus, the institutional systems constitute the rules of the game for interactions within and between food systems. Because the institutional systems are nothing naturally given but the product of negotiation between different actors these systems also include the power mechanisms that underlie the negotiation for the development and implementation of the rules, regulations and norms. Different institutional systems can also be contradictory and conflictive (see explanations by Ensimger (1992), Toulmin (2008) and Haller (2013), further discussed in chapter 5).
- Knowledge and Information Systems entail information, knowledge and know-how on farm practices, weather conditions, technologies, market prices for crops etc., and the sharing and generating of these knowledge, know-how and information within broader scientific or indigenous knowledge systems for example (Agrawal 1995).

[19] The analysis of the authors of the iPES Food Report (2015) on national and international policies that influence food systems can be located in this system.

- Cultural, Spiritual, Ethical and Ideological Systems describe religious and cultural systems (e.g. the concept of mother earth in Bolivia, see Delgado et al. 2010) as well as ethical principles (e.g. environmental ethics or animal welfare concerns, see Light and Rolston 2003). These systems greatly affect narratives and ideologies that influence power relations between different actors negotiating the content of the institutional system.
- To consider ingestion, digestion and health aspects, an important feature of Food Sustainability (see last chapter), the Physiological Systems of Food Systems describe physiological systems of the human body (Gillespie and van den Bold 2017, Sobal et al. 1998).

The description and illustration of food systems provided here combines different approaches to a thorough but surely not all-encompassing concept of food systems. Each author formulating food system approaches distinguishes, names, describes and highlights different systems that surround and interact with the food system.

In 1998 Sobal et al. published a paper with a first broad literature review on food system concepts. According to their analysis, Integrative Systems Theories have been used for decades for interdisciplinary analysis (Boulding 1956, Lilienfeld 1978, Miller 1978). Agricultural and farming system theories (Dalton 1975, Duckham et al. 1976, Spedding 1979) as well as ecological energy analysis (Steinhart and Steinhart 1975) were precursors of food system theories. As illustrated by Sobal et al. (1998), many terms have been used to describe food systems explicitly or implicitly (food system, food chain, food web, food path, food pipeline, food complex, etc.). However, only few studies using food system concepts actually applied a comprehensive system theory approach.[20] Most studies were disciplinary based and applied topic centred concepts to describe food systems by only looking at agriculture, food distribution or nutritional processes. Moreover, critical discussions or theoretical analysis of food systems as a concept were scarce (for examples of theoretical analysis and critical discussions of the concept, see Kneen 1989, LaBianca 1991, Tansey and Worsley 1995). Therefore, it is important to note that not all studies applying a food system concept apply a comprehensive concept that is needed to study the multidimensionality of Food Sustainability. In the analysis of Food Systems, Sobal et al. (1998) emphasize on the interactions between Food System activities that transform raw materials into food and health outcomes and the embedding social and biophysical environment. Thereby, they point at the importance of feedback loops and webs of relations between the food system and the environments. In comparison to agricultural and farming system theories or ecological energy analysis, Sobal et al. (1998) do not focus on production but consumption and use of food, including food acquisition, preparation, consumption, digestion, internal transport and metabolism.

[20] According to Ericksen, Norgaard (1984) was the first to describe "agricultural systems as co-evolved social and ecological systems" (2008: 237).

With this analysis, Sobal et al. (1998) conceptualize a Food System that includes production, distribution, processing, consumption and digestion of food. This last component adds a medicinal or somatic aspect to the food system analysis.[21] Moreover, it highlights the importance of studying the interactions between food system activities and the broader social and biophysical environment.

Polly J. Ericksen, a commonly cited author, further elaborated the multidimensionality of Food Sustainability by focusing on interactions between food system activities and the broader environment (Ericksen 2008, Ericksen et al. 2010). According to her analysis of food systems, it is important to recognise the dynamic nature of food systems and their embeddedness in the broader social, economic and ecological environment, which is shaped by food system outcomes and myriad "'cross-scale' processes and actors in different arenas and at different levels, e.g. from local to regional" as well as global (2008: 234). These processes make the environment dynamic, complex, and often unpredictable and risk prone. Embedded in this environment, food systems are indirectly affected by their own outputs (i.e. activities of stakeholders involved in the food system), by other food systems, and by broader social, political, economic and ecological changes (e.g. climate change, soil degradation, expansion of capitalist production, food price fluctuations or transformations in power relations). As such, they are "co-evolved social and ecological systems with mutually dependent and interacting social and ecological components" (2008: 237). Consequently, food system activities are governed by macro-level or structural features and at the same time, "individual actors affect change through their agency or maintain certain institutions by their actions. […] Thus although institutions [defined as the rules of the game] and structures govern people's actions, the structures are also modified over time as a result of individual actions" (2008: 237-238). These processes depend largely on the institutional setting, power-relations, agency, and legitimatisation (Ensminger 1992, Ribot and Peluso 2003, Haller 2013).

Ericksen (2008) distinguishes two types of food systems: 'traditional' and 'modern' Food Systems. 'Traditional' Food Systems are described as local food systems with short value chains, a small geographical range, family based and diversified production whereas 'modern' Food Systems are described as global food systems with long value chains, industrial production and processing of food and input and technology intensive monoculture production. There are power asymmetries between actors of so-called 'modern' and 'traditional' Food Systems. Generally, actors of 'modern' systems have better access to modern technologies, capital, infrastructure, markets, labour and land and related natural resources (Neumann 2009, Häberli and Smith 2014). This leads to a concentration of control over agricultural inputs and food chains by private companies, a commodification of agricultural

[21] Different studies draft comprehensive food system concepts with a focus on health outcomes (Gillespie and van den Bold 2017, Tendall et al. 2015, Global Panel on Agriculture and Food Systems for Nutrition 2014).

production and food chains, an intensification of agricultural production, an extension of food chains, changes in food consumption and a general marginalisation of actors of 'traditional' food systems. Moreover, Miguel Altieri (2005) warns that genetically modified organisms might replace the biodiversity of the traditional agriculture, what would further marginalise the 'traditional' food systems. This has ecological, economic and health impacts and again alters power relations within food systems (Ericksen 2008).

With the concept of Food Regimes as described above, Friedmann and McMichael (1989) also describe how the power to shape institutions with regard to food systems has been transferred from 'traditional' to 'modern' food systems' – or to capital owners, today mostly multinational agro-chemical and food companies that obey to market rationales. The International Panel of Experts on Sustainable Food Systems, headed by Oliver de Schutter and Olivia Yambi, explain in a report that was published in 2015 that despite power transformation towards capital owners, policy interventions still have a great impact. "Agricultural input subsidies, trade and investment policies, occupational, health and safety rules and labour inspections mechanisms, nutritional standards, land tenure regulations, energy subsidies, environmental regulations, public procurement practices, food safety regulations, social policies to provide subsidized food to poor communities or guarantee minimum wages to farmworkers, and different ways of informing and influencing consumer behaviour" affect food systems (iPES Food 2015: 4). However, such government interventions do not just exist but are created. How they are created is affected by power-relations. According to their analysis, power imbalances mainly emerge from economic inequalities and as such capital owners have again much power to influence national and international policies. With the concept of Food Sovereignty, La Via Campesina aims at returning the power to shape food systems and their rules and regulations from those earning money from these systems to those living therefrom, or from 'modern' to 'traditional' food systems.

In addition to the interlink complexity and governance issues of food systems, Ericksen (2008) addresses food system outcomes. She distinguishes three major outcomes: Food Security, ecological and social welfare outcomes. Her description of Food Security corresponds to the above presented concept of Food Security, including food availability on the basis of production, distribution and exchange; access to food, including affordability, allocation and social and cultural preference; and utilization of food, including nutritional values, social and cultural values and food safety. Ecological outcomes affect ecosystem stocks and flows and therewith ecosystem services and access to natural capital. Social welfare outcomes include income, employment, health impacts and therewith social, cultural and human capital – the livelihoods of affected people. Relying on Ensminger (1992), one could add here that food systems also affect power relations as well as ideologies and therewith the bargaining position of actors with regard to the institutional settings (see chapter 5). These outcomes

affect food systems again indirectly through feedback loops. However, it should be noted that food systems are not only affected by these feedback loops but generally by transformations in the broader social and ecological environment.

As such, Ericksen (2008) further elaborates interlinkages between food system activities and the broader environment. Thereby, she emphasizes the dynamic, complex, and often unpredictable and risk prone nature of this biophysical and social environment. Thereby, the environment is not only affected by social and biophysical food system outcomes but generally by myriad processes and actors that operate in different arenas at different levels from local to global. Embedded in this environment, food systems have outcomes that affect Food Security, social welfare and environmental security – or food system sustainability. Therefore, Food Systems should not only be analysed with regard to Food Security outcomes but all outcomes affecting different arenas at different levels. Generally, Erickson describes a transformation of food systems towards intensive agricultural production on large estates that increasingly depend on water for irrigation, agro-chemical inputs and hired labour, extended global value chains with power concentration by corporate companies and changed diets that cause malnutrition and obesity.

Tendall et al. (2015) combine the concept of resilience with food system sustainability. Food System Resilience describes "the capacity of the system to withstand and/or adapt to disturbances over time, even those which are unpredictable […], in order to continue fulfilling its functions and providing its services or desirable outcomes" (2015: 18). Disturbances can be external or internal, ecological, political, economic or social and they can occur suddenly, gradually or cyclically. Complex and dynamic interlinkages within and between food systems and their environment make disturbances often unpredictable and risk prone. Food Security as defined above is seen as the major service or desirable outcome of food systems. In addition, other food system outcomes with regard to Food Sustainability must be considered as well. According to Tendall et al., the various outcomes of food systems affect the resilience of livelihoods, agro-ecological systems, etc. that affect again the resilience of food systems. However, food system resilience is not an achieved stability or optimized state of the system but rather an inherent ability to continuously develop the capacity to "minimize food insecurity in a changing environment with recurring disturbances" (2015: 19). In addition, Michael Bollig (2014) notes that the use of the resilience concept implies the risk of applying a functionalist, narrow system-based perspective that does not consider power relations and agency. How a system is defined, what it's desirable outcomes are and what is responsible for a disturbance is often contested and politicised. Power relations that influence the definition of these aspects have to be taken into account to prevent

that resilience is appropriated by powerful actors to enforce their agenda over others.[22] Tendall et al. emphasize that an analysis of the resilience of food systems requires a transdisciplinary approach that includes different stakeholders. The concept of Food System Resilience as described by Tendall et al. is a core concept of Food System Resilience Project at the ETH World Food System Center.[23] With the concept of Food System Resilience, Tendall et al. focus on the stability of food system outcomes. For the concept of Food Security as described above, stability is an important feature of the availability, accessibility and utilisation of food.

Colonna et al. combine French (Malassis 1996, Rastoin and Ghersi 2010) and English (Goodman 1997) literature on Food Systems to draft a concept of co-existing Food Systems that "reflect different ways of producing, processing, distributing and consuming food products" (2013: 69). With their model, Colonna et al. further distinguish the bio-physical and social environment in which Food Systems are embedded. According to them, food systems operate in a social, political, economic and ecological context. Moreover, they enlarge the concept of food systems as chains that are characterised by the flow of material including all resources, institutions, practices and stakeholders that influence the provision of food for a specific consumer group. On this basis, they developed a set of structural, institutional and cognitive variables[24] to distinguish five ideal types of food systems. These ideal types of food systems are:

1) Domestic food systems that are characterized by the consumption within the producing unit. As such, domestic food systems describe the ideal type of subsistence farmers and are similar to the 'traditional' food systems described by Ericksen (see above).
2) Local food systems with a small geographical distance between producers and consumers, a small number of intermediaries and acquaintance between producers and consumers that ensures food quality.

[22] Referring to the debate on land grabbing, the use of resilience in discourses that obscure the acquisition of natural resources through powerful actors and the reduction of resilience of weaker actors is called resilience grabbing. A special issue on this topic will be published soon by Tobias Haller, Mariah Ngutu Peter and Fabian Käser in the Journal of Land.

[23] See: <www.resilientfoodsystems.ethz.ch/>, accessed August 30, 2017.

[24] Structural variables are: (1) geographical extension of food system, (2) number of intermediaries, (3) importance of processing, (4) product quality relative to its use, (5) number of functional/economic units at each stage of the food system, (6) consumption site and (7) storage methods. Institutional or organisational variables are: (8) organisation of work, (9) competitive and trade context, (10) role and forms of public action, (11) international integration, and (12) governance. Cognitive variables are: (13) product quality, (14) territorial relationship, (15) role and legitimacy of technologies (e.g. genetically modified organisms), (16) social considerations (e.g. Fair Trade, specific religious considerations, etc.), and (17) knowledge and control of culinary know-how regarding food preparation (Colonna et al. 2013: 83-84).

3) Regional food systems with a moderate geographical distance between producers and consumers of 100-1000km. This food system often links rural and urban areas through a manageable number of intermediaries that still interact on personal relationships.
4) Agro-Industrial food systems are defined by the production of food for mass markets, standardisation of products, high degree of industrialised processing, long chains of intermediaries and global systems. This type of food system shares many characteristics with the 'modern' food system as described by Ericksen (see above).
5) Differentiated quality food systems describe food systems that provide food with a specific quality. This quality can be heritage qualities (food with a specific origin), natural qualities (e.g. organic food), ethical or religious qualities (food that consider specific aspects, such as fair wages, animal welfare or religious commandments) or gustatory qualities (superior quality of special varieties or breeds, or specific forms of processing and preparation).

Similar to Erikson (2008), Colonna et al. (2013) observe a transformation towards agro-industrial food systems, but they emphasize on the prevailing importance of the other food systems. They argue that it is increasingly acknowledged (e.g. by Olivier de Schutter 2014) that local or differentiated quality food systems are important to ensure food security because the agro-industrial food systems could not ensure access to food for all or prevent various negative outcomes such as myriad negative ecological, economic, or health impacts, despite their contribution towards famine prevention, food safety and the creation of wage-work possibilities. Proponents of a promotion of local and differentiated quality food systems aim at avoiding negative environmental impacts, enhancing equity and maintaining or regaining collective decision-making power within a food system instead "of delegating this power to market operators or administrative structures" (2013: 90). Generally, they aim at developing more sustainable food systems but do not necessarily focus on the same aspects of sustainability. Feenstra (2002), for example, emphasizes that one can learn from communities that have already attempted to initiate more sustainable food systems. According to her, more sustainable food systems can be created by involving communities through public participation, new partnerships and commitments to principles that address social, economic and ecological justice.

Despite the potential positive contribution of such food systems to sustainability, Colonna et al. (2013) or Born and Purcell (2006) warn that one has to be critical as well. Short-distance food systems are not necessarily ecologically friendly, fair and participative or economic viable. The same holds for differentiated quality food systems. Specific geographical indications can make a food system more sustainable (e.g. through a higher remuneration of producers) but do not necessarily include ecologically friendly production or aspects of social equity (see Vandecandelaere et al. 2009). Organic labels often focus on ecological impacts of production (use of pesticides or biodiversity) but few

consider ecological impacts of transport or processing or social impacts, participatory possibilities or economic profitability of these food systems (see Getz and Shreck 2006, Schälle 2017). Similarly, Fair Trade can contribute towards Food Sustainability but does not necessarily cover all components of it. As such, alternatives to the expanding agro-industrial food system provide solutions for more sustainable food systems and might push agro-industrial food systems to become more sustainable.[25] However, alternative food systems do not necessarily covers all aspects of Food Sustainability as described above. Labels to classify the good performance of a food system in one aspect (e.g. the ecological performance of production) divert attention from other important aspects of Food Sustainability. Moreover, a label does not even guarantee a good sustainability performance in one aspect and some labels are also blamed for greenwashing or socialwashing food systems that have a very bad overall sustainability performance.[26]

The detailed analysis of different Food System concepts has shown that the study of Food Sustainability requires a comprehensive Food System concept, based on System Theory. Such concepts describe Food Systems as a food chain that are responsible for the flow of goods from input provision and production through processing, distribution and access to consumption, digestion and the management of waste. This chain covers all aspects of Food Security with regard to availability of food (input provision, production, processing and distribution), access of food (access), and utilisation of food (consumption, digestion and waste management). Thereby, it is important that studies balance their focus between availability, accessibility and utilisation of food.

The operational system is embedded in an agro-ecological subsystem and managed by an institutional and an information subsystem. This food system, consisting of an operational, agro-ecological, institutional and information subsystem is embedded in a broader dynamic, complex, unpredictable and risk prone ecological and social environment. As argued by Ericksen, Food Systems are as such "co-evolved social and ecological systems with mutually dependent and interacting social and ecological components" (2008: 237). To operationalise the interlinkages between the food system and the environment, also the environment can be divided into several systems: ecological systems; cultural, spiritual or ideological systems; economic systems; knowledge and information systems; institutional systems; and health systems. These systems affect each other on various levels from individual agency or small-scale changes to global transformation processes. Moreover, they are affected by and affect food systems' operational and organisational activities. This creates feedback loops between the food

[25] This can be seen, for example, in the case of Fair Trade or Organic Food. Such concepts have first been developed as alternative to the dominant agro-industrial food system but are today adopted into agro-industrial food systems.

[26] For example, the FSC label for ecological sustainable forestry or the MSC label for ecological sustainable fisheries are highly criticised (see, Greenpeace <www.grenpeace.org>, accessed April 20, 2018).

systems and their embedding environmental systems. Consequently, food systems activities are governed by macro-level or structural features as well as individual actors' agency and activities. Thereby, institutions that govern these interactions and power relations between different actors and actor groups are important to understand these interactions between macro and micro level interactions.

Various authors distinguish between different food systems. Colonna et al. (2013) elaborated variables to distinguish five types of Food Systems: Domestic Food Systems, Local Food Systems, Regional Food Systems, Agro-Industrial Food Systems and Differentiated Quality Food Systems. Generally, there is a trend from Domestic and Local Food Systems towards Agro-Industrial Food Systems. Nevertheless, Domestic and Local Food Systems globally still play an important role in feeding people and affecting social and ecological spheres. As a response to the rise of the Agro-Industrial Food Systems, Differentiated Quality Food Systems also gain importance.

To evaluate the Food Sustainability of such a Food System the diverse outcomes of interactions and interdependencies between components of a Food System and between the components of the system and its surrounding systems have to be scrutinized. Outcomes that are considered are located at different geographical levels and with regard to Food Sustainability should include influences on stability of food provisions, food accessibility and food utilisation, influences on the quality of food regarding health and cultural acceptance, impacts of the food provision and utilisation on other Human Rights and livelihood objectives, profit opportunities of companies, tax revenues for states or income as basis for individual livelihoods and resilience, impacts on the ecological environment, influence on ideologies, power relations and institutional settings and the ability of different actors to participate in the formulation of rules and regulations. The selection, which outcomes are to be considered, and generally how food systems frame topics, is not a pure scientific process but highly political. Therefore, power relations that affect the participation in the framing of such topics have to be considered as well.

To operationalise such a comprehensive and encompassing analysis of Food System Sustainability as well as for the generation of transformative knowledge on how to improve the Sustainability of Food Systems, various authors call for a transdisciplinary approach that includes academic approaches from different disciplines and non-academic perspectives (Hammond and Dubé 2012, iPES Food 2015, Tendall et al. 2015). However, most of these authors remain silent on how exactly such an inter- and transdisciplinary approach should be carried out in practice. The research project on Food System Sustainability, of which this Thesis is part of, has developed an approach to evaluate and improve the Food Sustainability of Food Systems. In the next chapter I describe transdisciplinary research approaches generally, how they are applied in the research project and my own research.

3. Transdisciplinary Research to Analyse Food System Sustainability

Transdisciplinary research aims at developing knowledge that helps to deal with problems that are related to sustainable development and are of importance to academic and non-academic actors. In this chapter I describe transdisciplinary research approaches generally, how they are applied in the research project on Food Sustainability (chapter 3.1) and how I used them in my own research (chapter 3.2).

To deal with complex problems that involve different fields, uncertainty and controversy, it is important to transgress disciplinary and scientific boundaries. Thereby, transdisciplinary research approaches combine perspectives, ontologies and methodologies of different scientific disciplines from natural sciences to humanities and include knowledge, experience and perspectives of different non-academic actors that are affected by or deal with these problems. As such, transdisciplinary research is interdisciplinary research that includes different academic and non-academic perspectives on often contested issues (Hirsch Hadorn and Pohl 2007, Herweg et al. 2012).

In transdisciplinary research approaches, three types of knowledge are differentiated: target knowledge, system knowledge and transformation knowledge. Target knowledge describes goals or how something should be. System knowledge analyses how something is and transformation knowledge shows pathways of how the current state of something can be transformed to approximate the defined goals. Mostly the goals are oriented on a common good, such as equity or intra- and intergenerational justice. All three types of knowledge, especially the target and transformation knowledge, are often contested. Therefore, already the framing of a problem or a topic is not a pure scientific, but a political process for which power relations and possibilities for participation have to be considered (ibid.).

Issues that are addressed through transdisciplinary research can be raised by academic actors through awareness creation or non-academic actors who approach scientists. Independently of whom raises an issue, it needs to appear of being important to both, academic actors from different disciplines and different non-academic actors. To carry out a transdisciplinary research project, common research questions and goals have to be formulated in a first step. Thereby, it is important that the different perspectives, concerns and opinions of all actors can be included and despite differences a minimal common ground can be found. Thereafter, disciplinary and interdisciplinary research can be carried out. This research has to include regular exchange and collective action with the different non-academic actors. Thereby, conceptual frameworks and methodologies have to be constantly developed and re-negotiated to include insights from research and possible transformations of the setting (ibid.).

Despite emphasizing the importance to include different academic and non-academic perspectives, literature on transdisciplinary research generally remains vague about how to identify, include and balance all the different perspectives and how to provide space for different actors to participate and include their perspectives in this process.[27] Reflections on participatory approaches for resource management and action research appear to be beneficial for a well-founded scientific analysis of this aspect.

Participatory approaches for de-centralised or co-managed resource governance (e.g. Community-Based Natural Resource Management (CBNRM) or the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) approach) are concepts that were developed and practically implemented to involve local actors in natural resources management and wildlife conservation. The goal of such concepts is to involve local actors to create ownership for conservation programmes and to gain their support. However, such programmes were often only based on a superficial knowledge of local perceptions of natural resources and institutions that regulated their use. This lead to false understandings of economic benefits and costs of such projects on a local level and of local expectations about political losses and gains of such projects. In addition, such projects were generally blind to power-relations within local communities and between local communities and outsiders. If no measures are taken to create arenas for participation of all actors, such approaches can lead "elite capture" whereby local elites or state actors appropriate the discussion and prevent participation of actors at lower levels. If this happens, such programmes are locally perceived as coming from outside or as being imposed from above through local elites or state actors. This in turn leads to opposition to such programmes by actors who feel excluded from negotiation processes. In retrospect, insufficient consideration of specific contexts and their perceptions by affected actors often explains failures of such programmes in practice (Haller et al. 2015, for critique of local resource management approaches see: Cook and Kothari 2001, Hulme and Murphree 2001, Blaikie 2006, Ribot et al. 2006, Galvin and Haller 2008, Haller et al. 2008, Mukamuri et al. 2009).

With the Constitutionality Approach,[28] new ideas are formulated on what needs to be considered to allow "actors' own active formulation and implementation of constitutional rules for resource governance" (Haller et al. 2015: 2). According to Haller et al., preconditions for such processes are "(a) emic perception of need of new institutions, (b) participatory processes addressing power

[27] Many studies argue that time and monetary constraints prevent a prior throughout analysis of the context in which a transdisciplinary research project is carried out (see for example, Leventon et al. 2016)

[28] According to Haller et al., "constitutionality refers to an institution-building process that highlights natural resource management initiatives from below, analysed from a perspective that emphasizes community members' views on participation, the strategies they employ in negotiating such initiatives, and the extent to which they can develop a related sense of ownership in the institution-building process for common pool resource management" (2015: 1).

asymmetries, (c) pre-existing institutions, (d) outside catalysing agents (fair platform), (e) recognition of local knowledge, and (f) higher-level state recognition" (2015: 13). If these conditions are met, conflicts over resource management can lead to institution building in which all affected actors participate and negotiate the constitutional rules for resource management. This does not necessarily lead to an equal integration of all actors or a win-win constellation, but to compromises that take into account power issues, local perceptions of the environment and senses of ownership, as well as local agency with specific notions of equity and fairness. Such an approach can, as case studies have shown, lead to more sustainable natural resources management (see Haller et al. 2015). In fact, with regard to sustainability, the application of the constitutionality approach is not restricted to re-negotiations of natural resource use arrangements but could be applied generally for the formulation of goals related to sustainable development. Moreover, it can be applied in the negotiation of other concrete arrangements as well (e.g. wage-labour arrangements, or the re-negotiation of institutional settings of entire food systems).

Transdisciplinary Research is insofar similar with participatory approaches for natural resource management that both deal with different perspectives on contested issues, existing power imbalances and the goal to improve a situation that is currently perceived as not sustainable. For the participation in transdisciplinary research projects for Food Sustainability, insights from the Constitutionality Approach show that it is crucial that participants need to recognize the importance of such a research project. Power asymmetries between different non-academic actors (and between different academic actors) and the role of pre-existing institutions must be considered. Where power asymmetries or pre-existing institutions might prevent a beneficial collaboration, strategies have to be found to prevent this. Moreover, the research must provide a fair platform that allows everybody's participation and recognises the different kinds of knowledge and perspectives. Last but not least, the participants must feel that the project is able to provide some change that is desired by the actors or benefits them.

3.1 Towards Food Sustainability

The transdisciplinary project "Towards Food Sustainability: Reshaping the Coexistence of Different Food Systems in South America and Africa" (in short: "Towards Food Sustainability") aims at implementing such a transdisciplinary research on food system sustainability. It is a six year funded Swiss National Science Foundation and Swiss Development Cooperation research project (2015-2021) that looks at how to improve Food Sustainability within and between food systems. It follows the rational that feeding the growing world population requires more than merely increasing productivity. The project aims at providing "evidence-based scientific knowledge for the formulation and promotion

of innovative strategies and policy options that improve individual and aggregate levels of food systems' sustainability" within and between food systems (Rist et al. 2014: 10). Thereby, food system sustainability is defined by five pillars: food security, right to food, reduction of poverty and inequalities, environmental integrity and social-ecological resilience.

- Food Security

  Food Security, as defined by the FAO (see definition in chapter 2.2), links stability of availability, access and utilisation food with "global change, […] e.g. climate change, global trends in trade and investment policies, and increasing competition over land and natural resources based on the needs to produce food and bioenergy while conserving biodiversity as well as on changing consumption patterns" (2014: 11).

- Right to Food

  With Human Rights and the Right to Food, principles of equity and social justice are included.

- Reduction of Poverty and Inequalities

  This dimension allows to evaluate how economic aspects contribute to the reduction of poverty and inequalities and what would be needed to improve this contribution with regard to "poverty reduction and growing incomes for rural people by improving overall conditions in terms of land rights, access to common–pool resources, rural people's organisational capacities for intervening in political arenas, and market mechanisms" (2014: 12).

- Environmental Integrity

  The concept of environmental integrity allows to assess biophysical aspects such as "greenhouse gas emissions, use of land, water, energy, fertilizer, and pesticides, and biodiversity conservation" (2014: 12).

- Social-ecological resilience

  Social-ecological resilience refers to the ability to cope or adapt "to environmental, socio-economic, or political pressure" (2014: 12)

According to this definition, Food Sustainability also has to consider general principles of sustainability such as "democratic participation in governance, economic viability and intergenerational equity" (2014: 12). As such, this definition is in general corresponding to the definition in this thesis (see chapter 2.2) but has a less explicit focus on participation and power-relations with regard to institutions.[29]

[29] For my Thesis, I use the definition of Food Sustainability as described in chapter 2.2, because this definition better addresses the aspects of Food Sustainability that are analysed in this Thesis.

To scrutinize how Food Sustainability within and between food systems could be improved, the project carries out empirical research about factors that influence Food Sustainability within and between different food systems that coexist in selected regions of Bolivia and Kenya.

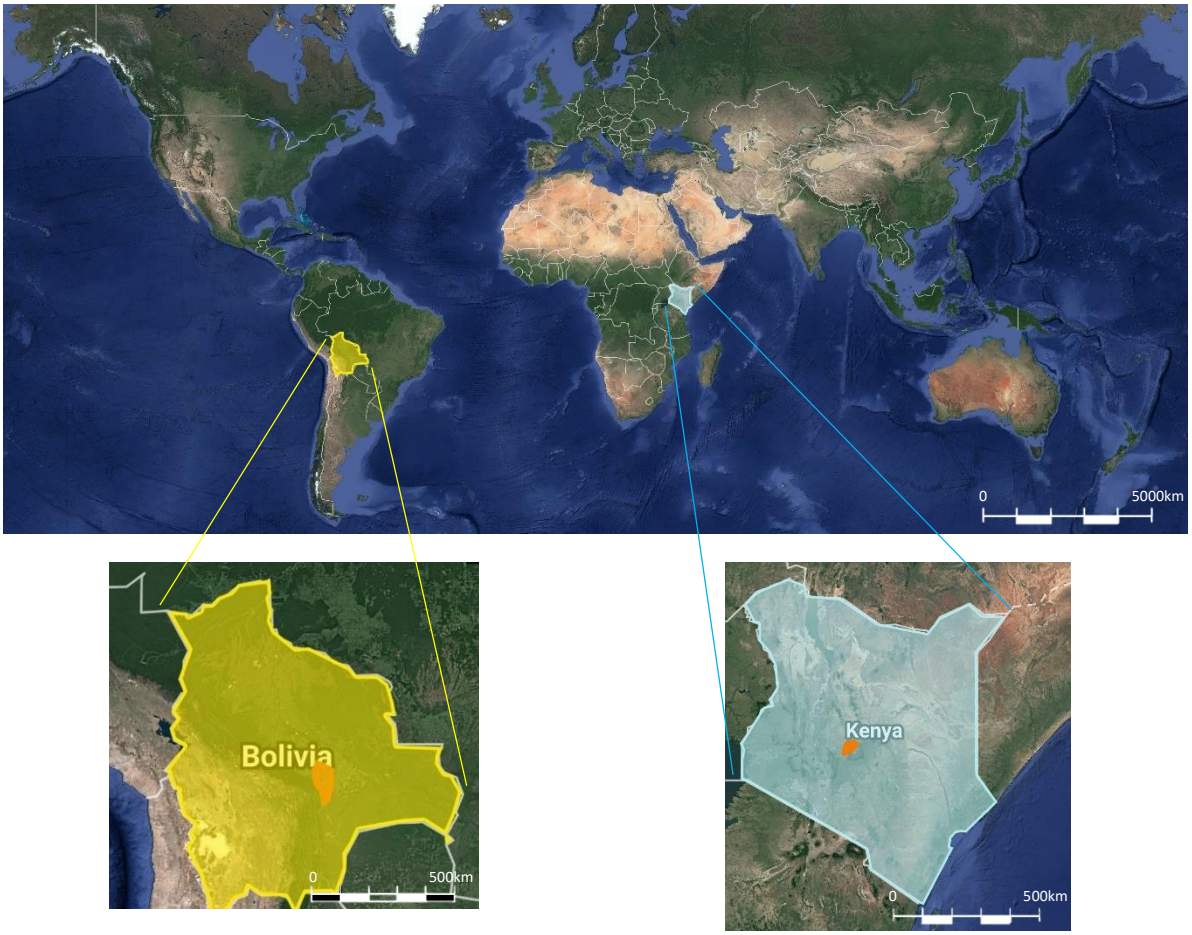


Figure 3: Maps of Study Area in Bolivia and Kenya
The selected study regions in Bolivia and Kenia are shown in orange. All maps are drawn by the author with GoogleMaps

Kenya and Bolivia had been selected for case study research because in both countries The Right to Food is well recognised at the national level but hunger and food insecurity were severe according to the global hunger index when the project set off (Bolivia 23,9 and Kenya 29,6 in 2008, see IFPRI 2016). Moreover, in both counties export-oriented food production for agro-industrial food systems coexists and competes with production for other food systems (Rist et al. 2014).

In Bolivia, the research project selected a region as case study area in the in the lowland department of Santa Cruz (see figure 3). In this region different types of food production, processing, distribution and consumption co-exist. Large-scale soy bean and food grain production for export occupies large areas and greatly expands into regions that were dominated by food production by indigenous Guaraní communities. Today, the traditional Guaraní production that was based on a milpa system and

reciprocity is increasingly assimilated into large-scale soy bean and food grain production for export. In this context of the expanding agro-industrial food system, some people try to establish new forms of alternative food production, processing, distribution and consumption. In addition to this food system diversity, the region has a high ethnic diversity with indigenous Quechua and Aymara peasants who moved from the highland of Bolivia to this region, local indigenous Guaraní communities and various groups of European origin (Rist et al. 2014, Schälle 2017, Heusser 2017).

In Kenya, the research project selected a region north-west of Mount Kenya as case study area (see figure 3). In the specific study region, export-oriented horti- and floricultural production for agro-industrial food systems coexists with different types of food production, such large-scale wheat and beef production, small-scale horticultural production as well as pastoralists' production, for local and regional food systems. Moreover, the study area shows a broad range of agro-ecological zones and people from different ethnic groups are living in this area (for a detailed description of the study region see chapter 7). Last but not least, research on related topics in this region has been carried out for many years and close scientific collaboration between the Centre for Development and Environment (CDE) and the Centre for Training and Integrated Research on Arid and Semi-Arid Lands Development (CETRAD) already existed before the project set off (see Rist et al. 2014).

In order to carry out this research, the project is sub-divided into five work packages (WPs) of which each is responsible for specific aspects:

WP1: Context mapping, trends, and space for democratic participation will (1) identify key external factors (laws, treaties, and economic, social, and environmental drivers) that have influenced the investigated food systems over the last 10–15 years, as well as related trends and their likely future development; (2) assess how these external factors impact on the policy space of the country or region concerned; and (3) identify innovative policy and legal options that contribute to an enabling environment for food sustainability.

WP2: Institutions, actors, and perceptions will work towards a better understanding (1) of how formal and informal institutions of public, private, and customary law transform and shape food-system-specific institutions and related patterns of interactions and power relations and hierarchies among key actors within and between food systems; (2) of how cognitive factors are expressed in actor-specific food system activities and their relation to risk and insecurity; and (3) on the outcomes of existing institutional configurations within and between food systems regarding human rights and especially the right to food.

WP3: Food system activities, value chains, livelihoods, and food security will strive to better understand (1) how specific food system activities shape the outcomes of individual food systems in terms of food security, the reduction of poverty and of inequality, as well as the right to food and other

human rights. This includes (2) the analysis of trade-offs between individual food systems co-existing in the same geographical area.

WP4: Environmental integrity and social-ecological resilience will (1) assess food systems' environmental integrity and (2) analyse how their environmental integrity and their socio-economic outcomes influence social-ecological resilience, and how this resilience is perceived by different actors.

WP5: Integration, policy options, and dissemination focuses on (1) the identification of most promising food systems in terms of their individual and aggregate contributions to food sustainability in a context of coexistence; and (2) assessing how innovations and novel policy options that increase collaboration within and between different food systems can help to raise levels of food sustainability. WP5 acts as a platform for integrating results from the other WPs and translating them into the development of a Food Sustainability Assessment Framework (FoodSAF) to be further applied, tested, and refined in other food systems in Bolivia and Kenya as well as in Brazil, Peru, Ghana, and Zambia. The FoodSAF will enable non-scientific actors to assess key problems of food system sustainability affecting them. It will also enable documentation of current best practices, help determine the conditions needed to scale up these practices, and help identify innovations that support transitions to more sustainable food systems. Transformative Pilot Actions will serve for jointly applying the FoodSAF in food systems outside the primary case studies with the aim of stimulating and enhancing societal and scientific debates and initiatives related to food sustainability.

(Rist et al. 2014: 10-11)

To carry out this project, researcher from various disciplines work together (human and physical geography, social anthropology, legal studies, economy, political economy and agro-ecology). These researchers are from four Swiss research organisations and diverse Southern partner organisations. From Switzerland, the Centre for Development and Environment (CDE), the World Trade Institute (WTI) and the Institute of Social Anthropology (ISA) from the University of Bern, as well as the Geneva Academy of International Humanitarian Law and Human Rights are involved in the project. Southern partners are the Agro-ecological Department of the University in Cochabamba in Bolivia (AGRUCO), the Centre for Training and Integrated Research on ASAL Development in Kenya (CETRAD) and diverse departments form the University of Nairobi in Kenya.[30] All of these organisations collaborate with further academic and non-academic actors such as farming communities, social movements, agribusiness, trade unions, public administration bodies and NGOs. Moreover, the project is supported by a scientific advisory board composed of Olivier de Schutter (former United Nations Special

[30] CDE: <www.cde.unibe.ch>, WTI: <www.wti.org>, ISA: <www.anthro.unibe.ch>, Geneva Academy of International Humanitarian Law and Human Rights: <www.geneva-academy.ch>, AGRUCO: <www.agruco.org>, CETRAD: <www.cetrad.org>, University of Nairobi: < www.uonbi.ac.ke>, all accessed September 14, 2017.

Rapporteur on the Right to Food), Renato Maluf (member of the FAO's High Level Panel of Experts on Food Security and Nutrition), Nadia Scialabba (responsible for the "Sustainability Assessment of Food and Agriculture Systems" framework and the FAO programme on organic agriculture and agro-ecology), Miguel Altieri (University of California), Jesse Ribot (University of Illinois) and Sonya Merten (Swiss Tropical and Public Health Institute).

Initially, the organiser of the project drafted the before mentioned Food Sustainability concept together with stakeholders from the different work packages and partner organisations. During regional meetings in Kenya and Bolivia, representative Food Systems were selected by the researchers and partners on the basis of the partners' knowledge and experience as well as short field excursions. In Bolivia, an agro-industrial food system producing soy in the Santa Cruz Department for worldwide export, a local food system of Guaraní communities and a differentiated quality food system for organic food that is produced in the surroundings of Santa Cruz and sold within the city have been selected. In Kenya, an agro-industrial food system producing horticultural corps and cut flowers[31] in the Region north-west of Mount Kenya for export mainly to European countries, a domestic and local food system of peasants living in the same area and a regional beef and wheat food system linking producers in this area with consumers within Kenya have been selected. On this basis, Master and PhD

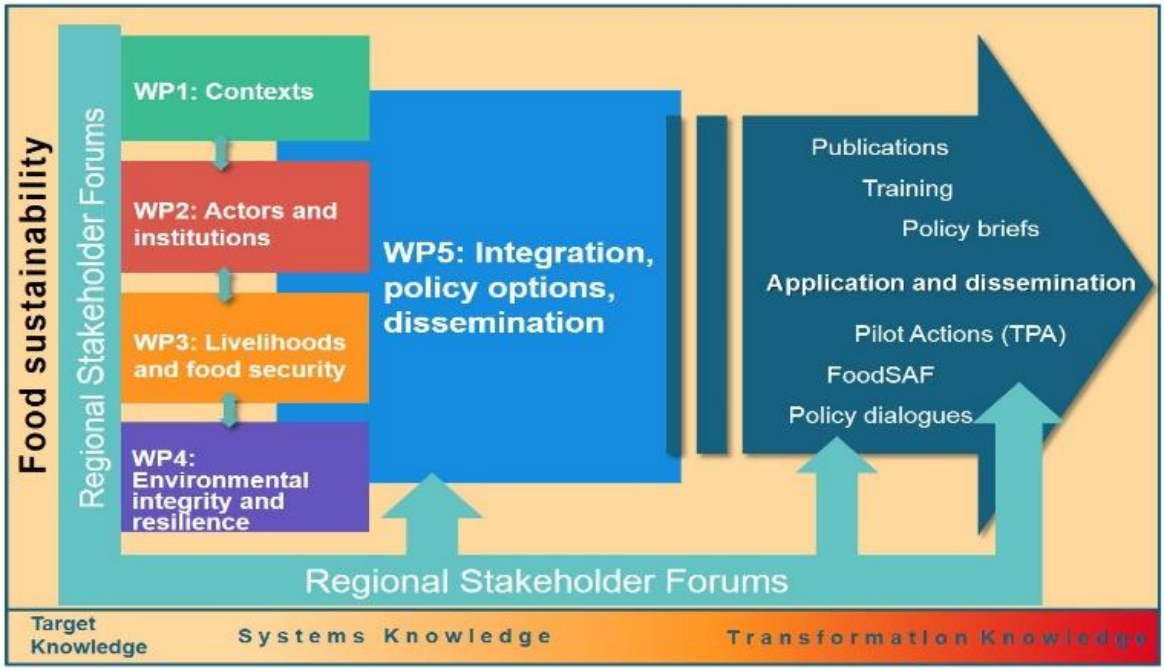


Figure 4: Schematic Figure of the Organisation of the Research Project "Towards Food Sustainability"
Source: Poster about research project by Johanna Jacobi printed in 2015

[31] With the exception that cut flowers are not eaten, they are handled very similar to horticultural crops in the way they are produced, processed, transported and retailed. Several floricultural farms used to grow horticultural crops initially and only underwent minor transformations when shifting to floricultural production. Since the focus of my thesis is not on agro-industrial production, I do not differentiate between horti- and floricultural production.

students from Switzerland, Kenya and Bolivia started to carry out research for the WPs 1-4 between 2015 and 2017. In addition to regular informal exchange, several meetings in Kenya and Bolivia facilitated some formal exchange between and within the work packages. On the basis of the formal meetings a table had been developed for WP 5. This table applies the Likert Scale (Allen and Seaman 2007) to compile the results from the research of the different work packages. In the next phase of the project (2018-2020), the findings from this analysis shall be applied in additional countries to analyse how the sustainability within and between food systems could be enhanced.

Regular participation of stakeholders aims at ensuring that the research project is not only interdisciplinary but also includes non-academic actors, as it is required for a transdisciplinary research project (see above). However, the selection of these actors and their opportunities for participation can be criticised with regard to insights form the Constitutionality Approach (see above). Stakeholders mainly represent heads of farming communities (if farming communities are represented at all), leader of social movements, managers of agribusiness, public administration principals and representatives from NGOs which do not necessarily represent all the affected actors. A previous throughout analysis of the specific context and requirements to include all affected actors' voices was not undertaken by the research project. Thus, despite a considerable effort to include researchers and partner organisations from Switzerland, Bolivia and Kenya as well as a great number of scientific advisories and to some extend stakeholders, at an initial stage of the project in which the parameters of the project were defined, we failed to include all affected actors in the project as it would be required for a participatory transdisciplinary research approach (e.g. the views and concerns of local input providers, small-scale producers or local consumers were not directly included).

3.2 Peasant Engagement in Food Systems in the Region North-west of Mount Kenya

In my own research, I analyse peasant engagement in food systems in the region north-west of Mount Kenya. My research is part of WP2 of the Food Sustainability Project, described above. The region north-west of Mount Kenya had been selected by the Food Sustainability Project because this region shows a broad range of agro-ecological zones, a great socio-economic and ethnic heterogeneity and important food production for different food systems co-exist in a small region. Export-oriented horti- and floricultural companies produce food and flowers for agro-industrial food systems. Large-scale wheat and beef farms produce food for national markets and export. Pastoralists and peasants produce food for self-consumption and sale to the national market.

I selected peasants for the focus of my study because they are important actors in most of the co-existing food systems in the region north-west of Mount Kenya.[32] Peasants produce food for self-consumption and sale. Therewith, they are stronghold in domestic, local and regional food systems. Moreover, some peasants grow food crops for export or work for companies growing food crops for export. These peasants are also part of an agro-industrial food system. To look at peasant engagement in these different co-existing food systems, I look at:

1) how these food systems influence economic activities[33] and generally livelihoods of peasants
2) and how peasants influence these food systems with regard to food sustainability through their activities and strategies.

To analyse how peasants' economic activities and livelihoods are influenced by food systems and how peasants influence food systems, I mainly look at institutional subsystems of food systems that influence activities of peasants and are affected by peasants' activities and. These institutional subsystems are embedded in complex interlinked and overlapping institutional systems (also called institutional settings) that are the product of historical transformations. Moreover, peasants are not a homogeneous entity engaging equally in food systems. Depending on their abilities, peasants have different possibilities to engage in and shape different food systems and their subsystems. Following an inductive research approach, I do not focus exclusively on institutional subsystem. Wherever it appears to be important I consider other sub-systems as well.

Looking at actors' engagement in food systems and how this is shaped by and shapes food systems' institutional systems requires an inductive and ethnographic research approach that can consider the heterogeneous and possibly unforeseen engagement of actors in food systems. With such an inductive ethnographic research approach I apply a research approach that includes different actors' perspectives as it is called for in transdisciplinary research (see chapter 3).

With the focus on peasant engagement in food systems, I show how food systems in the Mount Kenya Region operate, co-exist and which elements they contribute to each other from a peasants' perspective. Thereby, I adopt the focus of WP2, looking at institutions, actors and perceptions. With my approach, I do not analyse food systems as how they are theoretically thought, but as how they are practically experienced by selected involved actors. This allows to uncover aspects of co-existing food systems and co-existing food system interlinkages that are important in practice but might not

[32] Other important actors in these co-existing food systems are studied by other researchers of the Food Sustainability Project. Mariah Ngutu Peter (Ngutu Peter 2017, 2018, Ngutu Peter et al. (n.d.)) looked at labourers in large-scale horticultural production, Edwin Ameso (2016) looked at pastoralists in food systems in this region, Balthasar Teuscher (2017) looked at peasants in out-grower schemes.

[33] Economic activities describe all activities related to making a living – in this case mainly small-scale peasant crop and livestock production but also other agricultural and non-agricultural economic activities.

had been thought of in theoretical approaches or do not fit theoretical categorisation. This allows to critically review the concept of food systems and their sustainability and to adjust theoretical constructs to the experiences in practice.

My analysis of peasant engagement in the co-existing food systems is strongly linked with and contributes to research of other WPs of the research project “Towards Food Sustainability”. It helps to understand how food systems in the Mount Kenya Region are interlinked, which elements of a Food System contribute to other Food Systems, how rules and regulations influence interactions within and between Food Systems and how they influence other dimension of Food Systems, such as national and international policy spaces, laws and treaties (analysed by WP1), value chains and their impacts on livelihoods and food security (analysed by WP3), as well as the environmental integrity (analysed by WP4).

To understand peasant engagement in co-existing food systems, I first describe different theoretical approaches to describe the role of peasants in food and other systems. Therefore, I summarise the most important theories describing, analysing, classifying and understanding peasant economic activities. In addition, I summarise the most important theories on how institutional settings and their perceptions influence economic and food system relevant activities of different actors and how different actors’ activities and strategies influence these institutional settings. Equipped with this background, I analyse in ensuing chapters how economic and food system relevant activities of different peasants in the region north-west of Mount Kenya are affected by the various food systems’ institutional systems and these systems are affected by peasants’ and other food system relevant actors’ activities and strategies.

4. Peasant Theories

Rural people and their economic activities are described from different theoretical angels. Thereby, economic activities describe all activities related to making a living, such as earing money to buy food or producing food for self-consumption. Different authors defined and labelled rural people differently as peasants, smallholders, small-scale farmers, etc. For my Thesis I have chosen the term peasants. I perceive peasants as members of a group of rural people with the ability to perform agricultural production. This agricultural production covers, alone or in combination with other economic activities, the subsistence needs of the producing unit that is commonly the peasant household.

Peasants (or societies with features of peasantry) and their economy, culture, institutional settings as well as their links to societies with other economic features have ever been a topic of research, especially in social anthropology. From a formalist neoclassical microeconomic point of view, peasants, alike anybody else, are perceived as rational economic men. Their economic activities are embedded in the market. Thus, formalists do not have a specific theory to explain peasant behaviour. A peasant farm follows the logic of any other company (Plattner 1989). This neoclassical perspective on peasants is criticised in many ways. Chayanov (1966 [1925]) and Lipton (1982 [1968]) argue, also from a microeconomic perspective, that peasant behaviour is different from the generally assumed profit maximisation of economic actors. Chayanov argues that peasants do not aim to maximise benefits but minimise work. Lipton states that peasants cannot maximise benefits because they have to minimise losses. From a substantivist perspective,[34] economic activities are embedded in social institutions (e.g. kinship or religion) and economic activities are not only based on exchange but also on reciprocity and redistribution. Substantivists do not deny that market oriented economic activities exist, but they emphasize that they are not the only form of economic activities (see Dalton 1961). From an evolutionistic perspective, peasants are generally perceived as economically underdeveloped backward people whose persistence in tradition potentially treat hoped for development within unilinear teleological development models (see Marx 1962 [1867], Engels 1884, or Rostow 1960). From a cultural ecological perspective peasant societies are perceived as a form of adaptation to the ecological environment (see Steward 1955, Rappaport 1968). At the other hand, some authors argue that peasant can also change the ecological environment (see Boserup 1965, Haller 2001). Other authors describe the difference of peasants with cultural features of their society (Wolf 1957, Foster 1965). Last but not least many authors describe peasants as part of a larger world in which they have a specific position (see Frank 1969, Wallerstein 1974, Meillassoux 1975, Barlett 1977, Cancian 1989, Roseberry 1989). All these perceptions of peasants are further explained on the next pages to provide

[34] For a thorough comparison of formalist and substantivist positions see Wilk and Cliggett (2007).

a well-founded overview on these theories as basis for an understanding of peasant engagement in food systems in the region north-west of Mount Kenya from different perspectives.

4.1 Peasants in Neoclassical Microeconomics

From a neoclassical microeconomic perspective, peasants are as every other human being perceived as rational economic actor that seek the optimum of satisfaction. This premise does not call for a specific theory to explain peasant behaviour. The general concept of utilitarianism explains how people, as 'economic men', maximize their satisfaction in a world of scarcity.

Following this rational, neoclassical micro-economic models were applied to describe farm production models in a great number of economic textbooks such as the volumes of Heady (1952), Upton (1976) or Ritson (1977). According to Frank Ellis, the application of neoclassical micro-economic theories to farm production follows the basic assumption that peasants are "efficient producers in the neoclassical sense [because they are] profit maximising economic agents" (1988: 77). Profit must not necessarily be a sum of money but can also be a sum of goods that have no monetarised value (e.g. if produced food is self-consumed). To understand, how peasants satisfy the needs of the household, mainly the economic performance of the farm as a business enterprise is at the focus of analysis. To conceptualize farms as firms, studies look at production functions (the varying level of output corresponding to different levels of variable inputs), techniques of production (the varying combination of two or more inputs required to produce a specific output) and enterprise choices (the choice between outputs that can be obtained from a given set of farm resources). As such, farms are analysed as any other business enterprise in neoclassical economic studies with theories that are based on the utilitarian principle of profit maximisation. According to this approach, economic activities in domestic, local or alternative food systems can be analysed with the theories that are used to analyse economic activities in regional or agro-industrial food systems. By looking at value chains and their outcomes many studies apply a universal theory to study economic activities in different food systems.

Two authors used distinctive micro-economic explanations why this neoclassical model of farmers falls short. Chayanov (1966 [1925]) explained that peasants are different from other economic actors as they are not satisfied by a maximised profit but by a minimized work. On the other hand, Lipton (1982 [1968]) explains that peasants do not seek a maximal profit but a maximum for security of the minimum required profit.

According to Alexander Vasilevich Chayanov (1966 [1925]) peasants' motivations differ from the profit maximising rational of neoclassical microeconomics.[35] Based on surveys on the peasantry by the Russian provincial administration Chayanov developed a theory of peasant behaviour at the level of the individual peasant family. He explained that peasants aim at securing the needs of the family but disguise the work that is necessary therefore. Farm work is a necessary evil to cover the needs of the family. Once the needs of the family are covered no additional manual labour is needed and thus avoided even if profits could be maximised. However, the needs of the family change over time and peasants might temporarily even accept self-exploitation to ensure covering the needs of the family. With changing family needs the amount of work and land use of a peasant family change. If a peasant family has children, the needs of the family increase by the increased number of consumers. This increased needs result in an increase in work and land requirements. The adult family members have to work more to be able to cover their needs and the needs of their children. Therefore, the consumer-worker ration increases. Once the children are able to also work in the family-farm, the required work to cover the family needs can be shared among more people and the consumer-worker ratio reduces again. Finally, once the children found their own families, the family needs reduce and therewith the work and land requirements. According to Chayanov, this family cycle is responsible for different land estates by peasant families at different stages of the family cycle. The table on figure 5 shows a schematic family cycle with the needs of the family represented with the number of consumers, the number of workers and the work load of every worker (consumer-worker ratio) at each stage of the family cycle. Araghi summarizes Chayanov's theory as that "in a peasant economy, therefore, a peasant's aim is not to maximize profit, for he or she is not, to use Weber's term, a 'rational' actor. Instead, peasants aim at maximizing the satisfaction of family needs to the point that their subjective distaste for manual labour outweighs the possible increase in output" (1995: 343). In contrast to

Years married	People present*	Consumers	Workers	Consumer/ Worker Ratio
1	H-W	2	2	1.0
5	H-W-C	3	2	1.5
10	H-W-C-C	4	2	2.0
20	H-W-C-C	4	3	1.3
25	H-W-C	3	3	1.0
30	H-W	2	2	1.0

* H = Husband, W = Wife, C = Child

Figure 5: Simplified Model of Chayanov's Family Cycle

[35] According to Basile Kerblay (1971), Chayanov formulated his theory of peasant economics as critic to the assumption of Marx (1962 [1867]) and Lenin (1899) that peasants are at a preliminary stage to capitalism. Marx and Lenin assumed that peasants ultimately become agrarian capitalists or so called petit bourgeois who own the soil as mean of production to employ and exploit labourers.

economic men that aim at maximising their profit or satisfaction, subsistence peasants only work to cover the family needs but not to make profit.

Authors that criticise Chayanov's theory argue that this form of peasantry might have existed in specific historical and geographical contexts in which farm products could not be sold and thus had no additional value to peasants (e.g. during the broken down world market after World War I). But such a situation does not allow to draft an ahistorical model of peasant economy (Araghi 1995). Nevertheless, Chayanov's theory shows that economic activities do not necessarily follow the utilitarian premise of maximising profits or satisfaction. Economic activities can also follow the rational to secure subsistence needs. Such activities aim at covering the needs to maintain the economic unite (the peasant family) only. Lipton further elaborates a theory to explain why subsistence oriented economic activities do not tend at profit maximisation.

Similar to Chayanov, Michael Lipton (1982 [1968]) criticizes the neo-classical assumption that all humans aim at profit maximising. While Chayanov explains the peasants' difference from the profit maximising rational with their distaste for work, Lipton explains difference with risk minimizing strategies that influence individual decisions of peasant behaviour.[36] Lipton developed his theory on the basis of field-work which he carried out in the 1960s in Kavathe, a rural Indian village. According to Lipton, the vicious circle of poverty keeps peasants in this village in poverty. Peasants could not invest in production that provides higher profits because they had to spend everything they earn from farming in securing their survival. Peasants at the margin of survival have to ensure to gain the minimum required for survival. Under this condition, peasants cannot seek maximum profit but have to maximise the safety of a minimum harvest required for surviving. In such a situation, they cannot afford even a little extra risk to enhance profit if this reduces the security to harvest the minimum required for survival. This strategy to minimize maximum loss (the loss of their basis for survival) or to maximize minimum profit is called minimax-strategy. Such strategies include intercropping diverse plants instead of planting a high-yielding crop to ensure that under whatever weather and market situation they are able make some little benefit. If peasants are a bit better off, they might apply strategies to enhance profit, but still in an interplay with risk-minimizing strategies. In addition to this vicious circle of poverty, other non-economic determinants, such as literacy, freedom from dysentery, access to technical advice etc. determine farming activities of peasants.

The theory of the minimax-strategy of Lipton shows that economic actors might not only prefer subsistence oriented economic activities over utilitarian profit maximisation because they dislike work,

[36] In the book chapter Lipton also mentions cultural aspects, such as land inheritance regulations, that affect peasants' economic activities. The role of cultural aspects for peasants' behaviour is further discussed later in this chapter.

as explained by Chayanov, but because they need to secure their subsistence needs.[37] The risk to fail in covering the subsistence needs of the producing unite prevents from striving for profit maximisation.

Chayanov and Lipton both use individual rational choice theories (minimizing the work, maximising the security of a minimum required profit) to explain individual economic decision that explain differences of peasant economic activities from the utilitarian principle of profit maximisation. With regard to food system theories, one can argue that actors in different food systems follow different rationales when engaging in food systems. Some might aim at maximising profits. Others might aim at minimising drudgery or risks. These different rationales of actors challenge the assumption that economic activities can be studied with a universal theory. Why different actors have different rationales for their economic activities had been described by adherents of substantivist theories. They analyse the cultural, economic or ecological environment of peasant societies to explain the differences of peasant economic activities compared to economic activities of other actors. In evolutionistic models, differences of peasants from other groups are explained with the peasant societies' stage of development. An examination of these evolutionistic approaches helps to understand persisting narratives of development and development aid that are important in sustainability discourses.

4.2 Peasants in Evolutionary Theories

Classical cultural evolutionistic models describe systematically the evolution of mankind. In classical cultural evolutionistic models, peasant societies (or the people that were later described as peasants because they mainly engaged in food production for subsistence needs) are in the classification between savage societies, consisting of hunter and gatherers and civilized societies showing a high degree of economic specialization. Lewis Henry Morgan, one of the founding fathers of professional anthropology, described in his 1877 published book "Ancient Society" an evolutionary model of mankind. According to such a cultural evolutionistic model, all cultures are developing the same way, from savagery through barbarism to civilization. Contemporary cultures with similarities to prehistoric tribes are according to this model still at the same evolutionary stage as these groups. "The art of subsistence" – or economic activities, based on intellectual, kin and property characteristics, provide the features to distinguish between the different stages of evolution. Savagery is characterised by hunting and gathering activities, barbary by the domestication of animals and plants and civilization by modern technology of farming and craft. Already Ancient Greek philosopher Aristoteles described a theory of economic development from hunting and gathering over pastoralists to agricultural production. This cultural evolutionistic approach has been adopted in various approaches to explain

[37] Subsistence needs do not only cover nourishment but can also include school fees, costs for healthcare or taxes. Therefore, covering subsistence needs might also require the earning of some money.

the latest economic development. Engels (1884) and Marx (1962 [1867]) developed their Marxist theory of the historic materialism with a capitalist and finally a communist development stage as addition to Morgan's model of cultural evolution. Rostow (1960) developed his neo-liberal model of five stages of economic growth to explain the development from traditional societies to the age of high-mass-consumption. According to all these cultural evolutionistic models, peasant societies have not made their development to the stage of modern societies but are expected to make this step at one point in time, replacing their peasant way of life with a modern way of living.

The idea of a stratification of societies with superior, modern or civilized societies that are above, uncivilized, barbaric or underdeveloped societies persisted through time. This was, and still is, used to legitimize the subordination, colonization or forceful incorporation of subordinated societies, such as peasant societies.

Peasants in Marxist Theories

The cultural evolutionistic model, as described by Morgan, is also applied in Marxist theories. Karl Marx (1962 [1867]) and Friedrich Engels (1884) describe an evolutionistic model based on the theory of historic materialism. According to this theory, the basis of a society consists of a mode of production with its material means of production, labour and relations of production. The superstructure of a society consists of legal and political institutions that emerge from and consolidate the mode of production. However, the mode of production evolves over time. If it evolves to a pint where it contradicts with the superstructure, the superstructure is overthrown.

Marx (1962 [1867]) distinguishes different stages of modes of production: primitive communism, slavery, feudalism and capitalism. In this model, peasants are assigned to the stage of feudalism, also existing aside of capitalist societies to which they become integrated as agrarian or small capitalists.

According to Marx, hunting and gathering societies are characterized by a low degree of productive technologies, little labour division, limited productivity, common ownership, and egalitarian social relations. These societies represent the primal stage of primitive communism. The Neolithic domestication of animals and plants resulted in increased productivity. People were able to produce more than they needed. This surplus production allowed to store food for times of crisis and to feed a ruling class that was no longer directly involved in production but the management of the surplus production. A ruling class developed and egalitarian societies became class societies. With the division of labour, people did not only start to do different jobs but some became able to acquire the fruits of the production of others through the control of the means of production. Superstructures to protect private property and to legitimize the ruling class evolved.

In Ancient societies, slavery developed as another form of class society. Through warfare and debt-bondage, people became slaves whose surplus production was acquired by their masters. Legal and political institutions regulated and maintained this mode of production (e.g. in the Ancient Rome legions were sent to quell slave rebellions).[38]

In feudal societies, aristocrats were the ruling class, owning the land and commanding peasant serfs that could use the land for their own production. Similar to slave societies, aristocrats were able to appropriate the surplus production of serfs. The superstructure, consisting of legal and legitimising components, emerged from and preserved this mode of production. Increasing productivity through agricultural innovations and the industrial revolution caused again a change in the mode of production.

Through land privatisations, in combination with agricultural innovations and the replacement of home manufacturing by industrial production, rural people were separated from their means of production. Marx called this process primitive accumulation. Though, through such processes, rural people lost their sources of income and became proletarians, people who do not own any capital or property to invest in production. Proletarians are left with no other choice than selling their bare labour force to capitalists – those owning the means of production. However, in this capitalist mode of production, not all proletarians find an employment as labourer because the need for labourers is gradually replaced by improved production. Production can be improved through the investment of accumulated capital in technical means. Proletarians who are not or only sporadically employed by the capitalistic production form the so called 'reserve army of labourers'. The existence of a reserve army of labourers leads to competition among the proletarians to find employment. The dependence on employment with lack of employment offers forces active workers to accept rigorous exploitation by the capitalist production, i.e. maximal working hours for minimal salary.

The privatisation of common land and common pool resources, an important mean of production for rural people, is called enclosure. Such processes were often backed, carried out and promoted by the state.[39] According to Marx, the expropriation of the peasantry in Great Britain from the 16th century onwards represents the first and purest form of primitive accumulation but through the commodification of natural resources, enclosures and primitive accumulation occur all over the world up to the present day. Enclosures of common pool resources often happen without accurate inclusion and compensation of people who formerly depend on these resources as means of production. With the appropriation of land and associated natural resources for capitalist production, people who formerly used these resources as means of production in a non-capitalistic economy are separated

[38] Marx refers to slave society only in the context of ancient societies (cf Marx 1962 [1867]).

[39] The institutional transformations converting communal land and natural resources regimes into state property and private property regimes are explained in depth by Haller (2013) and later on, in chapter 5.2.

from these means of production and their non-capitalistic economy is weakened by lost access to important natural resources. If these people become proletarians, they are forcefully integrated into a capitalist economy. As shown in chapter 4.5, the non-capitalistic economy might persist and subsidises the capitalist mode of production despite its impairment through the same.

David Harvey (2003) and Saskia Sassen (2010) show that through the commodification of natural resoruces the processes and features of primitive accumulation have remained powerful up to the present day. While new forms of primitive accumulation or in Harvey's term "accumulation by dispossession" have emerged,[40] processes of primitive accumulation as described by Marx still exist (e.g. recent land acquisitions by multinational companies that is also called land grabbing).

Marx (1962 [1867]) anticipated a further last evolutionary step caused by increased exploitation and inequality inherent to capitalist production. According to him, the exploitation of the proletarians will cause a revolution that overthrows capitalism to create an egalitarian modern communist society. In the aftermath of the October Revolution in Russia, Lenin tried to implement a communist society in Russia. Other states followed leading to a division of the world into capitalist and communist societies.

As described in the Marxist model of evolution, peasants have not yet developed to capitalists but will inevitably do so. According to Engels, a peasant, "like every other survival of the past mode of production, is hopelessly doomed. He is a further proletarian" ([1894] 1977: 460). Once a landowning class of peasants controls the means of agricultural production and employs landless labourers to work on their farm based on capitalist modes of production, landowning become agrarian capitalists. To avoid an evolution of peasants into capitalist land-owners and proletarians, Lenin (1972 [1918]) proclaimed a direct integration of peasants into communistic modes of production – what was later forcefully implemented.[41]

According to Netting (1993), this predicted transformation of rural societies into land-owners and wage workers did not necessarily take place when they were integrated into market economies. Despite inequalities existing among peasant families, there is no rigid class stratification. For example,

[40] E.g. "patenting and licensing of genetic material" or "the corporatization and privatization of hitherto public assets" (Harvey 2003: 147-148). According to Sassen (2010), today's primitive accumulation goes even further by consolidating an advanced capitalism that strengthen the dominant position of capitalism and excludes people from traditional forms of capitalist production, for example, through adjustment programmes imposed on countries by debt-service regimes.

[41] Better-off peasants, so called kulaks were expropriated by the state and large-scale collectively organised and state controlled agrarian production was implemented, leading to the long-term Soviet agricultural crisis (Davies 1980, Shanin 1990). According to Netting (1993), the failure of this form of collectively organised large-scale production and the more successful family based agricultural production mode of Chinese Communism Agricultural Reform shows that the household or family as productive unit is much more successful than collective organization of agricultural production.

in the case of Swiss rural villages, mobility up and down the economic scale exists without preventing the development of a clear-cut class society.

According to Murray Tania Li (2011) who analysed more recent forms of primitive accumulation as a result of recent land appropriations by multinational companies, she argues that most rural people would welcome a transition from more subsistence-based pre-capitalist mode production to well-paid secure wage labour in a capitalist mode of production. However, in the current economy, such wage labour is rare and as she notes, "what makes it hard for landless people to accept their de facto proletarian status is that there is no sign that they can move into a proletarian future" (2011: 296).

Marxist theories explain how the capitalist mode of production developed, how it operates and how it leads to exploitation of the proletarian class through the capitalist class. Thereby, peasant societies are conceptualized at a preliminary stage to capitalistic class societies. This does not mean that peasant societies do not know exploitation, but exploitation is not based on a class structure. Marx, Engels and Lenin expected an unavoidable transformation of peasant societies into class societies. However, the persistence of non-capitalistic forms of peasant production alongside capitalistic forms of production has shown that peasant and capitalistic forms of production can exist alongside. How peasant forms of production exist alongside capitalistic forms of production and what implication this has is further elaborated in chapter 4.5.

With regard to food systems, one can argue that domestic food systems are characterised by non-capitalistic modes of production and non-utilitarian economic interactions. The household as producing unite owns its means of production and there is no accumulation of wealth by one class on the expanse of another class. On the other hand, agro-industrial food systems are characterised by capitalistic modes of production and features of the market economy.[42]

Local, regional and alternative food systems can have features of capitalistic and non-capitalistic modes of production. Producers in local food systems might employ labourers to work on their field and a shop assistant selling food of an alternative food system might be employed as labourer. On the other hand, local institutions might prevent the exploitation of an agricultural labourer in a local food system, as it is described for capitalist production, and a shop assistant might be member of a cooperative that owns the means of production in an alternative food system.

Marxists link agro-industrial production directly with enclosures, primitive accumulation and exploitation of proletarians. An understanding of processes that lead to enclosures and primitive accumulation for the expansion of agro-industrial food systems explains how the transformation

[42] As shown in chapter 4.5 capitalist production in agro-industrial food systems also depends on non-capitalist production and non-capitalist production in domestic food systems is linked with capitalist production.

towards agro-industrial food systems separates people from their means of production and captures their power to decide over food systems on which they still depend for their livelihoods and source of food. Capital owners and multinational agro-chemical and food companies owning the land and natural resources (or access to them) and other means of productions, such as patents on genetic material or agro-chemicals, can decide under which conditions food is produced and distributed and therewith how food systems are shaped. Following the capitalistic logic, they decide for conditions that improve their benefit. In a market economy, this is necessary to reinvest into means of production in order to remain competitive. This transformation towards a capitalistic mode of agricultural production or Food Regime is also described by Harriet Freidmann (1987) and Harriet Friedmann and McMichael (1989) in chapter 2.2. In the light of Marxist theories, claims from the Food Sovereignty debate that demand to give back the power to those who depend on food production – generally the public – can be seen as a claim for a (r)evolution towards an egalitarian society, or a modern communist global food sector.

In response to the Marxist model of development from primitive communism through slavery, feudalism and capitalism towards an egalitarian modern communist society and the Marxist description of capitalist exploitation, Rostow (1960) developed another model of human development from traditional societies towards an age of high-mass-consumption.

Peasants in Modernisation Theories

Walt Whitman Rostow (1960), an American economist, criticised the Marxist model of human development. According to Rostow, economic development depends not only on property situations and means of production but is shaped by cultural, social and political circumstances as well. Therefore, economic development does not necessarily end in communism. Rostow described a model with five steps from traditional societies to an age of high-mass-consumption with a capitalistic economy and general prosperity.

- In his theory, traditional societies are characterised by limited technological knowledge and production functions. Despite inventiveness and innovations, there is little improvement of productivity. This results in low productivity of which most is dedicated to cover food needs. Power is decentralised. Land-owners and religious leaders are vested with most power and the ability to appropriate surplus production.
- The initial step providing the preconditions for take-off were created in Western Europe with the evolution of modern science and the widening of the market. Modern science and a modern attitude towards science opened room for new technologies at certain strategic points. Agricultural innovations and their acceptance were the first necessary pre-condition, resulting in a general rise in population. At the same time, the discovery

of new lands widened the market and increased trade and specialisation of production. Last but not least, the state played a major role in supporting the development to take off – or inhibiting it.

- Take-off describes the step at which some economic sectors which apply modern technologies experience a fast and lasting growth. During take-off, those aiming at modernising the economy, society and culture prevail against those cling to the tradition. Rostow detects the first take off in Britain in the late 18th century. This take-off accelerated the creation of preconditions for take-off in other states.
- Drive to maturity is reached when a society has largely adapted modern technologies to most economic sectors. A rise in real income per head makes levels and types of consumption possible that has not been seen before. First to reach technological maturity, according to Rostow, was again Britain by the mid-19th century.
- Finally, at the age of high-mass-consumption, technological and real income maturity is reached. At this step, a society can decide whether to further improve the social welfare state, private consumption on a mass basis, or global political influence.

A modern economy can be developed if the preconditions for take-off are met. These preconditions include the adaptation of agricultural and industrial innovations and a state that promotes an economy friendly environment. As such, traditional agricultural production – or peasantry – and tradition in general have to be overcome. The idea of peasantry and tradition as a hindrance to development can also be found in different texts. According to Araghi, T. J. Byress, for example, noted that "backwardness exists when capitalism has not 'yet rooted out and destroyed […] non-capitalist [agrarian] relations'" (Byress 1991: 7 in Araghi 1995: 341).

The creations of the preconditions for take-off in traditional societies can be accelerated by states that have already made their take-off. Rostow's model of economic development classifies peasants as underdeveloped. He describes their cling to tradition as a hindrance for the take-off of development. Rostow's idea of economic development and possibilities to support development by states that have already made their tack-off inspired neo-liberal development agendas, for example, of the World Bank[43], that aimed to transform underdeveloped societies into modern ones. According to the Modernisation Theory, traditional elements and con-capitalistic relations in food systems are a hindrance to development. The promotion of technological agricultural innovations and agro-industrial Food Systems prepares a country for an economic take-off that frees the people from distress and finally lifts the country to the stage of high-mass-consumption and prosperity.

[43] See, for example, the World Bank Report on Lesotho of 1975 that was critically analysed by James Ferguson in 1990.

Similar to Marxist Theories, the Modernisation Theory describes peasants as economically underdeveloped and backward. Proponents of both theories view peasants as hindrance to reach the ultimate state of development. Lenin tried to avoid an expected peasant development into capitalism by forcefully integrating them into large-scale collectively organised, state controlled agrarian production. On the other side, international organizations, such as the World Bank, issued loans to underdeveloped countries to support economic development and to incorporate non-capitalist (peasant) forms of production into global markets in order to promote pre-conditions for take-off.

The Theory of Economic Development by Rostow had been criticised by a broad range of authors. Frank (1969) and Wallerstein (1974) criticised with their Dependency and World-System Theory that underdevelopment is not caused by a lack of development but by the development of the so-called 'developed countries' (see explanations later in this chapter). Furthermore, Ferguson (1990) criticised the depoliticised perspective on development that neglects historical and political aspects that led to underdevelopment. Already in the 1950s, Steward (1955) described ecological factors that affect development. Last but not least, Escobar (1992) criticised that in Development Theories, development is defined from above. It is defined by actors from already developed countries or societies. This leads to hegemonic development agendas in which 'developed countries' formulate how and to where 'underdeveloped countries' have to develop. Escobar calls for new development agendas in which people that are to be developed can decide themselves what development means and how they want to be developed.[44]

Accordingly, underdevelopment, of peasants for example, cannot be simply explained with outstanding development. Underdevelopment is also caused by external factors, such as ecological factors, the development of other regions on the expense of a region or historic and political processes. Moreover, there are several visions to where development should go and how a society should go there. Therefore, visions to where development should go and how one cold go there should not only be formulated by those who see themselves already at the envisaged stage. As such, peasants cannot be simply seen as underdeveloped to a capitalistic economy, one has also to understand why peasants developed to where they are.

Food Sustainability, as defined in chapter 2.2, can also be understood as an evolutionistic model of development. Thereby, the ultimate stage of development is Food Sustainability, (comparable to the egalitarian socialist society targeted in Marxist theories or the age of high-mass-consumption described by Rostow). Similar to other evolutionistic models the ultimate stage of development is a

[44] How important discourses and the framing of a topic are, is further elaborated in chapter 5.2. Adherents of the Food Sovereignty concept use the arguments of Escobar (1992) to criticise that the Food Security concept is mainly developed by actors from above who are already food secure and therefore neglects the role of agency in the definition process of such concepts.

normatively defined state that has not yet been met. The goal to meet this state calls for and justifies measures that are perceived appropriate to reach this state. Including the arguments of the Food Sovereignty debate, the formulation of the normative state to be reached and the formulation of the path towards it makes the envisaged stage of development more inclusive and negotiable (as it is called for development theories in general by Escobar). Thereby, the role of peasants to reach Food Sustainability is discussed controversial. Adherents of the production-innovation oriented narratives propose a transformation towards technology and capital intensive production as solution to achieve Food Sustainability. In their view, peasants play a minor role in achieving Food Sustainability. At the other hand, authors that criticise this approach propose a strengthening of peasants and their production as solution to achieve Food Sustainability (see La Via Campesina 2007, Ericksen 2008, Thompson and Scoones 2009, Pretty et al. 2009, De Schutter 2011 and 2014, Anseeuw et al. 2012).

In my Thesis, I will further elaborate the role of peasants to reach Food Sustainability. Therefore, I cannot only perceive peasants as a specific state of development (be it as economically underdeveloped backward people that potentially treat hoped for development within unilinear teleological development models, or role models for a Food Sustainable state of development). It is important to look at how peasant production is linked with other functions and features of their society and the ecological, social and economic environment. Other contributors to the peasant debate describe them with models that look exactly at specific functions of features of their society are linked with their environment. Their arguments are examined in detail in the next sub-chapter.

4.3 Peasants and the Ecological Environment

In contrast to the above mentioned evolutionistic theories that describe a unilineal development of mankind, to a great extent driven by technological innovations, theories of the Cultural Ecology describe a multilineal development that is affected by ecological factors. Julian Steward (1955) was one of the first to formulate such a theory. His theory of the Cultural Core describes that ecological factors determine “subsistence activities and economic arrangements” (1955: 37). These activities and arrangements in turn determine social, political and religious patterns, the cultural core of a society. Secondary features of a culture, such as kinship or land rights, develop from this cultural core. In his book, he explained, for example, how the abundance of wildlife and access to it determines social organisation and land rights of hunter and gatherers. According to his approach, hunting and gathering as subsistence oriented economic activity only allow a social organisation in small groups, so called bands. These groups defend their territory and develop a sense of territoriality. The dependence on these territories leads to alliances among patrilineal linked families. As a result, the land is distributed

among different bands. According to this theory, similarly peasant societies constitute a specific adaptation to the ecological environment.

According to Ellen (1982), Steward's theory describes an ecological and economic determinism of cultural development. Thereby, the economic determinism is formulated similarly to the Marxist idea of the superstructure that emerges from the mode of production. Different ecological contexts and economic strategies lead to different multilineal developments of societies. The theory of Steward had been criticised for many aspects. Among other aspects, Ellen opposes the one-sided ecological determinism in Stewards theory that does not consider feedback loops and the possibility of actors to change the ecological environment. Nevertheless, peasants' so-called secondary features (i.e. institutional settings) can be affected by the ecological environment. This can have impacts on how a food system, in which peasants are involved, is shaped.

Roy Rappaport (1968) formulated a theory that considers such feedback loops between human activities and the ecological environment. For his theory, he followed the premise that mankind, including culture, and the ecological environment form an interlinked balanced system in which cultural features of a society keep human activities within the range of the carrying capacity of the ecological environment. On the basis of fieldwork in Papua New Guinea, he showed how the culture and rituals of the Maring, which he studied, maintained the equilibrium in such a human-ecological system. A cycle of peace and warfare restored the human-ecological equilibrium when the human use of the ecological basis exceeded its capacity. According to Rappaport, an increase of people and livestock (pigs) of the Maring increased the pressure on the ecological environment. This resulted in conflicts for which allies were sought through offering them pork-meat. This required the slaughtering of pigs, reducing their number. The ensuing war also reduced the number of people and finally restored the equilibrium in the human-ecological system. According to Rappaport, this ritual cycle of peace and warfare "helps to maintain an undegraded environment, limits fighting to frequencies that do not endanger the existence of the regional population, adjusts man-land ratios, facilitates trade, distributes local surplus of pigs in the form of pork thought the regional population, and assures people of high quality protein when they most need it" (1968: 224). With this theory Rappaport explained how the culture and rituals of these groups include a negative feedback loop that keeps the homeostasis of this human-ecological system within the 'golden ranges' – the carrying capacity of the ecological basis. According to Rappaport, culture is not the result of the ecological conditions but the regulatory frame to keep human activities within the range of the carrying capacity of the ecological environment.

Rappaport's theory had been criticised in many ways. Haller (2001) argues that need to keep pigs in a number that exceeds the carrying capacity of the ecological environment is caused by the cycle of

peace and warfare in the first row. Without warfare, there would be no need to keep pigs in a number that exceeds the carrying capacity. Furthermore, the reduction of people and pigs is not a goal of warfare but a side-effect.

In addition, other theories put into question the rigid conceptualisation of the carrying capacity. Ester Boserup (1965), a Danish economist, postulated that a change in the population density changes the intensity of agricultural production. Unlike Rappaport who argued that cultural and ritual mechanisms reduce population pressure by reducing the population, Boserup argues that an increase in population pressure results in intensification of agricultural production and as such an increase in the carrying capacity of a given area. Boserup used examples of various pre-industrial agricultural societies to explain that the increased population density or land scarcity results in an intensification of agricultural production. According to her, agricultural intensification is possible through an increase of work invested in the land. Through additional work (e.g. constructing of terraces or irrigation systems), the productivity of land and therewith its ability to produce food can be increased. However, without increased pressure on land, there is no need and as such no intensification of agricultural production. Intensification is work intensive and thus only accomplished if needed. Rational actors would not invest more work in agricultural production if it would not be necessary. Thus peasant societies do not improve the productivity of their agricultural production if there is no need therefore. In addition, peasants shift back to more extensive agricultural production if the population pressure reduces.

Therewith, Boserup argues similar to Chayanov that peasants do not invest more in farming than required. However, Boserup's analysis is to be located at the level of the society and not at the household level. She also rejects evolutionistic models that draft a unilineal development of mankind. Moreover, she questions the idea that technological innovations in agricultural production are the engine of development, as assumed in Marxist theories and Modernisation Theories. Last but not least, she rejects the ecological determinism formulated in the Cultural Ecology of Steward.

Even though the theories of Steward and Rappaport are legitimately criticised, one can note that the ecological environment and its use can influence the cultural features of a society. Societies have to develop ways for a balanced use of the ecological environment. In other terms people have to develop mechanisms that reduce the human pressure on the ecological environment to an extent that does not exceed its carrying capacity (see figure 6). As shown in the chapter on Common Pool Resources (see chapter 5.1) and Institutional Transformation (see chapter 5.2), the reduction of pressure on the ecological environment is not only possible through war and slaughtering of pigs, but also through less violent collective actions.

At the other hand, Boserup has shown that an imbalance between the ecological environment and human use can also be restored through a man-made increase of the ecological provision. In other

terms people can develop mechanisms to improve the carrying capacity of the ecological environment to a level that meets the human need (see figure 6). As shown in the chapter on Common Pool Resources (see chapter 5.1) and Institutional Transformation (see chapter 5.2), the improvement of the carrying capacity can be achieved not only through privatisation of land and associated natural resources, but also through collective action.

In the theory of Rappaport, the restriction of human pressure on the ecological environment is achieved through the killing of people and pigs. This is an extreme form of reducing people's pressure on the ecological environment. Less extreme forms for reducing people's use of the ecological environment are described by Ostrom for example. However, both theories do not address the question, who has to carry the burden of reducing the human pressure on the ecological environment or how this burden is shared among different actors. Chapter 5.2 will shed more light at this aspect. At the other hand, Boserup's Theory does not consider physical limits that inevitably prevent an infinite increase of the ecological provision.

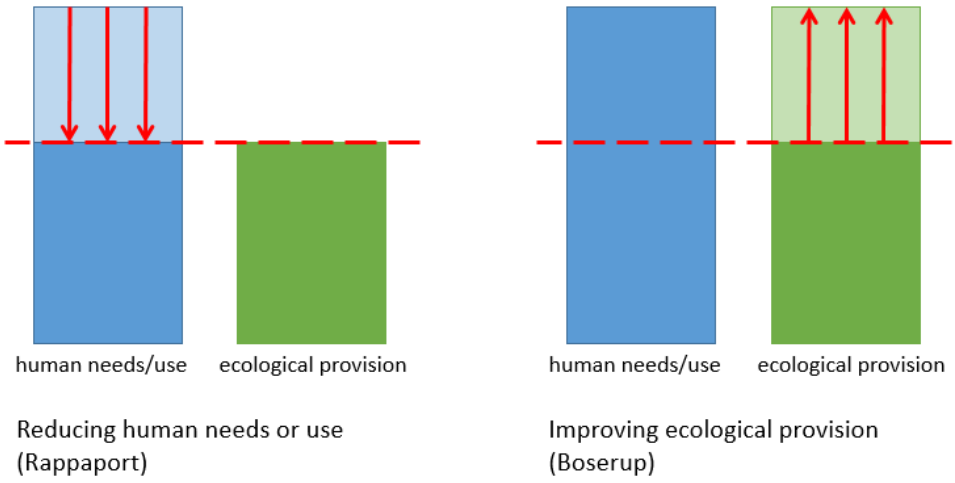


Figure 6: Schematic Figure of the Equilibrium between human use and ecological provision

In the food sustainability debate, both approaches can be seen. Adherents of the productivity narrative for example view innovations in agricultural technologies and the use of synthetic fertilizer and agro-chemicals as a way to improve the productivity of agriculture and as such of the ecological environment. As shown in chapter 2.1, it is controversial whether such an approach actually improves the productivity on the long run. On the other hand, in the debates about the distribution and accessibility of food, it is discussed how available food can be better used to reduce the pressure for producing more food (see chapter 2.2). This approach can be seen as an attempt to reduce the human pressure.

To improve the sustainability of Food System both possibilities to restore the humane-ecological equilibrium might to be considered. There might be need to reduce humane pressure on the ecological environment, not only the use of resources, but also the dumping of all kinds of waste. Thereby, it is important to look at how a reduction is organised and at whose expense. At the other hand, there are possibilities to improve the resource base or the ability of the ecological environment to absorb dump. But also here, one has to look at who has to accomplish the effort for improvement and who benefits therefrom.

Peasant production is a specific use of the ecological environment (e.g. compared to hunting and gathering or pastoralism). As such, it depends on specific features of the ecological environment. As other societies, peasant production can be seen as an adaptation to the ecological environment. However, the ecological environment does not determine its use, it can be partially altered by human activities, such as building irrigation systems or fertilising the soil. Moreover, different forms of using the ecological environment might develop under similar ecological conditions. As such, the ecological environment does not determine forms of agricultural production. Therefore, other theories are needed as well to understand peasant societies and their economic activities. The nexus of culture and economy are an explanation therefore. In the next sub-chapter, I further elaborate how culture and economic activities are interlinked.

4.4 Peasants and Culture

According to cultural relativist perspectives, human experience can only be understood in the context of the respective culture. Therefore, cultural features, to which also economic activities are counted, should only be explained with a society's culture and not with other features, such as the ecological environment, nor through comparison with other historically and geographically distant societies. One of the first formulating this premise was Bronislaw Malinowski (1992 [1922]). He suggested in a cultural relativist perspective that economic activities, as other cultural features, have to be understood in the context of the culture of the respective society. Following this rational, some authors highlight cultural features to explain differences in economic activities of peasants compared to other societies (see Wolf 1957, Foster 1965, Cancian 1989).

Karl Polany (1944) further elaborated the idea that economic activities are embedded in the respective culture and specific premises. As summarized by Wilk and Cliggett, in modern capitalist societies, "the economy is embedded in (meaning 'submerged in' or 'part of') the institution of the marketplace. In the economic systems of other cultures, however the economy is embedded in other social institutions and operates on different principles from the market. In some cultures, the economy may be part of kinship relations, whereas in other places religious institutions may organize the economy. Economies

that are not built around market principles, Polany observed, are therefore not focused on the logic of individual choice" (2007: 7). According to Polany, in addition to the neo-classical microeconomic model of exchange, reciprocity and redistribution[45] constitute other models of economy that exist in every society. In every society, these three models of economy can be found to a certain degree.[46]

If peasant economy has to be understood as embedded in their culture, the question to be addressed is how a peasant culture or peasant cultures would look like. Peasants are often described as poor and homogeneous groups in comparison to rich people of the larger society. Cultural relativists however call for a description of peasant societies in the context of their culture instead of describing them through a comparison with other societies. Different authors have described cultural features of peasants to describe their behaviour. According to Cancian (1989) Wolf's theory of enforced philanthropy and Foster's (1965) theory of shared poverty use cultural features of peasant societies to explain their behaviour.

Anthropologist Eric Wolf (1957) compared two peasant communities, the ancient peasants of the Mesoamerican high culture and contemporary peasants from Central Java. In both peasant societies, Wolf found cultural features that led to a redistribution of temporarily acquired surplus production resulting in a state of 'shared poverty'. These features are often based on religious systems. Cancian (1989) also described such a feature in his text on the Economic Behaviour in Peasant Communities. In Zinacantan communities, indigenous Mayan peasant communities in South-East Mexico, peasants practice a so-called religious cargo system. It is a complex system whereby every year a peasant organises an expensive festivity ritual to gain prestige within this community. This prestige is of no use except within the respective community and culture. People spend the bulk of their wealth on these festivities. The more wealth somebody has, the more he spends. Therewith, the institution of the cargo-system establishes pressure for a redistribution of wealth. This redistributive pressure keeps the peasant group relatively homogeneous and prevents an economic or societal stratification in these groups. Moreover, various mechanisms isolate these groups from other communities by preventing outsiders from becoming members of the group and limiting the ability of group members to communicate with outsiders.

Georg Foster described in his 1965 published book on "The Image of Limited Good" another way of how the cognitive orientation or the culture of peasants determines their behaviour. According to

[45] Reciprocity describes a general helping and sharing. Redistribution is a system whereby a central authority collects things from everybody and redistributes them (see Wilk and Cliggett 2007: 8).

[46] Polany put these three models of economy into an evolutionistic model from simple to complex societies with the modern capitalist society breaking radically from the past with its dominance of exchange. Even though Polany's evolutionistic model is not uncontested, especially by cultural relativists, his idea of economic activities as being embedded in a broader cultural system remains important.

Foster, the cognitive orientation or the culture of the 'Image of Limited Good' emerges as an adaptation to ensure survival in a limited or as limited perceived social, economic and ecological environment. Foster described 'the Image of Limited Good' as following: "By 'Image of Limited Good' I mean that broad areas of peasant behaviour are patterned in such fashion as to suggest that peasants view their social, economic, and natural universes – their total environment – as one in which all the desired things in life such as land, wealth, health, friendship and love, manliness and honor, respect and status, power and influence, security and safety, exist in finite quantity and are always in short supply, as far as the peasant is concerned" (1965: 296). Foster carried out fieldwork in the Tzintzuntzan community in Mexico. In this community, people who increased their economic status were either suspected to have found a buried treasure or to have "encroached upon the shares rightfully belonging to others" (Foster 1964: 40 in Cancian 1989: 138). Thus, the increase in someone's wealth is observed and commented by others with suspicion and therefore, nobody dares to improve his or her economic status. Foster notes that the Image of the Limited Good is often very realistic because acquiring wealth in peasant economies is generally difficult and also people of non-peasant communities who cannot expect to improve their situation often develop the Image of Limited Good. Moreover, the Image of Limited Good as part of the cognitive orientation or culture of peasants might persist even if the material world conditions change and would allow for wealth accumulation. Thus, according to Cancian, "the Image of Limited Good explains much peasant behavior that helps to keep the community homogeneous" (1989: 138).

To recapitulate, Polany (1944) explained that economic activities are embedded in the relative culture of a society. Following a Cultural Relativist perspective, cultural features, of which economic activities are part of, can only be explained in the context of the culture of its society. Wolf (1957), Foster (1965) and Cancian (1989) described economic activities of peasant societies in the context of their culture and could explain in a substantivist manner why peasant economic activities do not follow the rational of the economic man as described in neoclassical microeconomic theories. In comparison to Chayanov and Lipton, who both describe differences in peasant behaviour from the behaviour of the rational economic man with peasants' distaste for work or peasants need to secure a minimum yield, Wolf, Foster and Cancian describe differences with cultural features of the respective society. With regard to food system theories, one has to note that food system relevant activities might also be different from activities of the rational economic man because of cultural features of an actor group.

The argument that peasant behaviour is different from the rational economic man is also invoked by adherents of Modernisation Theories that argue that peasants' cling to tradition impedes development. However, Wolf, Foster and Cancian describe these differences of peasants' behaviour or this cling to tradition not as something negative and do not classify it with an evolutionary model.

Last but not least, Wolf emphasizes that peasant culture and their economic activities are not the product of an isolated society but as a result of interactions with other communities and societies. The awareness that societies and their culture are not a product of isolation but interaction with others revises the Cultural Relativist perception of societies and culture as isolated and clearly definable entities. This insight does not put into question that economic activities are embedded in culture but the way culture is thought. If culture and economic activities are the product of interaction with others, these interactions have to be considered for a thorough analysis. In the next sub-chapter, the interactions of peasants with other societies and the global world are further examined.

4.5 Peasants and the World

Peasants' interactions with other societies and the global world vary. Wolf distinguishes two types of peasant societies: open peasant communities and closed corporate peasant communities (1955, 1957). Both types are peasants that are distinct from a larger dominant surrounding society. Closed corporate peasant communities isolate themselves from the larger surrounding. Open peasant communities maintain close contact to the larger surrounding society.

The above described communities, the Zinacantan, described by Cancian, and the Tzintzuntzan, described by Foster, are examples of closed corporate peasant communities. According to Wolf's analysis, closed corporate communities disconnected themselves from the larger society in response to a "dualization of society into a dominant entrepreneurial sector and a dominated sector of native peasants" (1957: 8). If such a dualization restricts native peasants access to wage-work, they rely on their own subsistence agricultural production. Imposed charges and scarce availability of land exacerbates the situation of the dominated peasant communities. In such situations these communities develop institutions that "restrict their membership, maintain a religious system, enforce mechanisms which ensure the redistribution or destruction of surplus wealth, and uphold barriers against the entry of goods and ideas produced outside the community"(1957: 6). Cultural features described in the last chapter lead to a redistribution of surplus production. This redistribution is often based on religious systems that provide a source for prestige only valid within a specific community. Cultural features prevent outsiders from becoming members of the community, communication with the larger society is limited, and interpersonal relationships within the community are important. This defensive disconnection from the dominant society and the homogenization through 'shared poverty' within the community helps to prevent land alienation by external actors or land concentration in the hands of few individual community members. According to Cancian (1989), anthropologists described many communities with such patterns all over the world.

Open peasant communities at the other hand have an economic, political and cultural connection to the larger society. As described by Wolf, they tie their fortune to the outside world. These communities share, for example, jurisdiction over land with this society, provide community membership to outsiders or allow the accumulation and display of wealth. According to Wolf, such communities "arose in response to the rising demand for cash crops which accompanied the development of capitalism in Europe" (1955: 462). As such, open peasant communities depend to a great extent on the sale of cash crops. In comparison to closed corporate communities with shared poverty, poverty in open peasant communities is a characteristic of individual families and differences between families might change over time. Moreover, compared to closed corporate communities, relationships with the outside world are more important than interpersonal relationships in the community. This means that individual relationships (economic, juristic or social relationships) with outsiders are more important than relationships with people of the same community, compared to closed corporate communities. What distinguishes open peasant communities from other communities is their specific way of interacting with other communities. The specific features of open peasant communities and their interactions with the larger world are further elaborated in the next paragraphs.

Many studies have been carried out of what happens if peasant communities open themselves to the larger society. Peggy Bareltt (1977) was one to describe such an open community. She carried out fieldwork in the early 1970's in Paso, a village in the mountainous areas of Costa Rica. No symbols, language or cultural aspects separated the people of Paso from the larger society. Moreover, there was a great heterogeneity within the people living in Paso. Generally, land was scarce in the village and it was difficult to rent additional land. Some had access to large tracts of land. Others had only limited access to land. In former days, people in Paso grew maize and beans for self-consumption. In the 1970s many started to produce cash crops. However, people with different preconditions grew different cash crops. Villagers with more land started to rear cattle for sale. The rearing of cattle was land but not labour intensive. Those with limited access to land but more work force available grew tobacco. Planting tobacco was highly work but not land intensive. With an increase in prices for coffee, both, people with much land and people with less land, started to grow coffee. In addition to cash-crops, all the people in Paso grew crops for self-consumption, even though not enough to cover subsistence needs. In sum, "land use choices [for cash-crop production] in Paso depend primarily on access to land" (1977: 295). People with more land available substituted labour with land and reared cattle. Those with less land but many able-bodied workers grew tobacco to compensate the lack of land through labour.

Another aspect observed when peasant communities open to the larger society had been described by Cancian. The above described peasants of Zinacantan did not remain a closed corporate community. They opened to the larger society "when the Mexican government programmes brought many changes

to the region" (1989: 149). When the government built a road to the area where they lived and started to buy their maize to favourable conditions, people in the village quickly took advantage of this opportunity. This shows that their former distinction from the larger community was rather caused by a lack of opportunities to interact than their resistance to opening. However, similar to Barlett's example, not all people of Zinacantan reacted in the same way to the opening. On the basis of the regularity in which families form the village organised cargo-festivities, Cancian (1989) made a stratification of the villagers. He distinguished between those making the most cargo-festivities, an Upper Middle Class, a Lower Middle Class, and those organising the fewest cargo-festivities. He discovered that those who made most cargo-festivities and those of the Lower Middle Class were the ones that took advantage of the new opportunities first. Those Zinacantecos that did the least cargo-festivities and those of the Upper Middle Class took longer to take advantage of the new opportunities. The poorest Zinacantecos had no means to immediately take advantage of the new opportunities. Those of the Upper Middle Class feared failures and did thus not immediately take advantage. Comparing these findings with research on other peasant and non-peasant communities he found that this Upper Middle Class conservatism appeared in many communities all over the world.

This shows that closed corporate communities can open themselves if the larger context changes. However, they can also withdraw again from the larger society if unfavourable changes occur. Moreover, heterogeneity among peasant communities exist even if they have cultural features that seem to promote socio-economic homogeneity. The heterogeneity of peasant communities affects how different peasants of such a community deal with and react to changes in the surrounding world. The heterogeneity of peasant communities has to be considered when analysing peasants' activities. However, one should not only look at the peasant community with its cultural features and heterogeneity to understand how peasants deal with changes in the surrounding world, one should also look at the surrounding world itself.

William Roseberry (1989) emphasized the importance to study peasant communities not only in a classical anthropological manner that looks at a community as an isolated entity. Economic activities of peasants can often only be understood and described with reference to other localities. According to Roseberry, peasants "might produce crops that would be sold in nearby market towns. If crops included export products like coffee or tobacco, the market town would represent the next link in a chain that eventually led to the centres of the world economy. Likewise, peasants might purchase good that had been produced in other cities, regions, or countries" (1989: 109). Furthermore, peasant communities are politically and culturally part of larger administrative units and greater religious and cultural traditions. Thus, peasants are "part of a wider world" and thus, studying peasants requires some understanding "about that wider world as well" (1989: 109).

Different theories exist to describe this wider world and the position of peasants therein. Dependency and World System Theories attempt to describe this outside world and the peasants' position. The Dependency Theory by Andre Gunder Frank (1969) describes a world that is divided into centres and peripheries. The peripheries to a centre are again centres to their peripheries. As such a chain of dependent peripheries can be drafted. The main international centre, according to Frank, were at this time, cities in the United States. Main metropoles in other countries, such as São Paulo were perceived as their periphery. At the national level São Paulo was seen as centre to other cities in Brazil. These other cities were again regional centres. Local markets were centres for local peasants. In this way, the main centres are linked with local peasants. Centres have a monopoly position in their metropole-periphery relationship and can acquire the production of the peripheries. This allows for the development of the centre to the expense of the periphery that is in turn underdeveloped. Therefore, according to Frank, underdevelopment in peripheries is not caused by a lack of development (as assumed by Rostow, for example) but a product of the development of the centres. Using a similar premise to the Dependency Theory, the World System Theory of Immanuel Wallerstein (1974) describes the underdevelopment in so-called Underdeveloped Countries with the formation of the capitalist world economy and colonial and post-colonial changes.

The expansion of the capitalist world through state led colonialism at the turn of the last century and the spread of neo-liberal economic models with the promotion of globalisation did not only incorporate peasant communities and generally third-world communities in an unfavourable position in the world market, it also appropriated land and associated natural common pool resources, required for peasant production and resilience, through the transformation of property rights from communal to state and eventually private property and a fragmentation of cultural landscapes. This land and natural resources appropriation and fragmentation of cultural landscapes can be classified as enclosure that led to primitive accumulation, forcing peasants into labour work for capitalist production as described in chapter 4.2 (see Harvey 2003, Glassman 2006, Sassen 2010, Baird 2011, Haller 2013). Therefore, historic and political processes that caused underdevelopment should not be neglected (see Ferguson 1990). However, peasants are not purely at the mercy of these external processes caused by the expansion of the capitalist world. Peasants can withdraw again from the larger society if unfavourable changes occur and they still have own market-systems through which they can influence how external changes affect them. Moreover, interlinks with the capitalist economy are often complex and multi-layered and can therefore not be understood as causing simple and direct impacts.

Roseberry (1989) used an example from his own research of a peasant in Boconó, a village in the Venezuelan Andes, to show how local peasants reacted to processes caused by the interlinks with the capitalist economy. The main cash-crop that was grown in the area of Boconó was coffee. Peasants did

not sell the coffee directly to international companies. When the coffee boom set off, former petty trader started to trade coffee. They got loans from large coffee companies and provided credits to peasants in order to retain a steady number of coffee growers. The traders bought the coffee from the peasants and it to branch warehouses of the large coffee trading companies. From there, the coffee was shipped overseas.

With the production of coffee, the peasants in Boconó made themselves vulnerable to global price fluctuations in coffee. However, price fluctuations did not affect the peasants directly and price fluctuations were not the only aspects that affected the live of peasants in this village. The way the peasants were linked to the global coffee market through former petty traders exacerbated impacts of price fluctuations. These traders had loans from large coffee companies to issue credits to coffee producers. A drop in coffee prices during the depression of the 1930s forced them to provide more coffee to repay the loans. Consequently, they had to push the coffee producers, to which they issued credits, to produce more coffee. This resulted in a slow increase in coffee production that finally led to overproduction and a second crisis in coffee prices. The need to produce more coffee to repay credits and lower coffee prices made it difficult for peasants to earn a living from coffee production. However, peasants were not only linked through coffee to the outside world. People wore clothes made somewhere else, they read newspapers that were printed in the capital of Venezuela and they went to urban centres to work during the season of low farming activities. During the coffee crisis, younger peasants migrated to urban centres to earn money to substitute losses in the coffee sector. In addition, the state launched programmes to stabilize the coffee sector. All these aspects affected how the outside world influenced the live of peasants in Boconó.

This shows that peasants are not only affected by an individual external impact but a multitude of changing external impacts. Therefore, it is important to study both, the various and changing external aspects that affect peasants and the way peasants react to these impacts. According to Roseberry, “Anthropologists who try to place peasantries in a wider world, then, cannot be content with a synchronic approach. They need to pay close attention to the complex interplay of external pressure and internal responses over time and need to be aware of the possibility that those features of peasant life that seem most traditional or customary may be the result of past impositions, response, or accommodations” (1989: 118).

Despite peasants have always been integrated in the larger economy, Cancian and others, describe a general shift towards rather open communities – for example if “more families depend on income from members who migrate to find wage work” (Cancian 1989: 156). Authors of evolutionistic approaches even proclaimed or proclaim an entire integration and dissolution of peasants into capitalist production (see chapter 4.2). However, as mentioned by Wolf and Cancian, market situations or

generally the dominant society can change and open communities can transform towards closed corporate communities again. As such, both, the closed corporate and the open communities act "to respond to forces which lie within the larger society to which the community belongs rather than within the boundaries of the community itself" (Wolf 1957: 7).

Even though peasants seem more to react on external changes than shaping them, Cancian states that peasant communities have an active role in shaping their relations with the dominant society and, peasants have different ways of adapting to external changes that lie beyond their influence. As such, it is not only, as overestimated in Marxist and Modernization Theories, "technological inputs and capitalist economic relations [that] determine what goes on in the countryside" (1989: 169). Local ecological conditions, cultural features, the position in the global world and reactions of individual peasants and peasant communities to external changes constitute the characteristic of peasant economic activities and peasant societies. With their nexus to the global world, peasants cannot be described meaningfully as local rural people only. However, with their specific ecological environment, cultural features, position in the global world and reactions to external changes, they are neither global players that are disconnected from a local context. In fact, peasants amalgamate global and local aspects in a unique way as global and local actors, so called glocal actors. With the amalgamation of local and global processes, peasants engage in and depend on different food and non-food systems. With this engagement they ink features of these systems. My analysis of peasant engagement in food systems in the region north-west of Mount Kenya will further elaborate this glocal amalgamation and its multifaceted nature by using theories that are subsumed under the label New Institutionalism. Before immerging into the New Institutionalism debate I briefly go back to the Marxist debate that sheds light on an important aspect of interlinks between different economic systems in which peasants are embedded.

As shown in the previous examples, peasants do not only produce food for self-consumption. Peasants also produce food for sale to earn money with which they can cover subsistence needs – or even accumulate wealth. Moreover, Roseberry already mentioned that peasant household might not only depend on agricultural production to cover their subsistence needs or to accumulate wealth. They also engage in other economic activities such as petty trade or wage-work. Wage-work can even lead to temporary or permanent migration of some members of the peasant household.

Already in 1975, Claude Meillassoux, known for his Neo-Marxist Theories, analysed peasant engagement in capitalist modes of production. He showed that peasant production with its specific features described in this chapter (distaste for work, mini-max strategies, specific adaptation to and of the ecological environment, extraordinary cultural features and specific position in wider economic systems) is exploited through such arrangements. The reproductive work of peasants is appropriated

by the capitalist production. Meillassoux elucidated how the capitalist production depends on the peasants' reproduction of labourers. During his research in the Ivory Coast, he observed that the reproduction of labourers occurred in the remaining rural subsistence sector of peasants and not within the capitalist sector. The rural subsistence sector produced labourers for its own perpetuation. These labour force was partially appropriated by the capitalist sector as cheap labourers. Moreover, if the labourers were no longer needed in the capitalist sector, because the need for labour force reduced or persons were no longer capable to fulfil the requirements to work in this sector, labourers had to sustain themselves again within the remaining subsistence sector. Therewith, the rural subsistence sector subsidised the capitalist production in two ways, by supplying labourers for the capitalist production and by taking care of labourers that were no longer sustained by the capitalist production.

According to Georg Elwert (1982), and described already by Robinson in Shanin's (1971) analysis of Russian peasants around 1900,[47] this subsidise of the capitalist production can go even further. If the subsistence sector feeds active labourers, the capitalist producers can even pay wages below the costs of sustaining the active labour force. Marxist feminists like Margaret Benston (1969) and Peggy Morton (1971) stressed out that not only the rural subsistence sector is exploited by the capitalist production, but all types of reproductive work[48]. Reproductive work is acquired by the capitalist production by drawing on well cared for labourers without remunerated the work required therefore. As such, the reproductive work, mainly done by women, is exploited by the capitalist production. Thus, following Rosa Luxemburg's (1913) arguments, capitalist accumulation is based on a constant drawing upon non-capitalist or not yet capitalist areas that support the capitalist economy.

Last but not least, formal capitalist production also draws on other formal or informal economic activities of peasant such as petty trade, petty service provision or petty production. Such non-farm economic activities of peasants also employ people that are temporarily or permanently expelled from formal wage-arrangements, either because of a lack of employment possibilities or because the people are not capable or allowed to work in such arrangements. Moreover, such economic activities provide cheap goods or services that can be used in the formal capitalist production. In these activities, only self-exploitation enables people to participate in the capitalist economy. Therewith, also such non-farm economic activities of peasants subsidise the formal capitalist production. They absorb and

[47] According to Shanin, Russian peasant production at the turn of the 20th century was mainly self-consumption oriented with some engagement in craft and "when the brief agricultural season did not yield a living for the peasant family, the work for less than subsistence through the long winter months was better than to be altogether idle – and perhaps to be buried in the spring" (Robinson 1923: 104 in Shanin 1972: 32).

[48] Reproductive work is distinguished from productive work. Productive work describes all work done to earn money in the capitalist production. Reproductive work is all work that people have to do for themselves (e.g. cooking, having children, taking care of elders, etc.).

sustain surplus labour forces and produces cheap services and commodities that also benefit the formal economy (Elwert et al. 1983). To sum it up, according to these Neo-Marxist Theories, capitalist production exploits non-capitalist, not yet capitalist and weak capitalist areas.

This Neo-Marxist analysis has shown that people who engage in the capitalist sector as labourers are exploited by the capitalist economy. To cope with this exploitation, they depend on services that are provided in the non-capitalist areas (reproductive and care work, the sustaining of people who are temporarily or permanently expelled from the capitalist production, or even the feeding of active labourers). Even though the capitalist expansion often undermines the viability of non-capitalist areas (see chapter 5), they have to be maintained against all odds to sustain the people that are exploited by the capitalist production. This explains the persistence of non-capitalist areas despite the global expansion of the capitalist economy.

However, peasants cannot only cope with exploitation through the capitalist economy by maintaining non-capitalist areas. As noted before, some open peasant communities might also withdraw from the larger surrounding society. But resistance can also be expressed in direct interactions with the larger surrounding society and the capitalist economy. James Scott's (1976, 1985) study of peasants in Malaysia describes resistance of peasants to exploitation. If open resistance is not possible, peasants can develop so called weapons of the weak against powerful actors. Such weapons of the weak include anonymous threats, foot dragging, little acts of sabotage, poaching, smuggling, theft, desertion, gossiping about powerful actors, etc. In accumulation, such acts of resistance can be a real threat to powerful actors. In the examples of Scott, peasants use these weapons of the weak to resist exploitation through powerful actors.

Moreover, resistance of peasants to capitalist exploitation and a full integration into the capitalist economy cannot only be explained with their dependence on non-capitalist areas to survive in the capitalist economy. Ideological resistance of peasants to a full integration into the capitalist economy is also important. Such an ideological resistance to a full integration of peasants into the capitalist economy is formulated openly by la Via Campesina and adherents of Food Sovereignty concepts (see chapter 2.2), but can also be expressed indirectly through practices of peasants that do not follow the rationales of the economic man as described in neoclassical micro-economic theories. Such practices can be related to peasants' distaste for work, their need to secure a minimum income, specific adaptation to and of the ecological environment or specific cultural features of peasants. As noted by Benedict Tria Krekvliet (2009), unremarkable actions of peasants are already expressions of everyday politics in peasant societies. Following Scott's description of the weapons of the weak, Tria Krekvliet argues that the impacts of everyday politics of peasants should not be underestimated.

With regard to food systems, one can conclude that the capitalist mode of production in food systems, especially in agro-industrial food systems, is subsidised by non-capitalist production. Non-capitalist production, such as peasant subsistence production or non-remunerated reproductive work provides and sustains labour force for the capitalist production in food systems. In addition, peasant production and informal economic activities provide cheap goods and services for the capitalist production in food systems. Therewith, the capitalist production in food systems is subsidised by subsistence production, non-remunerated reproductive work and petty economic activities.

As described in chapter 4.2 agro-industrial food systems can be characterised by capitalist modes of production and features of the market economy. Domestic Food systems, on the other hand, can be characterised by non-capitalistic modes of production. Through the exploitation of the non-capitalistic mode of production through the capitalistic mode of production agro-industrial foods system exploit domestic food systems. In food systems that have both, features of capitalist modes of production and features of non-capitalist modes of production, exploitation is also possible within food systems. To consider these forms of exploitation, food systems should not be seen as co-existing along each other but as being strongly interlinked with each other.

The interlinks of food systems and the exploitation of the non-capitalist mode of production through the capitalist mode of production is backed by the so-called superstructure or superstructures. How superstructures, or in other terms rules and regulations that enable such exploitation, emerged and transformed over time through internal and external processes, how they are influenced and by whom is further elaborated in the next chapter.

4.6 Conclusion

With regard to my research questions (see chapter 3.2), the features of peasants, described in this chapter, affect how food systems influence economic activities and generally livelihoods of peasants and how peasants influence these food systems with their activities and strategies. Peasants are a group of heterogeneous actors whose economic activities, cultural features and interactions with others differentiates them from the larger surrounding society. Peasants might be profit maximising economic agents. This profit is not necessarily the sum of goods that have a monetarised value. It can also be the prevention of unnecessary drudgery. In this way peasants might not follow the rational of the firm as describe in neoclassical micro-economic theories (see Chayanov 1966 [1925]). Moreover, their actions are confined by a range of factors, such as the need to secure a minimum yield through minimax-strategies instead of seeking maximum yield (see Liption 1982 [1968]), impacts of ecological factors (see Steward 1955), the need to find an equilibrium between natural resources provision and

human consumption through the reduction of consumption or the enhancement of provision (see Rappaport 1968 and Boserup 1965), cultural features that foster homogeneity among peasant communities (see Foster 1965, Wolf 1957 and Cancian 1989), a specific position in global capital economies (see Frank 1969 and Wallerstein 1974), and different abilities of peasants in a heterogeneous community to react to and adapt to internal and external changes (see Barlett 1977, Cancian 1989, Ensminger 1992, Haller 2013). This leads to heterogeneous adaptations to external changes (see Barlett 1977 and Cancian 1989), exploitation through capitalist modes of production (see Marx 1962 [1867], Meillassoux 1975, Elwert 1982, Benston 1969, Morton 1971 and Luxemburg 1913) and adaptation or resistance to the expansion of the capitalist economy and its exploitation (Meillassoux 1975, Scott 1976, 1985, La Via Campesina 2007). Therefore, not only internal aspects of peasant communities but also external aspects that affect peasant communities and the way they affect peasant communities have to be considered in an analysis of such communities (Roseberry 1989, Ferguson 1990 and Haller 2013). With these specific features, peasants' economic activities and generally livelihoods are influenced by food systems in particular ways and, with their specific features, peasants influence food systems through their activities and strategies in particular ways too. How these aspects influence economic activities and livelihoods of peasants, and how peasants influence food systems, is greatly affected by institutional settings that are the product of historical and political transformations, negotiation, power-relations, discursive legitimatisation and individual strategies at various levels. How these aspects influence institutional settings is, as mentioned above, further elaborated in the next chapter.

5. New Institutionalism in Social Anthropology

To understand, how peasants' economic activities are influenced by individual decisions, ecological factors, their culture and their specific interactions with others and the global world, I draw mainly on theories that are subsumed under the label of New Institutionalism. This approach allows to analyse economic activities of individuals and groups with a focus on institutional settings that consist of formal and informal, as well as social and legal constraints, norms, values, rules, regulations and laws in the context of a changing political, economic, social and ecological environment. Thereby, as explained in the last chapter, economic activities describe all activities related to making a living, such as earning money to buy food or producing food for self-consumption. Economic activates do not necessarily follow the rational of the market but are embedded in social institutions and might be based on reciprocity or redistribution instead of exchange. In the case of my research, I focus on economic activities that are related with food systems. Since food systems provide food for one or more consumer groups as well as economic opportunities for involved actors, activities related with food systems are generally economic activities.

Theories of the New Institutionalism acknowledges that actors' economic activities and strategies are facilitated or restricted through institutional settings that are in turn shaped by power relations. Thereby, institutional settings structure actions and interactions of actors, for example through property rights. These institutional settings are nothing naturally given but the product of negotiations between different actors with different power relations. Moreover, institutional settings can be contradictory and conflictive (North 1990, Ensminger 1992, Toulmin 2008, Haller 2013).

North (1990) used the concept of institutions to describe how rules and regulations structure individual economic activities of actors. In his concept, he applied a revised rational choice paradigm that describes rational choice decisions not only as pure economic rationales but also as embedded in social institutions of a particular society (in other words, culture). Thus, according to North, rational choice decisions are not made in the empty space but within the guiding principles of social institutions. As such, social institutions, also just called institutions, structure actions and interactions, especially with regard to "economic activities, collective action and sustainable resource use" (Haller 2013: 16). If institutions work properly, they reduce transaction costs (North 1990) and allow for joint benefits from cooperation and collective action (Ostrom 1990).

Institutions are nothing naturally given nor fix, but frameworks that are temporarily accepted by a group of people to structure their actions and interactions (Ensminger 1992). Institutions can be located at different scales from the local to the global (Haller 2013). For my analysis of peasant engagement in food systems in the Mount Kenya Region I focus on local institutions as the rules of the

game for the operations within and between food systems. These institutions are nested in and linked to regional, national and international institutional settings and affected by broader economic, social, political and ecological changes. Local institutions are generally highly complex and nuanced (private property, common property, user rights etc.), but also conflictive and contradictory. Conflicts and contradictions emerge from institutional pluralism between and within different settings. In this case, institutional pluralism leads to processes of selection of institutions and legitimatory discourses by different actors based on their power to access and shape institutions and discourses in place. These selection processes are called institution shopping (see Toulmin 2008, Haller 2013).

With regard to food systems and their economic activities, access to natural resources is an important asset. The sustainability of food systems depends to a large extent on a sustainable use of the natural resource base on which they depend. Looking at Food System Sustainability therefore requires an analysis of how actors of food systems manage the use of natural resources. Most analysis from a New Institutionalism perspective deal with institutions (e.g. property rights) that structure access to natural resources. Property rights manage access to natural resources in different ways.

Elinor Ostrom (1990) has shown that private property regimes are not the only way of managing access to natural resources sustainably. Moreover, Jean Ensminger's (1992) analysis of institutional change shows that the negotiation of institutions that structure access to natural resources is affected by power relations and does not necessarily lead to the institutional setting that is overall most beneficial or fair but a setting that serves those with most power to influence the negotiation. The Theory of Access by Ribot and Peluso (2003) helps to understand how actors are able to act within a state of institutional settings that is influenced by these activities. In the following sub-chapters, I describe the theory of Ostrom about common pool resources management, Ensminger's theory of institutional transformation and Ribot and Peluso's Theory of Access. This allows a comprehensive examination of the New Institutionalism Theories used in my Thesis to understand, how peasants' economic activities are influenced by individual decisions, ecological factors, their culture and their specific interactions with others and the global world.

5.1 Common Pool Resources Management

With regard to food systems, food production depends on access to land and related natural resources. According to Elinor Ostrom (1990), an American Political Scientist, access to natural resources can be managed through private property institutions, it can be governed by the state, or it can be organised through common property regimes. If none of these management systems operates properly, a natural resource becomes an open access resource. This often results in over-exploitation of such a resource.

Many assume that the privatisation of natural resources internalises externalities.[49] Therefore, in the private owner's interest the natural resource is be prevented from destruction (Hardin 1968, Johnson 1972, Smith 1981). However, also the privatisation of natural resources entails problematic aspects with regard to a protection from destruction. According to Ostrom, privatisation does not necessarily thwart over-exploitation. It can be economically beneficial to over-exploit a resource if the possible gain from this over-exploitation can be re-invested in a manner that provides a higher benefit than the constant use of the same resource (e.g. if returns from saving money at the bank are higher than returns from sustainably using a forest, it is economically more benefitial to log off a privately owned forest instead of using it sustainably. See Clark 1977). Moreover, some resources are mobile (e.g. fish or water) or spread over vast areas (e.g. pastures or forests) and thus difficult to be controlled as individual property (see Ostrom 1990). If access to private property resources cannot be controlled effectively by the owner it can lead to an open access situation whereby everybody can access the resource and incur externalities with no restriction. Open access to a subtractable renewable resource leads to overexploitation and depletion of this resource. Other resources are difficult to disentangle (e.g. water and land, see Ostrom 1990) or entail overlapping, reciprocal or contested claims that involve the danger of rights being suppressed with the privatisation of particular resource (e.g. if land property is privatised, former user-rights may be extinguished and cultural landscape ecosystems become fragmented, see Toulmin 2008, Peters 2009, Haller 2013).

Also state control of natural resources can be problematic. State control often lacks profound knowledge about the local natural resource base, leading to inappropriate regulations, or, if the state claims to be to sole legitimate manager of a access to resources but is not able to exercise control in practice, a de facto open access situations emerges, whereby everybody accesses the resources with no restrictions (Acheson 1989, Ostrom 1990, Haller 2013). Moreover, state control of natural resources can wrest control over natural resources from local users to the state and eventually to private owners. This can result in a commodification of natural resources, the fragmentation of cultural landscapes and primitive accumulation, whereby local users lose access land and associated natural resources that are important for their resilience and as means of production. Through this process, they become forcefully integrated into a capitalist mode of production as proletarians (see chapter 4.2 and 4.5).

In two famous articles Garrett Hardin (1968, 1977) explained why commonly owned subtractable renewable resources are doomed to be overexploited and destroyed. With the game theory model of the prisoner's dilemma he explains why commonly owned resources (e.g. pastures) are inevitable over-

[49] Externalities are the costs of benefits that affect others who are not responsible for the incurrence of these costs or benefits. Theoretically, if a natural resource is privatised, the owner protects this resource from negative externalities affecting it because the owner does not want to bear costs caused by others without compensation.

exploited, leading to the well-known Tragedy of the Commons. According to Hardin, a commonly owned resource is inevitable over-exploited because benefits from using such a resource are privatised while negative effects of this use are shared by all users. In such a situation, everybody tries to maximise private benefits and therewith also maximises the negative impacts. An actor who does not maximise the private benefits still suffers, as anybody else, from the negative impacts caused by the others. To not only suffer from negative impacts caused by the others, everybody tries to benefit as much as possible, causing a maximum of negative impacts, leading to a tragic over-exploitation of this common.

On the basis of anthropological studies, Ostrom (1990)[50] rejected this premise and showed that various local communities were able to develop institutions that allowed to prevent a Tragedy of the Commons. With the selected anthropological examples, she explained how various local communities were able to develop institutions that allowed sustainable uses of Common Pool Resources (CPR) to jointly benefit from their use. These examples include commonly used pastures, but also commonly used irrigation systems, terraces, paths, corrals or huts. This shows that CPR are not only natural resources, protected from overuse, but also man-made resources that need to be maintained.[51] From these examples, Ostrom derived eight design principles of robust and sustainable common pool resources institutions.

Design Principles for Robust Common Pool Resources Management Institutions

(1) Groups that are appointed to use a CPR as well as the CPR itself have to be clearly defined with clearly defined boundaries.

(2) Rules for access to and use of the CPR have to be appropriate to the local context.

(3) The rules that manage access and use of the CPR have to be open to modification through the affected users to be adapted to changes and new contexts.

(4) The users must be monitored in a way that is accountable to the users themselves.

(5) Rule violation must be sanctioned gradually.

(6) There have to be mechanisms that allow conflict-resolution among users and between users and monitorers.

(7) The institutions must be recognized by external governmental authorities.

(8) The rules have to be nested into larger systems, thus in tune with institutions on a larger scale.

(Ostrom 1990: 91-102)

Figure 7: Table of Design Principles for Robust CPR Management Institutions

[50] Ostrom (1990) was the first to provide a detailed analysis of robust common property regimes. More recently, Lesorogol (2008) and Haller (2013) described institutional settings that structure access to CPR, such as pastures or fisheries.

[51] Through such collective action people are not only able to reduce the pressure on the ecological environment to an extent that does not exceed its carrying capacity but also to improve the resource base as described by Boserup in chapter 4.3.

Ostrom's design principles for robust common pool resources are generally well perceived. However, some authors argue that her depoliticised idea that such institutions are formed to allow benefits for all users of a common pool resource falls short. According to Haller (2013), cooperative resource use, as it is the case in joint CPR use, can be based on two principles: reciprocity[52] and asymmetric altruism. If cooperation is based on reciprocity all people involved in the cooperation benefit similarly from cooperation. If cooperation is based on asymmetric altruism, asymmetric power relations prevent equal benefit sharing. Powerful actors force weaker actors to accept an unequal distribution of benefits to their disadvantage. The disadvantaged might still accept this cooperation instead of not benefiting at all. Therefore, an analysis of access to CPR should also consider power relations as well as the negotiation of the rules and regulations that manage access to and the distribution of benefits from CPR. How actors with different bargaining power affect institutions that regulate cooperation is further elaborated in the next chapter.

With regard to food systems, access to land and associated natural resources is important for the production of food. Some of this access is organised through CPR management. For some domestic, local, regional and alternative food systems, access to resources through CPR management is important. The expansion of food production for agro-industrial food systems is often accompanied by a fragmentation and privatisation of former cultural landscape ecosystems and CPR that were important for food production in other food systems or as buffer do draw upon if stressors limited the ordinary food production (i.e. they were important for people's resilience as described in chapter 2.3). This leads to a marginalisation of already marginalised actors engaging in the other food systems (see Toulmin 2008, Peters 2009, Haller 2013, or in the context of the land grabbing debate Locher et al. 2012, Marfurt et al. 2016).

In addition to land and associated natural resources, institutional settings also structure other aspects of food systems, such as labour arrangement, or access to infrastructure and knowledge. For labour arrangements, one can differentiate between arrangements that are embedded in the market (wage-labour arrangements) and arrangements that are embedded in social institutions (e.g. kin based labour arrangements or bonded labour arrangements). How labour arrangements are structured influences if they entail exploitation as described in Marxist Theories. Institutions that structure labour arrangements are described in Marxist Theories as the superstructure (see chapter 4.2 and 4.5). Access to infrastructures and knowledge can also be organised differently. Infrastructure such as irrigation

[52] Haller distinguishes two types of reciprocity: reciprocal cooperation and reciprocal altruism. Reciprocal cooperation describes a cooperation whereby access to a resource is guaranteed to somebody or a group in exchange for access to their resources at the same time or later, or anything else of equivalent value. In reciprocal altruism, "the various people involved benefit from cooperating" without a balancing of individual benefits (Haller 2013: 17). For an easier understanding, I only talk of reciprocity.

systems, corrals, paths or huts can be privately owned and maintained but they can also be commonly owned and maintained. Similarly, knowledge can be organised as a commons with open access or privatised and protected by patents (see Hess and Ostrom 2007).

Moreover, food systems as such can be seen as a man-made CPR, similar to irrigation systems, corrals, paths or huts. Food systems thought as a CPR allow for different uses, the most obvious is the provision of food. Other uses are opportunities to carry out economic activities and benefiting from these activities (e.g. earning money from producing, processing or distributing food). Food systems are managed by a broad number of institutions from different institutional settings at various levels from local to global. Different actors involved in food systems have different power to shape institutions that affect how benefits from food systems are shared and therewith whether benefit sharing is reciprocal or asymmetric. Some food systems, especially agro-industrial food systems, tend to have few powerful actors dictating how benefits are shared. This results in a rather asymmetric sharing of benefits. To achieve Food Sustainability as defined in chapter 2.2, a democratisation and equal participation of all involved actors in the negotiation of institutions that affect benefit sharing within food systems is required. The next chapter shows how institutions that currently affect benefit sharing are negotiated by actors with different bargaining power.

5.2 Institutional Transformation

As mentioned above, institutions are nothing naturally given nor fix but frameworks that are temporarily accepted by a certain group of people to structure their actions and interactions. Jean Ensminger (1992) developed a model to analyse change of such frameworks and to include the role of power. According to Ensminger, institutions – the rules and regulations – are part of endogenous aspects of a society. Thereby, the negotiation, evolution, configuration or maintenance of institutions are the product of an interplay between endogenous aspects of a society with external factors. Interactions between ideology, institutions, organisation and bargaining power – the endogenous

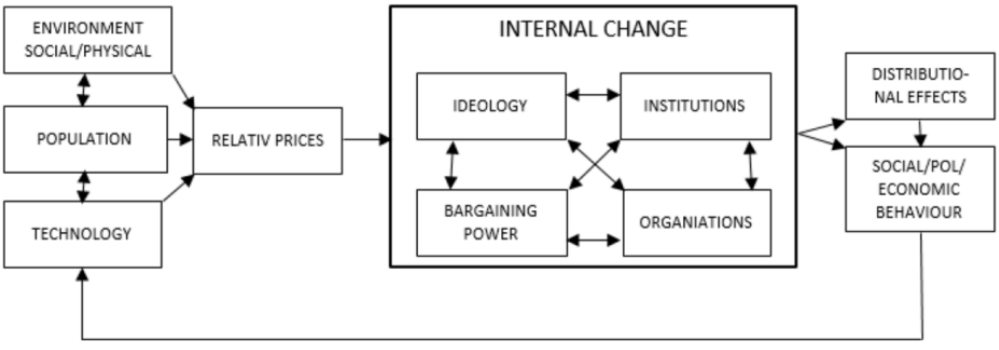


Figure 8: Schematic Figure for Modeling Change

(Ensminger 1992: 10)

aspects of a society – are affected by changes in relative prices that represent the external factors (see figure 8).

In the context of food systems, it has to be noted that a society describes a group of people. Such a group of people can be a closed corporate peasant society as described by Wolf (1957) or Foster (1965), a group of peasants reacting heterogeneous to external changes, such as the peasants described by Bareltt (1977), or a group of people engaging in the same food system or sections of it (e.g. a production company). As Frederik Barth (1969) noted in his renown book on Ethnic Groups and Boundaries, people are generally members of different groups or societies and their membership is situational and contextual.

Relative prices are, according to Ensminger (1992), prices for goods and services. In her model, changes in relative prices are affected by ecological, social and physical transformations, population changes and technology development. According to Ensminger, the ecological, social and physical transformations, population changes and technology development are affected by distributional effects and social, political and economic behaviour. These aspects in turn are affected by endogenous changes. Haller (2013) adds macroeconomic and political changes to the three influencing factors of relative prices described by Ensminger. How macroeconomic and political changes, such as the expansion of the capitalist mode of productiion, affect peasants is analysed in various peasant theories (see Wallerstein 1974, Bareltt 1977, Roseberry 1989, and Cancian 1989).

With regard to food system theories, ecological, social and physical transformations, population changes and technology development as well as macroeconomic and political changes can be translated into the systems of embedding environment of a food system that influences its internal subsystems. As such, changes in the ecological systems, the cultural, spiritual, ethical and ideological systems, the economic systems, the knowledge and information systems, the institutional systems and the physiological systems (see figure 2 in chapter 2.3) cause changes in relative prices and therewith affect endogenous aspects and internal change.

With regard to the endogenous aspects, according to Ensminger, ideologies are “values and beliefs that determine people’s goals and shape their choices” (1992: 11). Such goals can be inconsistent and include values from narrow economic self-interests to concerns of well-being of others. Ideologies are not fix or immutable but influenced by institutions, bargaining-power and organisations. Ideologies are used to legitimise claims to alter or maintain a specific institutional configuration (1992: 5-6). Haller (2013) explains that the analysis of discourses and narratives allows to understand how ideologies and actor’s strategies are framed and legitimised. Different discourses and narratives can be used to apply ideologies that fit actor’s interests and goals. For example, discourses on modernity and tradition that associate modernity with development and tradition with underdevelopment can be used to lobby for

change (see remarks by Ferguson 1990 and Escobar 1992 in chapter 4.2). Other discourses about modernity and tradition that associate modernity with exploitation of natural resources and tradition with their preservation can be applied to lobby for the opposite. Successful implementation of ideologies, discourses and narratives alters the bargaining power of negotiating actors.

Organisations are the body of collective action, "the groups' people form to achieve their goal". Such groups are formed to campaign for changes or maintenance of institutional configurations or underlying ideologies (Ensminger 1992: 6). If cooperation in such organisations is based on reciprocal altruism, the various involved people benefit equally from the cooperation. If people benefit differently from cooperation (e.g. through the so-called free-rider problem or unbalanced power relations within the group), cooperation in such a group is called asymmetric altruism (see above). Similar to ideologies, successful collective action alters the bargaining power of negotiating actors.

Institutions are the rules and regulations, as described above, that structure actors' interactions, access to resources and also the negotiation of change and maintenance of the institutional setting itself. Institutions can be formulated by states, corporate private companies, local communities, specific actor groups etc. Formal institutions are formalised, often written down laws. Informal institutions, also referred to as 'customary laws', are institutions that emerge from practice that becomes accepted by a group. Often several parallel institutional settings exist (e.g. state-laws and local informal practices). If institutional settings are conflictive or contradictory, actors may try to apply the setting that is most likely to rule in their favour. As mentioned before, this practice is called institution shopping. Such practices lead to situations in which people do not know which institution will be applied in the case of a contention. To cope with this insecurity, they may try to secure their rights in as many settings as possible (Toulmin 2008: 13).

Bargaining Power describes the ability of actors to implement institutions, organisations or ideologies. As described before, this bargaining power in turn is affected by institutions, organisations and ideologies. Ribot and Peluso (2003) note that the bargaining power of actors also depends on their ability to mobilise resources, such as money, social capital, knowledge etc. (see next sub-chapter). Using their bargaining power, actors aim at implementing institutions, organisations and ideologies that serve them most in achieving their goals. However, James Scott (1985) noted that actors with less bargaining power are not powerless. If open resistance is not possible, people with little bargaining power can develop so called weapons of the weak against powerful actors (see chapter 4.5).

With her model of institutional transformation, Ensminger combines "the individual-actor approach of economics, anthropology's appreciation of institutional constraints, incentives, and ideology, and the attention to power that we associate with Marxist analyses" (1992: 1). At the centre of her analysis are individual actors' activities and strategies. These activities and strategies are influenced by ideologies,

institutions, bargaining power and organisations. At the same time actors are able to manipulate these aspects.

Ensminger's model enables an understanding of how institutions that govern peasants' access to natural resources as well as other food system relevant activities were formulated and are constantly re-negotiated. Moreover, the model shows how the negotiations of food system relevant institutional configurations and the selection of institutions and legitimately discourses in the case of pluralism (institution and discourse shopping) are influenced by power-relations that are affected by endogenous and external changes. The impacts of prevalent institutional settings on distributional effects that affect negotiation processes of the institutional settings via relative prices create aggregating feedback-loops. Actors with power to shape and select institutions chose those institutions that are mostly in their favour. This again affects distributional effects in their favour and further enhances their bargaining power. This can result in a consolidation of power imbalances. Such a consolidation of power imbalances can be observed in the wake of the commodification of natural resources and primitive accumulation for example.

The Theory of Ensminger enables an analyse of how features of a peasant society (such as economic rationales, the natural resources basis, culture or the heterogeneity of a society) as well as external changes (i.e. changes in the embedding systems of food systems, such as changes in the population, the expansion of the capitalist mode of production) influence the configuration of the institutional setting that structures peasants' access to natural resources, economic activities and benefits from these activities. The Theory of Access by Ribot and Peluso (2003), outlined in the next sub-chapter provides a beneficial approach to further analyse how peasants operate in the context of specific institutional configurations and individual capabilities to benefit therefrom.

5.3 Theory of Access

As much as individual activities are not independent rational choice economic decisions, the much they are not determined by institutions. Ribot's and Peluso's (2003) Theory of Access provides a beneficial perspective to distinguish between the above described right to benefit from something, and access, the actual abilities to do so. According to their theory, rights at one hand, describe "an enforceable claim to some use or benefit of something […], acknowledged and supported by society through law, custom, or convention" (i.e. acknowledged and supported by the institutional setting). Access, at the other hand, describes "the ability to benefit from something" (2003: 155).[53] Access, the ability to

[53] Also Ribot and Peluso explain their theory with examples of rights and access to land and associated resources. However, their theory can be easily expanded to analyse rights and access to all relevant means of production of food systems.

benefit from things, depends largely on the right to do so, but not only. One can have rights to benefit from something but is not able to do so in practice. For example, “someone might have rights to benefit from land but may be unable to do so without access to labour or capital” (2003: 160). In other terms, one has property rights (the right to benefit) but no access (no ability to benefit). At the other hand, one can have access without having the right to do so. In this case, access is achieved illegal or illicit (i.e. not socially accepted by one or more conventions), for example, by using force, deception or taking advantage of a governing position (2003: 164). In addition to the right-based mechanisms of access, Ribot and Peluso developed structural and relational access mechanisms. With this differentiation Ribot and Peluso developed a theory to look at who actually benefits from things and not only who is allowed to do so. Moreover, their theory allows to analyse which processes are in charge that some actors are able to get access and others not.

Ribot and Peluso distinguish three different actions with regard to access: gaining access, maintaining access and controlling access. Gaining access describes “the process by which access is established” (2003:159), maintaining access describes the activities to maintain access. These activities include the expense of resources and power to keep access to a specific resource. Controlling access describes the ability to control one’s own and others’ access to a specific resource. Those who cannot control access to a specific resoruc must gain and maintain their access through those who control it. This can result in a negotiation of benefits division. Actors who get access to resources that others control, often have to transfer some benefits to those in control of the resource. However, the person who controls access to one resource might have to seek access to other resources controlled by other actors. Because people control access to one resource but have to seek access to others, Ribot and Peluso reject the clear-cut Marxist class division between those owning the means of production and those with no access to them (see chapter 4.2). According to Ribot and Peluso, control over and access to resources as means of production is more fragmented.

In addition to right-based mechanisms of access, access depends on structural and relational access mechanisms. Ribot and Peluso distinguish eight structural and relational access mechanisms:

Right-based mechanisms of access	Structural and relational access mechanisms
- property rights, user rights, etc. that are formulated and re-negotiated as described by Ensminger (1990) and Haller (2013) in chapter 5.2	- access to technology - access to capital - access to markets - access to labour and labour opportunities - access to knowledge - access to authority - access through social identity - access via negotiation of social relations

Figure 9: Table of Mechanisms of Access

Access to technology describes access to various means that are needed to be able to benefit from a resource. Technology is understood broadly, reaching from a fence that allows to control who can access a resource, to pumps that allow to fetch deep groundwater and as such physically access a resource, roads and vehicles that facilitate transport and as such allow rural people to reach urban markets, or weapons that help to defend right-based access or the enforce illicit access (Ribot and Peluso 2003). Technology as described here could also be described as equipment that only becomes a useful technology if it is combined with knowledge and know-how for its use.

Access to economic capital[54] has a great impact in enabling access. Access to economic capital can be transformed into "service of extractions, production, conversion, labour mobilization, and other processes associated with deriving benefits from things and people" (Ribot and Peluso 2003: 165). Moreover, access to economic capital can be used to purchase rights (property rights, access rights, etc.) or to purchase illegal forms of access (e.g. through bribery). Access to economic capital can result from access to wealth or credits, or access to markets.

Access to markets refers to "the ability to commercially benefit from resources" or "the ability of individuals or groups to gain, control, or maintain entry into exchange relations" (Ribot and Peluso

[54] Ribot and Peluse call this access mechanism simply "access to capital". In Social Anthropology, capital is often used in a broader meaning and can be used to describe economic, cultural or social capital (see Bourdieu 1983). In the paper, Ribot and Peluse clearly refer to economic capital. Social and cultural capital are described in the access mechanisms of access through social identity and access via negotiation of social relations. To prevent misunderstandings, I added this clarification in the designation of this access mechanism.

2003: 166). Good market access increases the benefit from access to resources. Market access is affected by different structures and processes, such as "access to capital […], structures of monopsony, exclusionary practices and forms of collusion among market actors, or support by state policies delimiting the acquisition of professional licenses and access fees" (2003: 166). Moreover, markets change and therewith relative prices (see chapter 5.2). As such the value of a product and benefits from access to a resource can change through market processes at local to global scales. This can also result in changes in property rights and bargaining power of actors. However, not all products are commercialised at the market. People might also use products for self-consumption or non-market based forms of exchange (see chapter 4). Therefore, the concept of access to markets has to be enlarged to a general ability to make good use of products.

Access to labour and labour opportunities has a great impact on who benefits from resources. Extracting benefits from a resource generally requires labour force, one's own or that of others. If somebody cannot provide enough labour force to extract the benefits from a resource to one this person has access to, this person needs to acquire labour force of others. Labour force can be acquired through the sharing of the benefit gained from using a resource, through social relations or through force. At the other hand, if somebody is reward for providing the labour force required to extract the benefits from a resource to which this person has no direct access, the person can benefit from access to a resource without having an own direct access to it. Such a reward can be in the form of a salary or a share of the benefit generated by the work carried out. Marxist Theories associate access to resources, or in their term, means of production, with the control of labour opportunities and a possibility to exploit labourers (see chapter 4.2). With the control of labour opportunities one can benefit from resources, as well as from the control of the labour opportunities. If labour force is sparse, those who desire labour opportunities can benefit more from their labour provision. If labour force is affluent, those who control access to labour opportunities benefit more from the labour provision.

Access to knowledge is important to benefit from a resource. For example, as mentioned before, knowledge is required to apply equipment. Such knowledge could also be described as know-how. Other important knowledge is information, such as information about product prices or market potentials. A certain knowledge is only meaningful in a specific economic, social, cultural and ecological context. Thereby, control of knowledge, know-how and information greatly influence possibilities for benefits. For example, if somebody has know-how to carry out a certain task this person can use this to get better access to labour opportunities. Or, if a merchant can deceive rural peasants about prices in urban markets he or she might get lower prices to purchase products. Control of knowledge is also achieved through control over framing knowledge and discourses. Such a framing is again associated with power and shapes power relations (Ribot and Peluso 2003). As described in chapter 5.1, rights to knowledge can be private, protected by patents, or open for everyone.

Access to authorities who have a good ability and legitimisation to influence the formulation and implementation of laws or regulations has a great influence on who benefits from a specific resource. Access to authorities can be sought legally and illegally or illicitly. Access to economic capital has a great influence on individual access to authorities. If authorities live fare away, one might not have enough money to go and see them (Ribot and Peluso 2003). Here, I would add, that social relations are also important for access to authorities, especially in informal contexts. Similar to institutional settings that can be conflictive and contradictory, the role of authorities can be so as well. This can lead to so called institution shopping, where actors try to use the notion or authority in an institutional setting that suits them best (see chapter 5.2).

Access through social identity describes access on the basis of social identity or membership in a community or group. Access is in many contexts only granted to specific groups. For example, access to common pool resources (as described by Ostrom) is characterised by access for a specific group and exclusion of non-members. However, social identity and membership in groups is nothing natural or clear. With his constructivist concept of ethnicity, Barth (1969) explained how group boundaries and memberships are constructed through mechanisms of inclusion and exclusion. According to him, socially relevant factors that distinguish one group from others are selected and emphasized to create and maintain boundaries. Thus, ethnic boundaries between groups are not the sum of fix objective differences but socially constructed and therefore fluid and flexible. Further, according to Cohen (1978), ethnic boundaries are multiple and include overlapping ascriptions that are situational and contextual. “The same person can be categorized according to different criteria of relevance in different situations” (Handelman 1977: 192 in Cohen 1978: 338). According to Ribot and Peluso, “competing identity discourses and the resurrection, invention, or telling and totalling of history can also be a discursive means of controlling or maintaining access” (2003: 171). Thereby, access does not only refer to access to resources but can refer to access to other structural and relational access mechanisms as well, e.g. access to markets.

Access via negotiation of social relations such as “friendship, trust, reciprocity, patronage, dependence and obligations” is important for all other structural and relational access mechanisms (Ribot and Peluso 2003: 172). Thus, social relations are important for access to resources. A good web of social relations can also be seen as social capital as it is described by Bourdieu (1983).

These structural and relational access mechanisms are often entangled with each other and access to one mechanism can be converted into other access mechanisms. The ability to benefit from something thus depends on right-based access mechanisms as well as structural and relations access mechanisms. According to Ribot and Pelsuo “the various mechanisms of resource access form the constitutive [material, cultural and political-economic] strands of bundles of power from which resource benefits

are gained" (2003: 173). Bundles of power are nodes in larger webs of powers whereby power that affects peoples' access to resources is "embodied in and exercised through various mechanisms, processes and social relations" (2003: 154). Access relations are "always changing, depending on an individual's or group's position and power within various social relationships. Generally, people have more power in some relationships than in others, or at some historical moment and not others. […] Different political-economic circumstances change the terms of access and may therefore change the specific individuals or groups, most able to benefit from a set of resources" (2003: 158).

In Ensminger's model, bargaining power, the power to negotiate rules and regulations, depends on actors' abilities to apply ideologies, institutions, and collaboration in organisations. These endemic aspects are in turn affected by external factors that affect relative prices. Ribot and Peluso describe power as mechanisms, processes and social relations that enable actors to gain, maintain or control access. Access depends on actors' abilities to use different capitals for a specific access. What Ribot and Peluso add to the analysis of Ensminger or Ostrom is that access, the ability to benefit from something, does not only depend on the right, embodied in the intuitional setting, to do so. Despite the role of rights, according to Ribot and Peluso, a broad range of structural and relational access mechanisms can be combined to gain access and access can be achieved also illegally or illicitly. At the other hand, Ribot and Peluse remain vague on how institutions, that also matter in their theory, emerge and structure peoples' possibilities to access the various capitals. Moreover, they are rather silent on how external factors affect the interplay between right, structural and relations based access mechanisms. Only a combination of these two theories enables a meaningful analysis of how institutional settings affect food systems influence economic activities and generally livelihoods of peasants and how peasants influence these food systems with their activities and strategies.

5.4 Conclusion

Institutions are formal and informal rules and regulations, norms, values and laws at various scales that structure economic activities, access to natural resources and interactions of people.[55] Ribot and Peluso (2003) have shown that institutional settings do not translate directly into economic activities and access to natural resources. Economic activities and access to natural resources also depends on heterogeneous actors' abilities to carry out such activities or access resources. These abilities are in turn greatly, but no only, affected by institutional settings. However, these institutions are nothing naturally given nor something fix that has always been there, nor something that emerges directly from the prevalent mode of production. Institutions are the result of constant negotiation processes

[55] Institutional settings are described by Substantivists as social institutions of economic activities (see chapter 4). Marxists describe them as superstructure (see chapter 4.2). In Food System Theories, they are called the Institutional Systems and Institutional Subsystems (see chapter 2.3).

that are influenced by power relations. These power relations are influenced by external changes, such as economic, ecological, political, or demographic changes, at various scales from global to local, and internal factors, such as the ability of actors to adopt legitimatory ideologies and the ability of actors to form collective organisations. External and internal aspects are in turn affected by outcomes of prevalent institutional settings. This creates feedback-loops that consolidate power imbalances in the negotiation processes of institutional settings (see Ostrom 1990, North 1990, Ensminger 1992, Haller 2013). The specific features of peasants, as described in the last chapter, shape internal and external aspects of peasant groups and how peasants perceive institutional settings and their transformations.

With regard to food systems as described in chapter 2.3, institutional settings can be seen as the Institutional Systems that are part of the embedding environment of a food system. These Institutional Systems are affected by Ecological, Economic, Knowledge/Information, Cultural/Spiritual/Ethical/ Ideological and Physiological Systems and transformations in these Systems (see figure 2 in chapter 2.3). The model of Ensminger provides a good explanation of how these Systems affect the Intuitional System and vice versa.

As shown in chapter 4.5, the expansion of the capitalist world through state led colonialism and the spread of neo-liberal economic models through globalisation processes have profoundly changed power relations and institutional settings through transformations of property rights from communal to state and eventually private property and a fragmentation of cultural landscapes. Such enclosures and the commodification of natural resources dispossessed peasants and other non-capitalist actors of their access to natural resources that were their basic means of production and natural resources that enhanced their resilience to cope with crisis. These losses forced peasants and other non-capitalist actors to integrate into the capitalist mode of production as labourers or petty producers. In weak bargaining positions, they had little say in the negotiation of institutions that regulated their activities (e.g. terms of employment) in the capitalist sector on which they depended now. This weak bargaining position in the negotiation of institutions resulted in a shaping and selecting of the plural institutional settings that enabled their exploitation. To cope with this unfavourable integration into the capitalist economy, these actors still depend on non-capitalist areas. Therefore, these non-capitalist areas (e.g. peasant subsistence production or unpaid reproductive work) have to be maintained against all odds. With the indispensable subsidisation of people that are exploited by the capitalist economy, the subsistence sector is also exploited through capitalist production. In addition to this adaptation, different forms of resistance to the capitalist exploitation exist. Nevertheless, current institutional settings are generally favourable for capitalist producers, exploiting labourers and the reproductive work in the remaining non-capitalist areas.

With regard to food systems (see chapter 2.3), the expansion of the capitalist world triggered a transformations of institutional settings (i.e. embedding Institutional Systems) and Institutions Subsystems in all kind of food systems in a way that strengthened capitalist and market economy features in these food systems. This generally strengthened agro-industrial food systems that are mainly characterised by these features. Non-capitalist features of food systems and especially domestic food systems were marginalised at the same moment. This can explain the observed transformation towards agro-industrial food systems. With regard to the research question of this Thesis, the expansion of the capitalist world and the resulting current institutional settings that transformed food systems as described just above greatly affect the influence of food systems on economic activities and generally livelihoods of peasants and how peasants influence these food systems and their plural institutional settings with their economic activities and strategies.

However, these transformations and the current situation do not affect all peasants the same way:
First, not all peasant groups are affected similarly by the expansion of the capitalist world, enclosure and commodification of natural resources and the transformation of food systems because this does not occur the same way or at the same pace all over the world.
Second, transformations affect peasant groups differently than larger surrounding societies and they do not affect all peasant groups the same way because peasants have specific economic activities, cultural features and interactions with others that differentiated them from others. Peasants might be profit maximising economic agents, but they also might prevent unnecessary drudgery or need to secure a minimum yield through minimax-strategies (see chapter 4.1). Moreover, they are affected by ecological factors and they develop specific features to reduce pressure on the ecological environment or to improve the provision by the same in order to balance the natural resources provision and human consumption (see chapter 4.3). Peasant groups can have specific cultural features that foster homogeneity among peasant communities (see chapter 4.4), they have a specific position in global and capitalist economies (see chapter 4.2 and 4.5) and different strategies of resisting capitalist exploitation (see chapter 4.5). This affects the negotiation of institutional settings that structure economic activities and interactions of peasants and the way they manage access to natural resources (see chapter 5.1 and 5.2).
Third, within a peasant group, different individuals also have different abilities to react on transformations and the current situation (see chapter 4.5). Prevalent institutional settings provide different actors with different opportunities to benefit (i.e. to access bundles of power) in a specific situation and to influence institutional settings to their advantage (see chapter 5.2 and 5.3).

Prevalent institutional settings, external and internal transformations, thereby affected power-relations that influenced the negotiation processes of shaping and selecting plural institutional setting, and the heterogeneous access of individuals to strands of power greatly affected the performance of

food systems with regard to Food System Sustainability, as well as how food systems influence economic activities and generally livelihoods of peasants and how peasants influence these food systems with their activities and strategies. How these aspects affect Food System Sustainability and peasants' engagement in food systems cannot be answered generally. The particularities of the influences on Food System Sustainability and peasants' engagement in food systems have to be explored carefully in every case.

In the ensuing chapters, I explore in a specific case, how transformations and the current situation influence peasants' engagement in food systems. Therefore, I analyse how the institutional setting that structures food system relevant economic activities of different peasants in the region north-west of Mount Kenya is affected by the various broader changes, the current situation and peasants' activities and strategies. Before presenting the findings of my research, I explain how I carried out the research providing these findings.

6. Research Methods

As part of the inter- and transdisciplinary research project on Food Sustainability, I carried out inductive in-depth ethnographic research on peasant engagement in food systems in a region north-west of Mount Kenya between September 2015 and November 2016. This region had been selected by the research project together with a region in Bolivia because in both countries the Right to Food is well recognised in the legislation at the national level but hunger and food security persist in practice. Land in the specific region under study is used for many purposes which include export-oriented horti- and floricultural production for agro-industrial food systems, large-scale wheat and beef production, small-scale horticultural production as well as pastoralists' production, for local and regional food systems. Moreover, the region is home to a broad range of agro-ecological zones and people from different ethnic groups. In addition, scientific collaboration to study this area already existed before the project set off (see chapter 3.1).

My analysis of peasant engagement in food systems in the region north-west of Mount Kenya shows how peasants with their specific features operate in the context of the interlinked co-existing food systems in this region. Such an analysis reveals how the specific features of peasants[56] in this region affect power relations that influence the negotiation of the plural interlinked and overlapping institutional settings that promote or constrain their specific economic and food system relevant strategies and activities. Moreover, my analysis shows how peasants' perception of these institutional settings and their negotiation shapes their heterogeneous economic activities and strategies to adapt to or to adapt the institutional settings in the context of the co-existing food systems in this region.

Such an analysis enables to describe how the plural food system relevant institutional settings and their perceptions are transformed through global processes and specific features of peasants and how this shapes distributional effects of food system, links between co-existing food systems, relevant activities and strategies of peasants, and power relations that shape the negotiation process of these institutions.

In order to grasp the specific features of peasants in this region, their impact on the negotiation of the plural interlinked and overlapping institutional setting, peasants' perception of these processes and peasants' strategies to operate in such a context, inductive ethnographic research is a beneficial research method. Inductive ethnographic research enables to include and understand different actors' perspectives, knowledge, experience and strategies. This also enables to uncover aspects that are of

[56] The specific features of peasants are described in chapter 4. They include micro-economic behaviour of peasants, specific features of their culture and interactions with the ecological environment, as well as specific features of their position in and heterogeneous interactions with the global capitalist world.

importance to peasants and their operations in this context but might be overseen by more deductive research approach that do not enable the subjects of a study to influence its course and foci (see chapter 3.2).

6.1 Ethnographic Research and Analysis Methods

Carrying out an inductive in-depth ethnographic research requires a long research stay in which the researcher resides among the people being studied. William Halse Rivers (1913) was the first to call for this type of research. In his famous book, *Report on Anthropological Research Outside America*, he stated that "a typical piece of intensive work is one in which the worker lives for a year or more among a community of perhaps four or five hundred people and studies every detail of their life and culture" (1913: 7). As emphasised by Bronislaw Malinowski (1992 [1922]), only when living for a long time within a community one studies, the community's social structures, connections and characteristics, and the community members' heterogeneous positions, experiences and perspectives can be understood on their own terms. The postulation to study social structures, connections and people's perspectives on their own terms remained a core aspect in Social Anthropology despite some profound changes within the discipline, such as the definition of the research object (see, for example, the analysis of group differentiation by Barth (1969)), and severe criticism of ethnographic research methods (see, for example, the critiques of Clifford and Marcus (1986) and Marcus and Fischer (1986) during the writing culture debate). Therefore, the need to understand social structures, connections, characteristics, knowledge, experiences or perspectives on contested issues from various affected actors' perspectives for its thorough understanding has been highlighted in ethnographic research since the turn of the last century and more recently also in the new field of transdisciplinary research (see chapter 3). To carry out an inductive in-depth ethnographic research with such an aim, various methods have to be applied and combined.

Living with the community being studied enables us to carry out participant observation. Participant observation is a typical social anthropological method established by Bronislaw Malinowski (1992 [1922]). This method has been regularly adapted during the history of the discipline. To carry out participant observation, the researcher participates in everyday activities and special incidents in order to directly observe how people perform in different situations. As such, this method enables the observer to study the different social, economic or cultural behaviour of people in diverse situations. This also helps one to observe things that were omitted in interviews or that were not asked by the researcher. Thus, this method can reveal previously unanticipated aspects. Moreover, participant observation leads to a multitude of opportunities for interviews that could not be planned in advance (for example, interviews about specific incidents directly after the incident occurred or other

coincidental interviews with various people). Insights from participant observation are noted in a research diary for later analysis. A researcher can never observe everything. Observation is already a first step of selection and interpretation. To create objectivity, researchers need to be aware of how their background affects their selection and interpretation of their observations. This can be achieved by enforced broad and focussed observation and thorough reflection (see Hauser-Schäublin 2003, Bernard 2006, Crang and Cook 2007).

In addition to participant observation, various forms of qualitative and quantitative interviews are important for ethnographic research. Interviews open access to the emic perspectives and the perceptions of the interviewed person. Different forms of ethnographic interviews exist. Informal and unstructured interviews resemble open talks and give maximum space for the interviewed persons to develop their own narrative on their own terms, at their own pace. Such interviews enable for the discussion of topics that are of importance to the interviewed person and thus enable the discovery of new topics that might have been overlooked otherwise. Such interviews can provide unanticipated information of which the research did not think to consider previously. Semi-structured interviews are based on an interview guide but keep the qualities of unstructured interviews. The interviewer notes the topics he or she wants to address but does not try to exercise excessive control over the course of the interview. Biographic interviews are a type of semi-structured interviews in which the interviewed person is asked to recount the history of his or her life. Biographic interviews give insight into the conscious, memory, interpretation, structuring and concepts of identity of the interviewed person. Structured interviews follow strict parameters. They can also be carried out with questionnaires. Structured interviews provide qualitative or quantitative data by following a clear and pre-defined structure. As such, they give less space for the interviewed person to express his or her own perspective. To ensure that the right questions are asked, the planning of meaningful structured interviews requires already established and solid knowledge of the local context. Structured interviews are carried out for household surveys on the basis of a questionnaire for example. A further interview technic is the focus-group discussion, whereby a group of people meets to discuss a specific topic. This method opens insights to the interests of a specific group and how discourses are framed. Interviews do not necessarily take place at a specific location but can be carried out as transect walks[57] or during inspections of specific places or buildings. Interviews can be recorded and later on transcribed or noted down during and after the interview if recording is not possible or feasible (Schlehe 2003, Bernard 2006, Crang and Cook 2007).

[57] Transect walks describes walks with actors to learn about their spatial perception and to discover and observe the area (e.g. to learn about locally important borders, ecological zones, vegetation, etc., for further elaboration see Chambers 1994).

Additional information can come from written texts and graphics, such as written regulations, contracts, treaties, manifests, instructions, maps, sketches etc. Written texts and graphics can be provided by local actors but can also be found through archive work and internet research. Such written information can be valuable but should not be overrated because such information is as much subjective and partial as information provided verbally. The background of information needs always to be included in its analysis (Bernard 2006). National statistics provide demographic data and statistical information on socio-economic as well as ecological aspects. However, these data has to be considered with caution as well because in some countries the data base is rather poor and not well adapted to specific local realities (see Jerven 2013)

Ethnographic research includes a mixed method approach that combines qualitative and quantitative methods. It is left to the researcher to apply a mix of these methods that is most appropriate to the given context and the given research question (Bernard 2006). Moreover, when studying social processes, one studies something that has no clear spatial borders, no absolute beginnings nor ends. Social processes have to be followed to where they reach and from where they are influenced. A pre-defined clear cut isolation of the research field would only prevent that the researcher finds the processes that actually matter in a given context. Therefore, the sample for interviews as well as for participant observation has to be selected carefully. Ethnographic research generally deals with smaller purposive samples adapted and adaptable to the research purpose. The sample should cover the range of important actors but should be small enough to enable sufficient time for in-depth analysis. In addition, ethnographic research is not comparable to laboratory experiments with clear parameters. Ethnographic research is embedded in a world with permeating, overlaying and contradictory processes in which the ethnographic research is not an objective outside observer but an embedded actor that influences the study setting as every other actor involved. This has implications for ethnographic research. The researcher has a gender role, comes from a specific origin, has other individual characteristics and knowledge, has social relations, etc. All these aspects influence how he or she is perceived by others and how he or she interprets information provided by others. Because these factors have a great influence on the research but cannot be eliminated, the researcher has to constantly self-reflect his or her doing as well as the relationships he or she has with others in the field and how this might affect the research (Crang and Cook 2007, Przyborski and Wohlrab-Sahr 2014).

Notes in the research dairy, transcribed interviews and other written or graphic information can be analysed by coding and memoing, an inductive method to analyse the collected data (Emerson et al. 1995). For coding and memoing, the data is categorized line by line with tags or codes to identify patterns within the data. The tags or codes used are developed by analysing the data. Thereby, the

framework for analysing the data is developed inductively on the basis of the data itself and not from preconceived theory. However, contrary to the grounded theory approach's assumption that data gathering and analysing are two distinct tasks, Emerson et al. (1995) argue that data cannot be taken as uninfluenced raw material because already the data gathering itself was influenced by analytical processes and theoretical commitments of the researcher. Thus, ethnographic research is both, deductive and inductive.

6.2 Research in the Region North-West of Mount Kenya

Similar to Malinowski, when I arrived in the field, I some resource persons who know the region and provided first contacts to people living there helped me setting off for the research. However, I did not arrive at a remote island by coincident but selected a specific location to carry out my research. Once the study area had been selected by the research project of which my studies are part (see chapter 3.1), I started to read available academic and general literature on this region, reaching from geo-physical descriptions of the area to socio-economic analysis of transformations in the area and from general historic and political descriptions of Kenya to specific description of ethnic groups living in the area and their history. The CDE has a close scientific collaboration with CETRAD for years what produced a great number of scientific publications on this area. To avoid a potential bias towards previous knowledge on the region I aimed to analyse not only these texts but also texts that were written by authors with no direct connection to CDE or CETRAD. From the analysis of the literature I developed first ideas of how I could carry out my research, what to consider when selecting the location of my research and what to look at during my research. At the same time, I reflected on how my previously acquired knowledge and imagination of the study region and its people might influence my research focus and might cause blind spots.

To facilitate communication in Kenya, I took Swahili lessons in Switzerland before starting my research. Swahili is a commonly spoken language in Kenya and Tanzania. Kikuyu is the common language of the people living in the study area but I was not able to learn Kikuyu in Switzerland. However, as most people also speak English it was only a minor disadvantage that I learned only a few phrases in Kikuyu during my research stays.

During first project meetings in Switzerland and Kenya I could establish contact with CETRAD. Once I arrived in Nanyuki for my first field trip, CETRAD supported me in selecting the location to carry out my research on the basis of my previously developed criteria for this selection. Moreover, CETRAD supported me in establishing first contacts with local peasants. We went to visit several peasants living in the study area. On the basis of my previously developed criteria I selected a peasant household with which I would live during my research stays. During the research, I acted independently from CETRAD.

I decided to stay with an elderly land-owning couple that lived in the study area and engaged in peasant agricultural production and livestock keeping, trade of agro-chemicals and was active in several local self-help group. Their children had already left the household, but at some time, they took care of two of their granddaughters. They lived in the vicinity of Mwireri, had an additional room in their house to accommodate me and overall, they were very enthusiastic to host me. Mwireri is a cluster of small shops, workshops and restaurants about 10km north-west of Nanyuki (for a further description of the socio-economic and ecological characteristics of Mwireri and its surroundings see chapter 8). For my research, I did not clearly define my field geographically, temporarily or demographically. In an inductive manner, I followed social processes that mattered in this local context to where they reached and from where they were influenced. By doing so, I focused at peasants living in a radius of approximately 2,5 kilometres around Mwireri. Additionally, I interviewed actors and observed activities that were important for my research outside this radius.

Between September 2015 and November 2016, I carried out three research stays in Mwireri of six months in total. The splitting of my research into three research stays enabled me to already analyse some data and better reflect my research practices between the research stays, adapt my research foci for the following research stays and expand the research over a longer time frame.

To carry out research in Kenya, I had to apply for a research permit. My study was approved by the National Council of Science, Technology and Innovation of Kenya as well as the Laikipia County Office of Education and the Laikipia County Office of Agriculture. Moreover, I sought the approval of the local authorities and the people whom I studied. Entering the field with a local partner organisation and obtaining a research permit through them told me a first lesson in how to get through bureaucratic processes in Kenya and how to deal with practices of powerful actors in these processes.

To carry out my research, the husband of my host family was an important key informant. With his broad knowledge of the local context and his distinct knowledge on farming as well as his enthusiasm to share his knowledge, he contributed greatly to my research. While living with my host family I visited various peasants in the region to participate in daily life activities and to carry out interviews. Some of the peasants I met at the agro-vet store of my host family, some I met at meetings of self-help groups in which I could participate with my hosts, some I met by coincident on the road, some I met because I learned about an important position they have or had in the local context and the longer I stayed there, the more people I met through which I got to meet even more people. With some interview partners I went for long transect walks to learn about administrative boundaries, settlement schemes, ecological zones, use and management of different natural resources and their perception of the environment. With others I went to visit selected places and infrastructure buildings, such as water intake and storage facilities or crop storages and mills to learn more about these places and to

stimulate explanations by the interview partners. With my selection of interview partners, I mixed random and purposive selection of interview partners to find and include perspectives of all important actor groups.

Moreover, I participated in farming technology trainings provided by NGOs, meetings of self-help groups, farming activities of peasants, such as preparing fields, purchasing and applying agro-chemicals, weeding, harvesting, transporting, sale of crops, grazing animals, milking and slaughtering, food preparation and agricultural fares. The participation in these daily-life activities and special incidents enabled me to carry out participant observation and various qualitative interviews.

In addition to participant observation in and around Mwireri and interviews with people living and working in this area I carried out interviews with key-informants from NGOs, government representatives at different levels, traders of agricultural crops and agro-chemicals and other researchers. These interview partners were selected purposely to cover actors of importance for local peasant production. I approached most of these actors through a bottom-up process using contacts of local peasants to these key-informants and contacts of these key-informants. This ensured that I was talking to key-informants that were actually connected to the local context. Selecting key-informants through a top-down approach bares the risk of talking to people that have programmes targeting the local context but do not reach there or are not perceived to be important locally. Moreover, as every statement, the statements of a key-informant have to be interpreted as their perspectival interpretation.

Before I talked to people, started interviews or participated in events I presented myself and explained the purpose of my research. This helped to explain my role. After some time in the field, people got used to my presence as a researcher and behaved less self-consciously. As most people could speak English, translation was rarely needed. For the few interviews for which I did depend on translation a young man living in the vicinity of Mwireri helped me. With prior consent, I could record most of the interviews. During the research and writing of the thesis I was cautious to reflect my role in the local context and to handle the concerns and circumstances of my interview partners or person living in and around Mwireri with the necessary sensitivity. My research deals with some contested and conflicting topics. To prevent causing harm to anybody, sometimes I had to circumvent some questions local peasants had about activities or statements of others. In my thesis I considered this ethical aspect of not causing harm by anonymising statements and observations.

Whenever possible and feasible I collected written documents and graphics of local contracts, by-laws, accounts etc. by taking pictures of them. Moreover, I analysed documents of governmental departments at national and county level, non-governmental and international organisations, companies and statistics by the Kenyan National Bureau of Statistics (KNBS) that were available online.

participating in milking

participating in maize harvest

demonstration of local food preparation

learning about the use and sale of agro-chemicals

interview for the household survey by one of the Master Students

Figure 10: Pictures of Researching

all pictures taken by the author

In total, I collected data from participant observation and unrecorded interviews on 175 pages in my research diary. Moreover, I carried out 85 recorded interviews with a total of more than 41 hours with 37 interview partners. I visited most interview partners several times to build trust and to enable them to reflect their statements. Later on, I transcribed most of the recorded interviews. In addition, I collected 49 locally used written documents and graphics.

Furthermore, I analysed the notes in the research dairy, the transcribed interviews and the additionally collected documents and graphics through coding and memoing in order to discover patterns within the data as proposed by Emerson et al. (1995). For coding and memoing I used Atlas.ti, a qualitative analysis program that enables to categorise the data line by line with codes which I developed in this process. Moreover, I triangulated the data from different methods and persons to test the validity of information and to compare statements from different actors.

On the basis of first insights and a well-founded knowledge of the local context I developed a questionnaire for a household survey. Two Master students from the University of Nairobi and myself interviewed people from 60 households in the vicinity of Mwireri. We carried out the household survey between November 10 and 19 in 2016. Out of the 60 interview partners, 30 respondents are male and 30 are female. Moreover, 37 stated that the land their family owns is issued on their name and 23 stated to be relatives within to the nuclear family of the land-owner. The households of 8 respondents lived on land belonging to the Gitugi Settlement Scheme, 25 on land belonging to the Kalalu Settlement Scheme and 27 on land belonging to the Mwireri Settlement Scheme. Including all the family members of which data was gathered, data on 211 people is included in the answers of the household survey. I analysis the information provided by the household survey in an excel-sheet to extract qualitative and quantitative findings.

To enable an inductive approach, I included knowledge, experiences and perspectives of different actors. In order to do so, I followed social processes that mattered to where they reached and from where they were influenced without clearly defining my research field previously. Moreover, I allowed new topics to emerge and followed them if they appeared of importance to my research. To enable new topics to emerge, I carried out unstructured and semi-structured interviews with various actors at different positions in food systems and the local context. These forms of interviews give space for the interviewed person to develop their own narrative on their own terms and to emphasise aspects that appeared important to them. Lastly, I constantly reflected my relationship with people in the field and how these people might perceive my role as a researcher to contemplate how this could affect my research.

Ultimately I spent more than a year analysing and describing the findings from my research, discussing these findings with other researchers from the project and preparing the findings for a broader analysis within the project.

7. The Study Area

In this chapter I describe the study area of the Food Sustainability Project. This chapter provides an overview of the ecological and social environment in which food systems and peasant production in this area are embedded. Firstly, I describe the regional physical and ecological characteristics – the ecological environment of food systems. To describe the social environment, I briefly depict the history and the current population of the study area. Moreover, I characterise the different land-use patterns of the study area and I portray the existing infrastructure. After describing the environment, I illustrate the different food systems of the study area as I defined them for my study. The description of the existing food systems of the study area and their ecological and social environment enables me in the following chapters to analyse more in detail how food systems influence economic activities and generally livelihoods of peasants in the vicinity of Mwireri and how these peasants influence food systems.

In Kenya, the study area of the research project Towards Food Sustainability is located in the region north-west of Mount Kenya.[58] This region is located approximately at the centre of the Republic of Kenya at the border triangle of Laikipia County, Nyeri County and Meru County (see figure 11). The study region is located exactly at the equator, expanding approximately 0°15’ North and 0°20’ South with at a longitudinal location between 37°00’ to 37°30’ East. Nanyuki, the largest city in the study region, is about 150 km North of Nairobi, the capital of Kenya, and about 450 km North-West of the Indian Ocean.

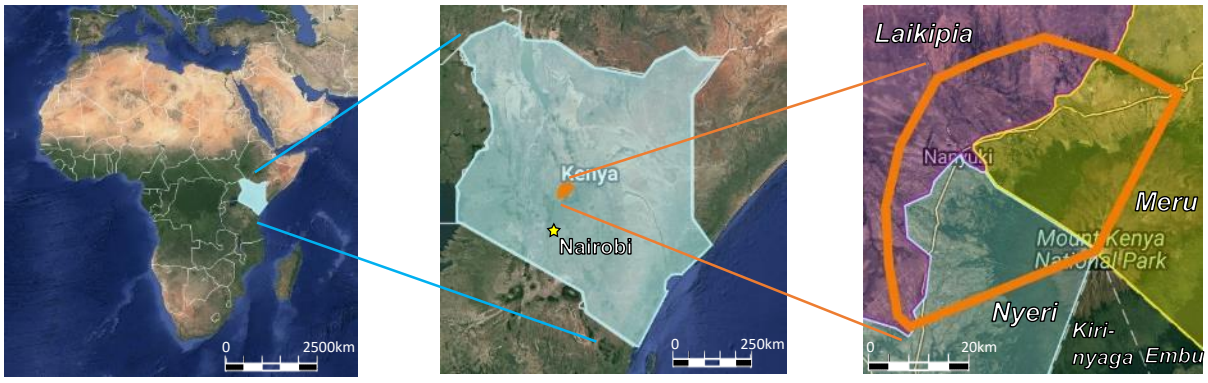


Figure 11: Maps of the Location of the Study Area in Kenya
All maps are drawn by the author with GoogleMaps. The satellite images of the study region were taken between 2015 and 2017.

As mentioned in chapter 3.1, the study region had been selected because in this region, agro-industrial food systems co-exist with local and regional food systems. Moreover, the study area shows a broad

[58] In addition to the research in the region in Kenya, the project also analyses a region in Bolivia (see chapter 3.1).

range of agro-ecological zones and people living in this area are from different ethnic groups, with different socio-economic backgrounds and have various positions in food systems.

7.1 Physical and Ecological Characteristics of the Study Region

The study region is at a relative high altitude between 1,700 and 2,500 meters above sea level, reaching up to 5,200 meters at the top of Mount Kenya. The area at the foot of the mountain is characterized by a smooth highland intersected by shallow valleys with small streams leaving the mountain. These streams join the Ewas Ng'iro River and form parts of its upper basin. The Ewaso Ng'iro River runs eastwards to Somalia where it empties into the Indian Ocean after joining the Jubba River. The region is located at the lee side of Mount Kenya and experiences an annual precipitation of over 1,600mm at the slope of Mt. Kenya, decreasing sharply to less than 600mm at some distance to the massive. As a result, climatic zones in the study area range from humid alpine zones to arid lowlands in the Laikipia Plateau where the mean potential evapotranspiration exceeds precipitation (see figure 12). The area experiences three rain-seasons per year. Most rain occurs during the rain-season from April to May. A second wet-season provides some precipitation between July and August, and the third rain-season occurs between September and December.[59] However, the time and amount of is highly erratic and can differ greatly on a small scale. Thus, rainfall is often unpredictable and varies greatly from year to year. Moreover, Gichuki (2002) mentions "wet-dry cycles of 5-8 years" and Kiteme et al. (2008) indicate that climate models predict profound changes in rainfall distribution in the study area as a result of global climate change. Heavy rains during the wet-seasons can cause local floods. Lack of rain often results in water shortages during dry spells and severe droughts occur frequently. The forest and wetlands on Mount Kenya act as water reservoir. Nevertheless, during dry spells, also the volume of water in the streams and the Ewaso Ng'iro River reduces drastically, mainly due to increased water abstraction (Gichuki 2002, Wiesmann et al. 2000, Wiesmann 1998, Berger 1989, Liniger et al. 2005, Schmocker et al. 2015). The mean monthly temperature in Nanyuki varies between 15°C and 17°C with the hottest days and the coldest nights in the beginning of the year.[60] With increased altitude, the mean temperature drops and frost can occur in most areas above 2,000 meters. On top of Mount Kenya snowfall is common.

[59] The rain seasons are called "long rains" (April and May), "continental rains" (July and August), and "short rains" (between September and December).

[60] See Climate-Data.org. <https://en.climate-data.org/location/11129/>, accessed December 5, 2017.

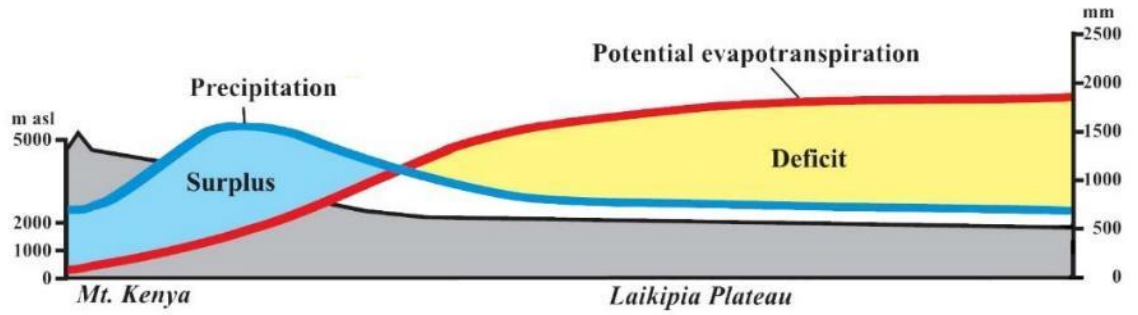


Figure 12: Schematic Figure of Annual Water Balance
Adapted figure from Wiesmann et al. (2000: 11). The figure shows schematically that precipitation at the slopes of Mount Kenya is higher than the potential evapotranspiration. This results in a surplus and runoff of water. With increasing distance to the Mountain, precipitation reduces and the potential evapotranspiration increases. A water deficit results where the potential evapotranspiration exceeds precipitation.

Alpine zone on top of Mount Kenya

Forested region at the slopes of Mount Kenya

Semi-arid lowlands at the foot of Mount Kenya (during wet-season)

Arid lowlands in the Laikipia Platea

Figure 13: Pictures of Different Climatic Zones in the Study Area
all pictures are taken by the author

As a result of this great climatic differences in the study area, very different climatic zones can be found (see figure 13). On the top of Mount Kenya almost no vegetation grows. At a lower altitude an Afro-alpine zone can be found. Many species in this area are endemic and typical plants are giant groundsels, giant lobelias and giant thistle. Alpine wetlands in this zone help to store water to feed streams during the dry spells. In this zone only few mammals are found, such as the Mount Kenya Hyrax. Below the tree-line a dense forest spreads around the mountain (Coe 1967). Today, the high part of this forest is protected and serves as a refuge and habitat for many species. Moreover, it serves as a water reservoir. Below the protected area the region is used for agricultural production small scale peasant farms, pastoralists, large-scale beef ranches and wheat farms and export oriented horticultural farms (see chapter 7.3). This zone is most densely permeated by small and large settlements as well as roads and other infrastructure. Forest and bush patches can only be found along streams and on ecological compensation areas of large scale and export oriented producers. Depending on the type of land-use the area consists of different smaller or larger agro-ecological systems. Large farms generally practice mono-cropping on large areas. On the other hand, most of them have separate ecological compensation areas. Small peasant farms have a higher biodiversity, including some trees and intercropped agricultural production. On the downside, they provide less

space for forests or bushes. According to Horacio Augstburger (2017) agro-ecological system of peasants perform best with regard to ecological sustainability. However, compared to ecological zones in other places of the world, all agro-ecological systems are rather bad with regard to ecological sustainability. Few wildlife can be found in this zone. From time to time large mammals jeopardise local inhabitants and their crops by roaming through the area. However, most conservancies in which these animals live are fenced off against the inhabited areas (for a further analysis of human-wildlife conflicts in this area see Weissman 2017). With increased distance to the mountain, the land turns drier and the vegetation is thinning. The differences ecological features of this region affect land-use patterns as will be shown in chapter 7.3. However, land-use patterns are not only affected by ecological features of this region, socio-economic characteristics affect them as well.

7.2 Socio-Economic Characteristic of the Study Region

The study region is characterised by great socio-economic and institutional transformations in the last century. These transformations have been subject to a myriad of academic research projects. Many of these projects were conducted under the Laikipia Research Programme that brought together Kenyan researchers and researchers form the Geographical Institute and the CDE of the University of Bern. As stated in chapter six, I considered not only these texts but also texts that were written by authors with no direct connection to CDE or CETRAD to avoid a potential bias.

History of the Study Area

Before colonialization, the study area had mainly been controlled by Maasai pastoralists. Some Okiek hunting and gathering groups also lived in this area. In the pre-colonial time, various Maasai groups inhabited an area that ranged from Lake Turkana to central Tanzania. According to Homewood et al. "Maasai-dominated lands were largely managed as common property, with access primarily governed through social networks of section, location, clan, kin and peer group friendships" (2009: 6). Okiek hunting and gathering groups lived in forested highlands in different areas in Kenya. Blackburn (1982) lists the Digiri as local Okiek hunting and gathering group in the Mt. Kenya Region. These groups lived from hunting and collecting wild honey. Moreover, Kratz (1999) accounts that some Okiek group from the Mount Kenya Region engaged in ivory trade with pre-colonial traders.

In the late 19th century, an epidemic rinderpest hit many Maasai groups and decreased their population and power. At the same time the United Kingdom proclaimed the East African Protectorate that covered roughly the present Kenya. At the beginning of the 20th century the Protectorate became a British colony. The British colonial administration relocated the Maasai groups gradually to Native Trust Reserves at the border between nowadays Kenya and Tanzania. With the colonialization and the privatization of rangelands, access to key resources became increasingly constrained and contested

(Hughes 2006, Homewood et al. 2009). However, some pastoralist groups remained in the study area and adapted more or less successfully to the changing conditions (e.g. the Mukogodo, see Herren 1991, Letai and Lind 2013). Some Okiek groups also lost their land and resources under the colonial government. Their lands were mainly transferred to colonial game and forest reserves. Gradually most Okiek groups diversified their economic activities by engaging in agricultural production or livestock keeping (Kratze 1999).

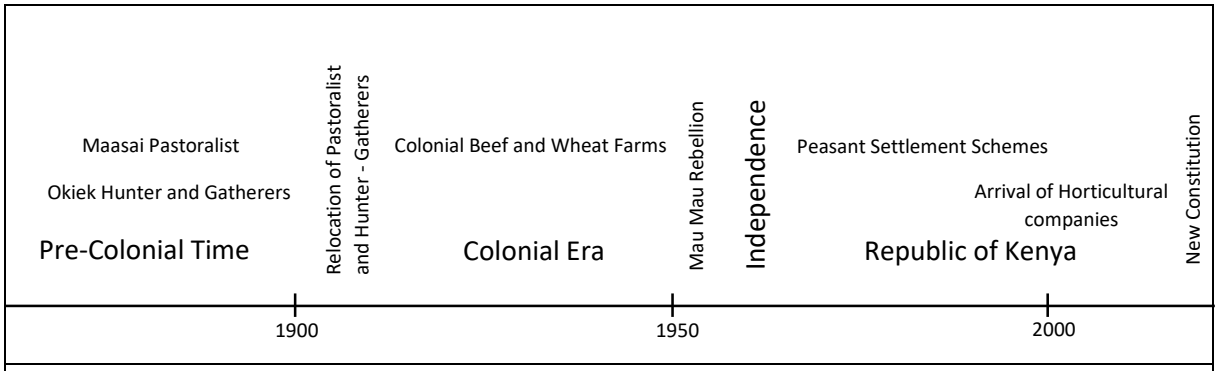


Figure 14: Timeline for the History of Study Area from the Pre-Colonial Time to Nowadays

In the wake of the relocations and land acquisitions, white settlers were provided freehold titles or leaseholds under the 1902 Crown Land Ordinance, replaced by the 1908 Land Titles Act and 1919 Registration of Titles Act (Morgan 1963, McAuslan 2013). On the occupied land, the settlers established large commercial beef ranches and large-scale farms for export production. In the southern and central part of the study region, mainly commercial beef ranches were established and in the northeaster part, cereal and barley farms were founded.

To command sufficient labour force at these farms and ranches, the settlers mainly employed Kikuyu peasants from the Central Provinces. Kikuyu peasants in the Central Provinces also lost land to colonial settlers and the remaining land under their control was densely populated (Morgan 1963, Fazan 2015). According to Wacker (1996), the employments at these farms and ranches initially provided an opportunity for some impoverished landless Kikuyu to move to this area and to live there as so-called squatters. Male Kikuyu worked as labourers on the ranches and farms, and their wives produced subsistence crops for their families on small plots allocated by the ranch and farm owners. This led to a migration of Kikuyu squatters to the study area. However, increasing use of agricultural machines reduced the need for an agricultural labour force and therefore also Kikuyu squatters.

Other peasants living in the study area today told me that their parents lived in so-called *shamba*-systems in the forests at the foot of Mount Kenya. There they were allocated a piece of forest by the colonial government free of charge. The land could be cleared by the peasants. People used the trees of the forest for charcoal production and after the land was cleared, they used the land for agricultural

production with non-perennial crops. After some years the government planted timber on this land. Once the trees overgrew the fields, the government allocated them a new piece of forest to be cleared to start again. The *shamba*-system exists up to the present day, but nowadays people have to pay to be allocated a piece of forest. As such, this *shamba*-system is a type of shifting cultivation in cooperation with the government (for a further analysis of the *shamba*-system see Witcomb and Dorward 2009).

Increasing pressure on land allotted to native Kenyans, declining possibilities to earn a living as squatters and mounting claims for independence, the 1950s Mau Mau Uprising, mainly led by Kikuyu, broke out. From 1952 to 1959 Mau Mau fighters attacked the colonial government and European settlers. They legitimised their campaign with demands for land and decolonisation. The colonial government crushed the rebellion ruthlessness but also initiated agrarian reforms to improve the lives of Kenyans. The role of the Mau Mau Uprising played in the decolonisation of Kenya remains disputed (see Leakey 2004 [1952], Edgerton 1990, Berman 1991).

In 1963 Kenya became an independent country and Jomo Kenyatta became the first president. With independence, the land owned by the white settlers was to be returned to native Kenyans. According to Kohler (1987) even before independence governmental programmes were initiated to register customary land as private property (Swynnerton Plan) and to redistribute land that had been alienated during colonisation. From 1961 to 1978, with money from British and German creditors the Kenyan Government bought land from European settlers who were willing to sell their land. The acquired land was either subdivided into individually owned plots that were assessed to provide for full subsistence and a surplus cash production – or handed over as large-scale farms to rich and influential Kenyans.

Despite their great extent, the governmental settlement schemes were not able to cover the demand of the huge landless population. Thus, people started to buy land from settlers on their own. Settlers sold their land normally in large tracts. To be able to mobilize the required capital for buying land, most people had to form groups (cooperatives or companies). Such groups reached the size of “a few dozen to several thousand members” (Kohler 1987: 31). Also for such private initiatives, public funds played an important role since the government provided credits to more than a thousand land purchase groups. However, not all land was bought immediately. Some groups took years to collect sufficient money from their members to buy land. Once the land was bought it was allocated to the group members according to how much money they saved within the group.

Independently of how people got land, they had to raise a lot of money in order to get land. It was very difficult for most people to raise the required money. Some people failed to raise the required money and did not get land. Without land, most of these people were forced to move to the proliferating urban slums. But also the people who were able to get land against all odds, struggled a lot the required

money in order to get a piece of land. In chapter 10, I will further elaborate how people got access to land.

Not all colonial landholders sold their property to governmental or private settlement initiatives and some land remained in the hands of large-scale landholders (Kohler 1987, Wiesmann 1998).[61] In the study area, large tracts of land are still used for large-scale wheat and beef production. Some of these farms belong to individuals, others to cooperatives that installed large-scale production instead of subdividing the land for individual smallholder farming. Fabian Ottiger (2018)[62] has shown in his Master Thesis that large-scale wheat and beef production is mainly rain-fed. Wheat production is highly capital, agro-chemical and technology intensive. Beef production requires less agro-chemicals and technology and is also less capital intensive. Wheat and beef is mainly sold to consumers outside the study area but within Kenya.

As shown in the Master Thesis of Edwin Ameso (2016), some large holdings in the study area are also used and managed by pastoralist groups as common property. Their products are either locally consumed by the pastoralists themselves or sold to consumers outside the study area.

The first ruling government after independence generally favoured Kikuyu settlers in their endeavour to acquire land, while the Luo and Maasai were allocated nearly any land. Kikuyu were best represented in the first government and "the complex bureaucratic processes used favoured those with money, education and contacts" (Hornsby 2012: 120). This led and still leads to ethnic and violent tensions around the issue of land (see Kanyinga 2009). Thus, it can be concluded that the governmental and private efforts to redistribute land did not lead to a redistributive or equal distribution of the land acquired during colonialization.

Kohler (1987) and Wiesmann (1998) describe that in Laikipia the settlement initiatives had far-reaching impacts. Accordingly, it triggered a considerable immigration and population growth.[63] Wiesmann (1998) notes that most immigrants came from ecologically high-potential areas where land became scarce. According to him, most small-scale farmers in 1994 in Laikipia were Kikuyu (89%) who came

[61] Kohler states that in the early 1980s, 41% of the land in Laikipia still remained in the hands of non-African large scale land-owners (mainly Brits or Brits that became Kenyan citizens after independence) and another 16% became the property of African large scale land-owners (1987: 27).

[62] In his Master Thesis, Fabian Ottiger carried out a lifecycle assessment to analyse the resource use intensity of selected products.

[63] Kohler (1987: 35) describes the annual population growth in Laikipia with an increase of 7.3% between 1969 and 1979, and Wiesmann (1998: 93) refers to a growth from 30,000 to 250,000 inhabitants in 1989 within 30 years and a forecast of 450,000 inhabitants in 2002. The 2009 population census counted nearly 400,000 inhabitants in Laikipia, nearly 700,000 in Nyeri and nearly 1,360,000 in Meru (KNBS 2009). According to the Socio-Economic Atlas of Wiesmann et al. (2014), in 2009 an average of 30-50% of the inhabitants of the study area moved there during their lifetime.

from todays' Nyery, Muranga and Kiambu Counties, and Meru (8%)[64] who moved out of Meru County and occupy the eastern part of Laikipia almost exclusively. Only a small percentage of the peasants had previously lived as farm labourers or squatters in the region. The new immigrants had little or no experience in agriculture under the semi-arid conditions of Laikipia (1998). Most Kikuyu moving to the area formerly practiced agricultural activities in an ecologically high-potential region (see Kenyatta 1962 [1938]). To continue the traditional agro-pastoralist production, the immigrants converted land formerly used for rain fed beef ranching or wheat cultivation into irrigated small-scale mixed farming plots. If plot allocations were not subject to subsistence need orientation but economic means, their size could be well below the estimated need for self-sufficient production. While the governmental settlement schemes aimed to provide plots to cover subsistence needs and to provide for a surplus cash-crop production, the private settlement schemes were rather steered by economic means (see above). In addition, plots were also subdivided among descendants of first settlers (Kohler 1987, Wiesmann 1998). However, peasants were also able to improve the producing capacity of the farmland. During my research, I learned that peasants started to apply agro-chemicals to improve soil quality and yields under these bare conditions. Today, a great number of agro-chemicals with different toxicity-levels can be purchased in local agro-vet stores. The workforce for agricultural production is mainly sourced from the peasant families themselves or hired on a salary basis from neighbouring peasants. I was told that during the time the peasants moved to this region, they knew a system of mutually helping each other on the farm but this system had been abandoned over time.

With immigration and land allocations, the management of land and associated natural resources, formerly concentrated in the hands of the few large-scale land holders, disseminated to numerous individual smallholders (Kohler 1987, Wiesmann 1998). Moreover, as described by numerous studies by the CDE and CETRAD (e.g. Wiesmann et al. 2000, Gichuki 2002, Kiteme and Gikonyo 2002, Liniger et al. 2005, Aeschbacher et al. 2005), water for irrigation and domestic use had mainly been abstracted from rivers. This led to overuse, depletion and fierce conflicts over access to the insufficiently available water, locally but also with downstream water users (pastoralists and wildlife conservancies). The formation of Water Resource User Associations (WRUA) in the late 1990s helped to mitigate these conflicts (see explanations further in chapter 7.4).

To cope with the precarious and unreliable natural resource base that barely provided for a sustainable livelihood, the immigrated peasants developed various strategies. Künzi et al. (1998) observed changes in farming practices of immigrants over time (such as slight adaptation of production or the acquisition of multiple landholdings). In the context of climate change adaptation, Ogalleh et al. (2012) describe

[64] In pre-colonial times, the Meru lived in the today's Meru County. They „are related to the Kikuyu in terms of economic and socio-cultural organisation as well as language" (Wiesmann 1998: 99).

that peasants apply intercropping as a mini-maxi strategy – as described by Lipton (see chapter 4.1) – to cope with the unpredictable and changing precipitation patterns. With regard to Peasant Theories, this can be seen as an adaptation to local ecological conditions (see chapter 4.3). During my research, I also learned, that the use of agro-chemicals initially helped to improve the soil quality and generally productivity of peasant farming under these bare conditions. With regard to Peasant Theories, this can be seen as an adaptation of the local ecological conditions (see chapter 4.3). As such, peasants did not only adapt to the ecological conditions, as described in Peasant Theories of Steward (1955) or Rappaport (1968), but also change the ecological condition or productivity of the area, as described by Boserup 1965).

In addition to these environmental challenges, peasants face a range of economic challenges. For most peasants it was difficult to shuffle together the required money to buy plots that were large enough for self-sufficient production under the given ecological conditions (poor soil quality, unpredictable rainfall). High costs for purchasing land, high costs for agricultural inputs, low productivity and difficulties in accessing markets reduced made farming expensive with little money to be earned in return (see chapter 9, 11 and 14).

Peasants have since been supported by NGOs and governmental departments in their endeavour to produce under these difficult conditions. Kenya has a long history of receiving development aid. Already during the colonial era people received aid from charity programmes by individuals and the church, as I have been told in biographic interviews. In the 1980s development aid for Kenya increased greatly, reaching a peak in the early 1990s (Mwega 2009). Kenyans benefited and benefit from food assistance programmes in different parts of the country.[65] Since the 1990s various development agencies are actively supporting people in the study region. As shown in later chapters, these agencies and organisations support water provision systems, teach farming practices, facilitate market access for peasants, provide medical assistance, build schools, water wells among others. In addition to and in collaboration with these development agencies the national and local government also implemented programmes to support peasants in the study area.

To cope with the difficult environmental and economic conditions, peasants combine the production for their own consumption with market-oriented production and off-farm income. Depending on their possibilities, the mix of these combinations and the ability to benefit from market oriented production varies (see Bühlmann 2012). In these mixed livelihood strategies, peasants combine local knowledge with external inputs, such as access to agricultural extension services or veterinary services (see Ogalleh et al. 2012). Künzi et al. (1998) noted that off-farm activities played an important role for

[65] See, for example, USAID 2017. Such food assistance programmes are food relief programmes as they are discussed in chapter 2.1.

household strategies. As Kohler (1987) has described in his analysis that most of the households observed in the early 1980s relied on remittances from own businesses or permanent or casual employment. At the other hand, by drawing on Neo-Marist Theories (see chapter 4.5), one ask if off-farm activities of peasants also resulted in exploitation through the capitalist economy.

Karin Holdener (2007) who wrote her Master Thesis about the importance of trans-spatial economic and social networks in household strategies of peasants in the study region, describes that in 2006 all analysed households relied on income from off-farm activities, such as permanent or casual employment or other cash generating activities. However, the on-farm activities (subsistence or market oriented) were perceived as more secure and remained the most important economic activities to cover household needs.

Some authors add a culturalistic assentation to explain the orientation towards on-farm activities. Accordingly, the Kikuyu ideal of acquiring and managing land to become a head of an *mbarî* (*mbarî* is a Kikuyu word to describe a group of people of the same descendants (Kenyatta 1962 [1938])) is made responsible for the orientation towards farming and land acquisition (see, for example, Künzi et al. 1998). This shows that not only pure economic rationales or the reduction of risks as described by Liption (1982 [1968]) are important for household strategies. Cultural features and activities that oppose a capitalist invasion into peasant farming also affect household strategies of Kikuyu, as described by Wolf (1957), Foster (1965), Scott (1976) and Cancian (1989) or Tria Kerkvliet (2009) in chapter 4.5.

In the early 1990s first export oriented commercial horti- and floricultural production started in the study region. Flower and horticultural products from this region are mainly exported to Europe. The initiation and evolution of this sector is elaborated in detail in two Master Thesis, written by Roland Schuler (2004) and Nora Lanari (2014). For our study area, Lanari identified 30 horticultural companies that operated at 35 farms and covered an area of 1,385 hectares in 2013 (for the location of the horti- and floricultural companies in the study area see figure 16 in chapter 7.3). For the implementation of horticultural production, mainly former commercial cereal and dairy farms, which were linked to the colonial era, had been converted.

The European demand for fresh horticultural products from Kenya reaches its peak during the European winter that coincides with the dry season in Kenya. Thus, rainfall does not provide sufficient water at the right time for the horticultural production. Therefore, cultivation depends largely on irrigation. Initially, irrigation relied mainly on river-water abstraction. This contributed to the reduction of discharge rates of local rivers. Horticultural companies were blamed for exacerbating the lack of irrigation water during the dry season. To secure irrigation water for production and to prevent an exacerbation of water conflicts with other water users, horticultural producers increasingly established

ground water pumps and storage basins to retain river water during the wet season (Schuler 2004, Lanari 2014). In addition, they support the formation of local Water Resource User Associations (see chapter 7.4). This reduced impacts on discharge rates of some rivers during the dry season and helped to mitigate water conflicts.

In addition to the use of water, this export oriented production is highly agro-chemical, technology and energy intensive. Ottiger's (2018) analysis confirms the high degree of water intensity for this production and it shows that the export-oriented production depends on a high amount of agro-chemical inputs that are imported from all over the world. Moreover, the production and especially the export of the crops to Europe are highly energy intensive, which has global climatic impacts. Last but not least, the high amount and toxicity of agro-chemicals used in the production has potential local environmental impacts as well. According to Ottiger, the export oriented production uses six times more pesticides than local peasant production, for example.

Moreover, horticultural production depends on cheap labour force. With the huge population increase and lack of other economic opportunities, the cheap labour force became widely available in the study region. According Mariah Ngutu Peter (see Ngutu Peter 2018, Ngutu Peter et al. (n.d.)) who carried out ethnographic research in an export-oriented horticultural production company in 2016, export oriented horticultural production created employment possibilities for peasants living in the area. The employment possibilities particularly benefit unskilled labourers and women. This employment can constitute an appreciated complement to the subsistence production (see above). However, according to Ngutu Peter (2018), Ngutu Peter et al. ((n.d.)) and Ulrich (2014)[66], the small availability of permanent employment, low salaries and poor working conditions (overtime work, health risks and insecure employment tenure) thwart efforts that these off-farm activities become the primary source of income of labourers. Consequently, labourers depend on other income possibilities, subsistence oriented production or the support of relatives and friends. As such, these labour-arrangements can present a capitalist exploitation of the peasant society as described by Robinson (1923) or Millassoux (1975), who's argument are described in chapter 4.5.

[66] Ulirich (2014) conducted a qualitative research based on semi-structured interviews. Schuler (2004) and Lanari (Lanari 2014) also analysed impacts of wage labour in their thesis, but only from the point of view of horticulturalists, whereas Ulrich (2014: 50) considered smallholders, employees and out-growers for her livelihood approach oriented qualitative analysis of impacts of the agro-industrial sector on smallholder farmers.

The greenhouse of a large-scale export-oriented floricultural farm with Mount Kenya in the background

Irrigation system of a large-scale export-oriented horicultural farm

Applicatin of agro-chemicals on a large-scale export oriented horticutural farm

Picture by Horacio Augstburger

Inside a greenhouse of a large-scale export-oriented horticultural farm

Harvesting at a large-scale export-oriented horticultural farm

Figure 15: Pictures of Export Oriented Commercial Horticultural and Floricultural Production

With the stated exception, all other pictures taken by the author

To meet growing demands from European markets, large-scale producers also started to source out their production or parts of it to small and medium producers. According to Mati (2004), a soil and water engineer at the Jomo Kenyatta University, Balthasar Teuscher (2017) who analysed economic implications of peasants' participation in out-grower schemes for his master thesis that is part of the research project "Towards Food Sustainability" and Ngutu et al. ((n.d.)), the collaboration with out-growers is regulated strictly. Out-growers have to comply with standards (e.g. the EUREP-GAP) set by European retailers. However, Jaffee (1994) who analysed contract farming in Kenya since World War II points out that the control of the contracting organizations is generally higher in theory than in practice. Accordingly, "in certain projects […], project documents, including contracts, provide detailed sets of rules, specifications, and prohibitions that give the impression that the contractor has close control over all operations. Actual patterns of behaviour have frequently flouted or moderated these project rules, however" (1994: 136).

It is assumed that if peasants manage to comply with these standards – be it in theory or practice –, they benefit from guaranteed minimum purchases, relative fix prices and the circumvention of exploitative intermediaries. Therewith, out-grower schemes should provide peasants who comply with the standards with a relatively secure source income (Mati 2004: 13-15, Teuscher 2017). However, in practice, many peasants stopped producing for export companies because they felt products were rejected too often and out-grower schemes did therefore not provide a reliable source of income (see chapter 14).

Besides subsistence oriented and commercial agricultural production, tourism became an important economic sector in the study region (Ramser 2007). In the urban areas, service industries gain importance as well (Wiesmann et al. 2014).

In 2010 Kenya gave itself a new constitution adapting the 1963 independence constitution. The new constitution decentralises many administrative tasks to the newly established Counties that replaced the former division of Kenya into provinces and districts. Impacts of this devolution of responsibilities and power to a lower administrative level is discussed differently in academia. In interviews many respondents mixed up terms used under the old and new constitution, such as District and County for example.

Over time, the population living in the study area and land-uses changed greatly. Before the colonisation different hunting and gathering as well as pastoralist groups dominated the area. During the colonial era, white colonial settlers used the land to keep livestock. After independence, some land was transformed to small-scale farms used by immigrating peasants. The immigrating peasants mixed production for self-consumption and sale with off-farm economic activities. Thereby, they were supported by different NGOs and governmental organisations. Since the 1990s export-oriented horti-

and floricultural production started in the study area. The change from hunting and gathering and livestock keeping to agricultural production has ecological impacts, such as increased river-water abstraction and increased use of agro-chemicals. The export-oriented agricultural production provided new income opportunities for wage-workers and out-growers. However, these new income opportunities were only beneficial for people living in the study area who managed to deal with the conditions under which these new income opportunities can be accessed. The new national constitution of 2010 leads to far reaching transformations. How the decentralisation sought with this transformations act operates in and affects the study area is still not clear seven years after implementation.

Current Population in the Study Area

The current population patterns in the study area are the result of the transformations and developments in this area. Wiesmann et al. (2014) published a neatly arranged socio-economic atlas of Kenya. The atlas displays data at sub-location level from the 2009 Kenya Population and Housing Census. According to their atlas, the population density varies greatly in the study area, reaching from no population in the Mount Kenya National Park to more than 1,000 people per square kilometre in Nanyuki. Most sub-locations have a population density of 50 to 500 people per square kilometre. Only at the northern boundary of the study area and in one sub-location to the West of Mount Kenya the population density reduces to less than 50 people per square kilometre. Generally, the population density is low in the forest area of Mount Kenya. In a belt with some distance to the mountain, the population density is very high, also compared to other areas of Kenya. With increasing distance to the mountain, the population density reduces drastically.

Ethnicity plays an important role in Kenya's politics, access to land and natural resources and identity. As stated above, some ethnic groups were better represented in the first government after the independence of Kenya and had better access to newly distributed land. This resulted in tensions between different ethnic groups. Tensions and rivalry between the larger ethnic groups resulted in ethnic violence after the 2007 national elections. Also the 2017 elections were highly ethicised again. Ethnic groups are distinguished by linguistic features and group affiliation is organised by lineage (Kanyinga 2009). According to the Socio-Economic Atlas by Wiesmann et al. (2014), there are about 42 different ethnic groups in Kenya. Most of these ethnic groups can be associated with one of the three language families Bantu, Nilotic and Cushitic. According to the 2009 census by Kenya National Bureau of Statistics (KNBS), the largest ethnic groups are Kikuyu (17%), Luhya (14%), Kalenjin (13%), Luo (10%) and Kamba (10%). Also in the study area, people from different ethnic groups can be found. The ethnic heterogeneity can be explained with the ethnic diversity of the country and the substantial in-migration in the recent history of this area (see above). Wiesmann et al. (2014) differentiate in their

Socio-economic Atlas of Kenya sub-locations with a majority of over 50% of one ethnic group. According to their analysis, sub-locations in the part of the study region in Nyeri and most of Laikipia County have a majority of Kikuyu inhabitants. This can be explained by the great number of Kikuyu that were able to acquire land in this areas after the independence of Kenya. Only at the northern border of the study region, sub-locations show a majority of Maasai inhabitants. There, affiliation to this ethnic group enable people to claim access to land. According to the KNBS (2009), in 2009 Maasai account for 2% of the total population of Kenya. The area of Nanyuki is, as other cities of Kenya, ethnic heterogeneous. The sub-locations in the part of the study region in Meru county are dominated by Meru people because they had easiest access to land in this region. Meru accounted for 4% of the total population of Kenya in 2009 (KNBS 2009). According to the same book, in the entire study area the majority of the people belong to a protestant or the catholic church. In addition to ethnic differentiation, faith based distinctions, especially between Christians and Muslims, are used to distinguish and exclude people. Violence, which is religiously motivated, has led to conflicts between Christians and Muslims in Kenya.

7.3 Land-use Patterns of the Study Area

The study area is characterised by seven different types of land uses that are the product of negotiations among different actors with different and changing bargaining power during the history of this area. First, there are several protected areas in the study region. These areas serve as a refuge and habitat for various species and therewith, they serve conservation goals. Some protected areas also serve as water reservoirs. The largest protected area in the study region is the Mount Kenya National Park. This national park was founded in 1949 as a forest reserve. Since 1997 it is part of the UNESCO World Heritage Site for natural conservation.[67] Mount Kenya National Park covers more than one-third of the study area. Other larger protected areas reaching into the study area are the Borana Wildlife Conservancy, Lewa Wildlife Conservancy and Ndare Ndare Forest in the North-East and Ol Pejeta Conservancy in the North-West of the study area (see green areas in the map on figure 16).

Second, large tracts of the study area are used as private or community ranches. Private ranches are remnants of colonial land holdings, managed by commercial companies. Community ranches are managed by pastoralist communities. The ranches can be found in the northern and western part of the study area where the climate is generally drier. However, there are also some ranches in the centre of the study area. This has most probably to do with the history of the region whereby individuals were able to acquire large tracts of land and use them currently for grazing or hay production. Private and community ranches account for approximatley one-tenth of the study area (see dark blue areas in the

[67] See: Mount Kenya National Park/Natural Forest: <whc.unesco.org/en/list/800>, accessed October 16, 2017.

map). Michael Herger (2018) has shown in his Master Thesis that in community ranches more people benefit from livestock keeping and more livestock is kept per square kilometer compared to private ranches. However, there are also negative ecological impacts that are higher compared to private ranches.

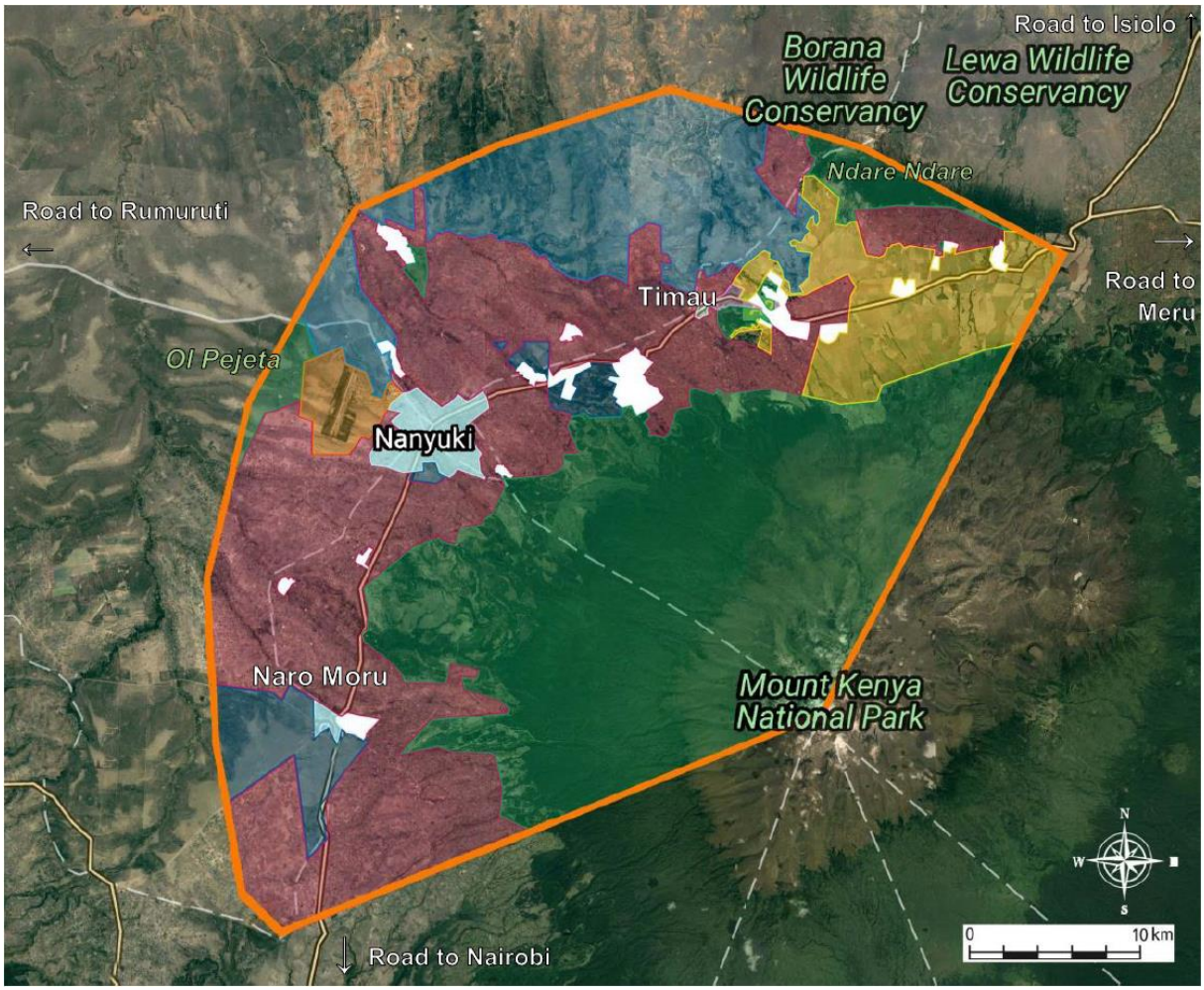


Figure 16: Map of Land-use in Study Area

Different types of land-use in the Study Area:

- national parks and conservancies
- farms of small-scale peasant
- urban areas
- military base
- large-scale wheat farms
- large-scale private and community ranches
- farms of horti- and floricultural companies

Drawn by the author with GoogleMaps. The land-use areas in the study area (orange border) are differentiated by visual analysis of GoogleMaps satellite images by the author on the basis of experience on the ground. The satellite images were taken between 2015 and 2017. This analysis does not provide an exact differentiation, but for a broad picture of the land-use in the study area this differentiation is sufficient.

Third, in the north-eastern region of the study area, large-scale wheat farms can be found. They are either privately owned or owned by a group of shareholders. These areas account for about 5% of the study area (see yellow areas in the map).

Fourth, by the 1960s the first peasants acquired land in this area for small-scale farming and livestock keeping, alongside these large-scale landholdings (see above). The land used by peasants is subdivided into small individually owned plots. Next to protected areas, the total area used by peasants accounts for the largest share in the study area (about one-fifth of the study area, see red areas in the map).

National Park

farms of small-scale peasants

large-scale wheat farms

large-scale community and private ranches

farms of horti- and floricultural companies

urban areas

Figure 17: Pictures of Different Land-uses in the Study Area

all pictures taken by the author

Fifth, since the 1990s horti- and floricultural companies started to set up production sites in this region. Several production companies set up their farms in the study area. The total area covered by these farms is rather small due to their intensive agricultural production (see white areas in the map).

Finally, some land in the study area is used by urban towns and cities such as Nanyuki, Timau or Naro Moru (cyan areas in the map) and in the West of Nanyuki a military base covers some land (orange area in the map).

Small-scale peasant farms adjoin the Mount Kenya National Park in the west and north west of the study area. Large-scale wheat farms adjoin the National Park in the north. This belt around the Mountain is interspersed by export-oriented horti- and floricultural companies and some urban areas. Especially the dry north of the study area is dominated by large-scale private and community ranches. The different types of land-use are only partially determined by ecological factors but mainly by negotiation among different land-users with different and changing bargaining power over time.

7.4 Infrastructure in the Study Area

From South-West to North-East a two-lane road passes through the study area. This road passes through Timau, Nanyuki and Naro Moru and connects Nanyuki with Nairobi by a roughly 200km drive South. In Nanyuki a tarred road branches off north-westwards (see map on figure 16). Most of the other roads are not tarred and complicate traffic during the rain-seasons. People use private vehicles, trucks, buses, *matatu* (Swahili for minibus) and motorbike taxis to travel from one place to another or to transport goods.

Most houses in Nanyuki as well as the rural towns have a power connection. Currently electrical connection is extended to rural households outside towns by Kenya Power, the national power company. However, electricity cuts are common both in urban and rural areas. Electricity is provided by a thermal plant in the area.

Mobile phone connection is rather good in towns and extends out to the rural area. Mobile phone connection makes communication and access to information easier. Furthermore, M-*Pesa*[68] and other money transferring applications allow people to send and receive money in real time at a relatively low cost without having a bank account.

Water Projects and Water Resource User Associations

To access water for domestic use, watering animals and irrigating crops people used to fetch water from nearby streams leaving Mount Kenya. They also collect rainwater during the rain-seasons and to dig water wells to access ground water. To facilitate and improve access to water, people affiliated in groups to construct water supply systems. They build furrows and pipes to provide water from intakes at the slope of Mount Kenya to their homes in urban as well as rural areas. These groups are mainly organised as community self-help groups (see also chapter 15.3). In Kenya, public and private water system schemes can be differentiated. Public schemes are managed by public institutions and are mainly for the irrigation of public agricultural lands. Private schemes are either community based to provide water for irrigation or domestic use or privately owned by individuals or companies for the irrigation of their farms. As in other community based water project, in the study area every member or customer of a water project had to contribute money, building material and work force for the construction of the infrastructure. The planning and construction of a water project could take years and improvements are still carried out today. Most of the projects were also supported by the government and through programmes of non-governmental organisations. Once a household is

[68] M-*Pesa* is Swahili and stands for mobile money. It is a mobile phone based money transfer services whereby everybody with a mobile phone number has an account from where money can be sent to and receive from other mobile phones. Money can be deposited and withdrawn easily almost everywhere. See: <www.safaricom.co.ke/personal/m-pesa>, accessed October 16, 2017.

provided with water, it has to pay a monthly maintenance and water permit fee. With increasing numbers of such water projects, water abstraction from streams increased, without any regulations as the government did not enforce its water rights and thus water became de facto open access. With an increasing number of water projects and an inadequate management of the water resources by state authorities, river water became scares during dry seasons. This led to conflicts among various peasant groups and between these peasant groups and down-stream pastoralist. This led to fierce conflicts between different water projects and between the upstream peasants, urban residents and downstream pastoralists. With the arrival of the export oriented horti- and floricultural companies that initially used to withdraw water from the same rivers for irrigation during the dry seasons (see chapter 7.3), water availability further reduced and conflicts exacerbated. Moreover, in many water projects internal distribution of the abstracted water does not allow to provide water for all members at all times. Thus, for most individual project members water provision during the dry season is only, if at all, sufficient for domestic use.

In order to address the problem of water scarcity and to mitigate conflicts between different water projects, the Water Awareness Creation Campaign Initiative supported the formation of so-called Water Resource User Associations (WRUAs).[69] In the late 1990s, the various water projects were encouraged to organise themselves as WRUA for each sub-catchment (WRUA in the study area see map in figure 18)[70]. Especially the commercial horticultural farms were important for the successful formation of many WRUA. They provided the necessary capital, knowledge and technical support for the setting up of the associations. After the foundation of the first WRUA in 1997, the number of WRUA in the region increased rapidly (Liniger et al. 2005, Ehrensperger and Kiteme 2005, Njuguna et al. 2014: 73-144).

Kiteme and Gikonyo (2002) who both conducted extensive research on WRUAs describe that the organisation of such associations consist of an elected Executive Committee that “is composed of the chairpersons of the active Water Projects and representatives of major water users in the subcatchement [as well as] the local administration and water office”. Moreover, special Task Committees of the WRUA are appointed to address specific water-related matters within a sub-catchment area, such as “pollution, abstractions, water permits, etc.” and Water Situation Monitors report to the committees about “all water use activities (river water level [fluctuation], new users, wasteful uses, pollution threats, etc.)” (2002: 335). WRUA of sub-catchment areas are nested in

[69] Initially they were called Water Users’ Associations but later became known as Water Resource User Associations. The Water Awareness Campaign Initiative had been assisted by the Laikipia Research Programme and the Department of Water and Natural Resources (Kiteme and Gikonyo 2002: 334).

[70] Sub-catchments are the smallest sub-division of river basins. For the study area, which is mainly part of the Ewaso Ng’iro Basin, a dozen sub-catchments that cover areas between 70 km^2 to over 1,000 km^2 with some hundred to several thousand inhabitants are defined.

institutions at a next higher level of river basins that are managed by Catchment Area Advisory Committees. On the national level, the Water Resources Management Authority coordinates national water uses and licence issuing (Mumma 2007).

WRUAs are also legally embedded in the national and local legislation. With the 1974 launched National Water Master Plan, the Kenyan Government planned to provide water for domestic use and small-scale irrigation for everybody. In practice however, many people were not supplied with water by the national government. Some formed self-help groups to build and maintain own water service systems (as described above). Others had no access to systematic water services. In the 1980s the government started to officially hand over the provision of water services to communities if they met

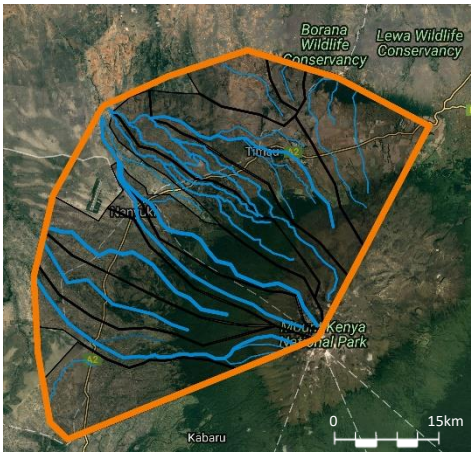


Figure 18: Map of WRUA in the Study Area

Drawn by the author with GoogleMaps with data from Njuguna et al. (2014). The sub-catchment areas are demarcated by black borders.

some required standards. With the 2002 Water Act, the task of providing water was officially decentralised from the national government to lower-level public institutions. Moreover, with the 2002 Water Act, also the importance of WRUA became acknowledged in the formal legislation. Even though this does not confer any explicit legal power to these organisations because the ultimate decision making over water resources remains centralised on national and county level, it motivates their operation and encourages their formation (Liniger et al. 2005, Mumma 2007, Zurkinden et al. (n.d.)). As such, WRUAs comply largely with the eight design principles of robust Common Pool Resource Institutions as described by Ostrom (1990, see chapter 5.1). Nevertheless, local project managers were not always clear about the role of WRUAs and state authorities. Moreover, they complaint that water is still scares in dry-seasons, individual projects would be privileged due to bribery or affinity and every project would need to cheat to a certain extent to get its share of the resource because everybody is cheating to some extent without fearing sanctions.

In 2008, the Kenyan Government adopted the Vision 2030 that formulates the goal to increase the area under irrigation for agricultural production. Therefore, water resources shall be conserved and new ways to harvest and use rain and underground water shall be started (Government of the Republic of Kenya 2007). The Agricultural Sector Development Strategy of 2010, the National Irrigation Policy of 2015 and the National Trade Policy of 2015 aim at contributing to the achievement of the goals stated in the Vision 2030. Thereby, the National Government as well as the County Governments have a duty to manage water resources efficiently and to promote irrigation that is viable and efficient to enhance agricultural production. Nevertheless, in the 2016 Water Act (Art. 43 (2), water for domestic use is legally given priority over the use for irrigation (see Zurkinden et al. (n.d.)).

7.5 Food Systems in the Study Area

As a result of the great ecological as well as socio-economic variety in this region, different forms of production for various food systems co-exist in the study area. Export-oriented horti- and floricultural production provides flower and food, mainly for consumers in Europe. As such, export-oriented horti- and floricultural production is part of an agro-industrial food system (see figure 19). This production uses only a small percentage of the land in the study area but is highly water, labour, capital, agro-chemical and technology intensive. Small-scale horticultural production and small-scale livestock keeping by peasants provides food for self-consumption by the peasant family and local consumption in the study area, but food is also sold to urban centres of Kenya, such as Nairobi and Mombasa. Some peasants even sell horticultural products to exporters who add them to the horticultural production of export-oriented companies. As such, small-scale peasant horticultural production and livestock keeping can be part of a domestic food system, a local food system, of a regional food system in Kenya and of an agro-industrial food system (see figure 19)[71]. Small-scale horticultural production accounts for the largest productive area in the study region. This area is subdivided into a great number of small plots. Small-scale horticultural production is less capital, agro-chemical and technology intensive than export-oriented horti- and floricultural production because many producers cannot access these inputs in large quantities. Small-scale horticultural production also provides economic opportunities for a large-number of people. Large-scale wheat and beef production (ranching and pastoralism)[72], provides food for consumption within Kenya. Pastoralists also consume some of the food from cattle

[71] The research project "Towards Food Sustainability" focuses at a regional food system that includes large-scale wheat farming, beef ranching and pastoralism, but not small-scale horticultural production (see chapter 3.1). Even though small-scale horticultural production for a regional food system is not included in the research project, my research focus on small-scale horticultural production makes it necessary to consider small-scale horticultural production that enters a regional food system in my analysis as well.

[72] Wheat production, ranching and pastoralism are taken together because wheat farming and beef ranching are very closely interlinked and the land used for pastoralism and beef ranching are not differentiated at the map on figure 16.

herding locally. Production for consumption within Kenya is part of a regional food system. The local consumption by pastoralists accounts for a domestic and local pastoralists food system (see figure 19).

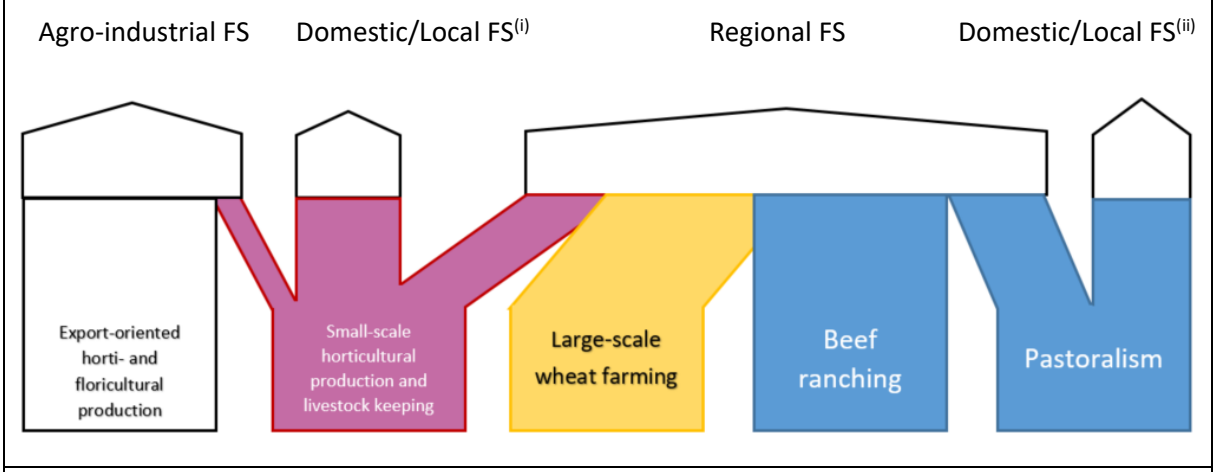


Figure 19: Schematic Figure of Production in the Study Area for Various Food Systems
(i) domestic/local food system of peasants
(ii) domestic/local food system of pastoralists

Export-oriented horti- and floricutural produciton is exclusively for agro-industrial food systems. Small-scale horticultural produciton and livestock keeping is for domestic, local, regional and agro-industrial food systems. However, the sahre for agro-industrial food systems is rather small. Large-scale wheat farming and beef ranghcing are almost exclusively for regional food systems. Pastoralism is for domestic, local and regional food systems.

drawn by the author

Together with the areas used by pastoralists, wheat production and beef ranching accounts for almost the same area than small-scale horticultural production in the study region. However, the area used for large-scale wheat and beef production as well as for pastoralism is only subdivided into few large tracts. All these forms of production are less labour intensive than export-oriented horti- and floricultural production or small-scale horticultural production. Thus, they provide economic opportunities for fewer people in the study region. Wheat production is also highly capital, agro-chemical and technology intensive. Beef production is less capital, agro-chemical and technology intensive, especially if beef is produced by pastoralists.

The production for these different food systems is interlinked through a broad range of features. All production sites are linked through geographical proximity. The production depends on, and in some cases, competes for, the same natural resources, especially water for irrigation. Furthermore, some people engage in different types of production. For example, peasants growing their own food for self-consumption and sale might also work as labourers for the export-oriented horticultural production to earn additional cash. Last but not least, some food systems share the same production site. Production from these sites enters different food systems. For example, peasants grow food for a local food system and for sale to urban centres. Which share of the food and which particular crops grown on their plot enter which food system might not be decided by the peasant until the very moment of self-

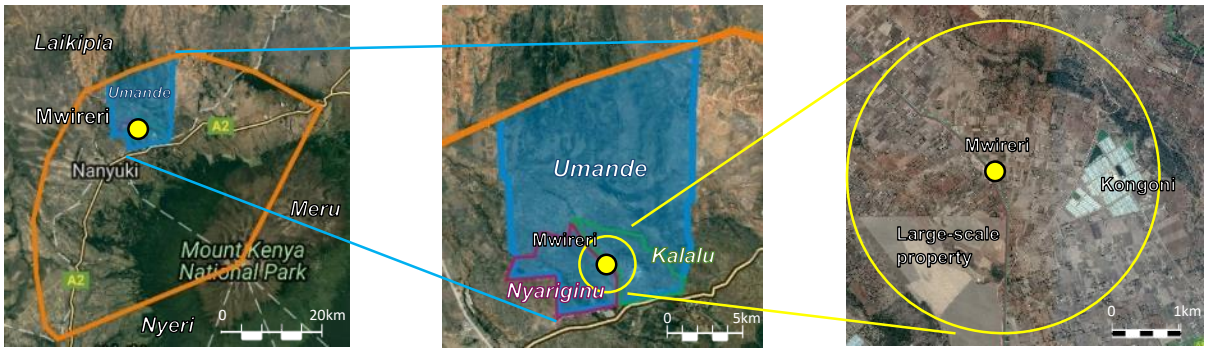
consumption or sale of these crops. Therefore, a clear-cut distinction of food systems as described in chapter 2.3 is difficult and is not always meaningful.

In addition to these three food system that produce food in the study area, other food systems activities exist in this region. In addition to producing food for consumption outside the study area, people also eat food that is produced and processed outside the study area. In Nanyuki, one can buy food from agro-industrial food systems that is produced and processed outside Kenya. My research has shown that in the rural shops most food that can be purchased is either produced and processed locally or within Kenya. For her Master Thesis, which is part of the research project, Marie-Luise Hertkorn (2016) assessed the role of and ascriptions to food from different food systems consumed in the study area. Other potential food system activities in the study region could be processing or distributing food that is neither locally produced nor consumed or the provision of information, institutions or ecological, spiritual and economic services for food production, processing, distribution or consumption outside the study area (see chapter 2.3). However, with the focus of our research project on the three food systems that produce food in the study area, these other potential food system activities in the study region are not further elaborated here.

8. Mwireri – The Village where I carried out my Research

As described in chapter six on research methods, I carried out my research in and around Mwireri, a cluster of small shops, workshops and restaurants. In this chapter I describe the ecological and social environment of the place where I carried out my research. Thereby, I focus on the local characteristics of Mwireri and how they are geographically, ecologically, economically, socially and historically embedded in the larger context of the study area described in the previous chapter. The description of the ecological and social environment enables me to describe more in detail in the next chapters how food systems in the vicinity of Mwireri influence economic activities and generally livelihoods of peasants and how they in turn influence different food systems with regard to their sustainability.

I did not clearly define my research field geographically, temporarily or demographically to be able to follow in an inductive social anthropological manner the social processes that matter to where they reache and from where they are influenced (see chapter 6). By following the social processes that mattered for my research I included peasants living in a radius of approximately 2,5 kilometres around Mwireri. Additionally, I interviewed actors and observed activities that were important for my research outside this radius. Mwireri is located about 10 km north-west of Nanyuki at approximately 0°04'N and 37°08'W. Mwireri itself is not a formal administrative unite but an economic centre of this area. Mwireri and its surroundings are part of two sub-locations: Nyariginu (red) and Kalalu (green, see map in the middle on figure 20). According to the 2009 Kenya Population and Housing Census, Nyariginu had a population of almost 6,000 inhabitants in the year 2009 and Kalalu had a population of over 5,300 inhabitants (KNBS 2009).



Umande Location in the Study Area | Nyariginu and Kalalu Sub-Locations | Mwireri and it's Surroundings

Figure 20: Maps of the Location of Mwireri
The map to the left shows the Umande Location (blue) within the study area (orange) and the location of Mwireri. The map at the centre shows Nyariginu (purple) and Kalalu (green), the two Sub-locations within Umande Location in which Mwireri is located. The map to the right shows Mwireri and it's surroundings with the small peasant land-holdings, the large compound of Kongoni Flower Farms and the large land holding to the South of Mwireri. The yellow cricle in the map in the middle and to the left shows roughly the surroundings of Mwireri in which I carried out my research. However, I did not clearly define the geographial extend of my studies (see chapter six on research methods). All maps are drawn by the author with GoogleMaps. The satellite images of the surroundings of Mwieri were taken in March 2017.

Administratively, sub-locations are further divided into villages. Villages included several dozens to several hundred households and are further sub-divided into so-called *Nyumba Kumi* (Swahili for a group of ten households). Upwardly, the Nyariginu and Kalalu sub-locations are part of the Umande Location (blue). The Umande Location in turn is part of the Daiga Division which is part of the Laikipia East Sub-County, one of the five sub-counties of the Laikipia County. Laikipia County is one of the three counties that reaches into the study area (see map on the left side in figure 20). Counties, sub-counties, locations and sub-locations are headed by representatives that are employed by the government. Villages and *Nyumba Kumi* are headed by representatives that are not paid by the government.

Mwireri can be accessed by a roughly 3 km long dirt-road that branches off from the main road between Nanyuki and Meru/Isiolo at *Maili Saba*[73]. Mwireri is a cluster of about 150 simple mainly one-storied houses built tightly together along the dirt-road and one parallel road. These houses mainly serve as small shops, butcheries, workshops, restaurants or bars. Two shops also serve as bank branches and M-*Pesa* agencies where one can deposit and withdraw money if there is enough money at the shop. One shop also operates a local millet. A sawmill produces logs from trees cut at the slopes of Mount Kenya outside the National Park. A carpenter produces furniture, a mechanic repairs cars and motorbikes and a metal workshop produces doors, gates, tools for local agricultural production and simple machines such as maize-dryers that are even exported to neighbouring countries. Such carpenters, mechanics and metal workshops are called *jua kali* in Kenya (Swahili for "under the hot sun") because they work mainly outdoors in front of their houses. Two shops sell agro-chemical products and advise peasants in the use of these chemicals. There is a police station in Mwireri, several small churches and two simple health centres offer some medical services. Primary and Secondary Schools are located outside Mwireri on large plots. Most houses in Mwirei are supplied with electricity most of the time but running water is not supplied at all. Mobile phone connection is rather good and a private company offers slow wifi access at a low cost. During the time of my research a high lamppost was erected to light Mwireri by night. *Matatu* pass through pass through Mwireri on an irregular basis. Bikes (motorbike taxis) are the preferred means of transport to reach Nanyuki and other places in the region or to transport goods.

Only few people actually live in the houses of Mwireri. Most people live in houses on their small farms around Mwieri. As my household survey has shown, most of these farms have a size of 1-7 acres (4,000-28,000 square meters). These farms occupy most of the area around Mwireri. Thus most of the land

[73] Along the road from Nanyuki to Meru/Isiolo villages, markets or places are called according to their distance to Nanyuki. *Maili Saba* (Swahili for seven miles) is thus approximately 7 miles or 11 kilometres away from Nanyuki.

around Mwireri is subdivided into small privately owned plots that are used for housing, small-scale agricultural production and livestock keeping. This leads to a scattered settlement around Mwireri with a household or several households on each small plot. Only some land reserved for roads schools or churches and some protected strips along streams are not used for agricultural production and livestock keeping. At some distance to the South of Mwireri, a large tract of land belonging to a single owner is used to grow hay for sale. Moreover, at some distance to the East, Kongoni Flower Farms grows roses under large greenhouses for export (see map on the right side in figure 20).

Figure 21: Picture of Mwireri with Mount Kenya in the Background

picture taken by the author

8.1 Physical and Ecological Characteristics of the Location

Mwireri is located at approximately 2,000 meters above sea level in the undulating highland at the foot of Mount Kenya. Between 1926 and 1982 Mwireri received at an average rainfall of approximately 700mm per year (Berger 1989). As the whole study area, Mwireri experiences three rain-seasons per year but rainfall is often unpredictable and varies greatly from year to year. Mwireri is not far from Nanyuki with its mean annual temperature that varies between 15°C and 18°C (see chapter 7.1). In the beginning of the year days get rather hot and by the end of the year, nights can get cold and I have heard recounts of rare occurrences of frost during this time.

In the South-West at a distance of about 3km Ontulili River runs through a shallow valley leaving Mount Kenya. In the North-East Gakeu Stream passes by the village. Gakeu Stream almost dries out during the dry season. A bit further away in the same direction, Sirimon River runs off from Mount Kenya. All

these waters join Ewaso Ng'iro River. Figure 22 shows the average monthly discharge of Ontoulili and Sirimon River from 1960 to 2010 according to Njuguna et al. (2014).

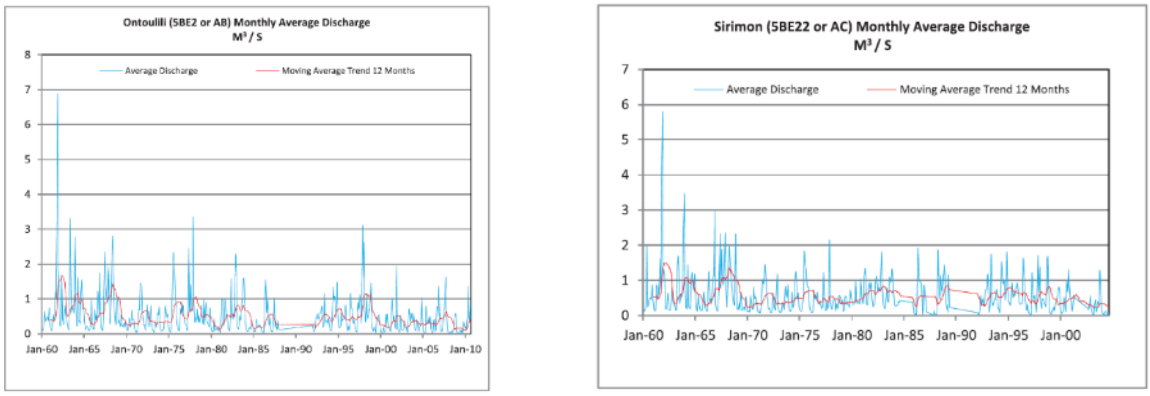


Figure 22: Schematic Figure of Average Monthly Discharge of Ontulili and Sirimon River
Average monthly discharge in m^3/s

Source: Njuguna et al. (2014: 106, 112)

Ecologically, the area around Mwireri is dominated by peasant agricultural use. Peasant farms are rather small; therefore, the area has a pattern of small sized rectangular plots. As described before, peasant practice intercropping and plant some trees on their farms. Therefore, peasant farms have a higher biodiversity than export oriented farms and according to Augstburger (2017) provide more agroecosystem services than other types of agricultural production in the area. The export oriented floricultural farm next to Mwireri (see further below) grows roses-monocultures under greenhouses but has a large ecological compensation area covered by bushes and trees. Otherwise, bushes and forest patches can only be found along some streams next to Mwireri. The large property in the South of Mwireri (see further below) is a large meadow privately used for hay production. Wildlife is rare in the area around Mwireri and peasants recounted that even beneficial insects became rare.

8.2 Socio-Economic Characteristics of the Location

During the colonial time, the land around nowadays Mwireri belonged, as most other land in the study area, to large-scale colonial land-owners who used the land for beef ranching. With the exception of the large tract in the south of Mwireri, this land had been transformed into small scale properties after the independence of Kenya. Around Mwireri three settlement schemes had been implemented to subdivide the land (see figure 23). The Kalalu Settlement Scheme is a governmental settlement scheme that started in 1972. In this settlement scheme, selected people could buy 5 acres of arable land from the government that formerly bought the land from a large-scale colonial land-owner. The Gitugi and Mwireri Settlement Schemes are private settlement schemes. There people could save money with the cooperative and once the cooperative had enough money, a big piece of land was bought from a

colonial land-owner and subdivided among the members according to the share of money they saved with the cooperative. In these private schemes the size of individual plots varies generally between 1 and 7 acres. Both, the governmental and the private settlement schemes were not free of abuse of power and conflicts. Some land conflicts and related conflicts are still reasons for resentments between local peasants and some cases remain dispute in courts up to the present day (for a detailed account of the settlement schemes and access to land, see chapter 10).

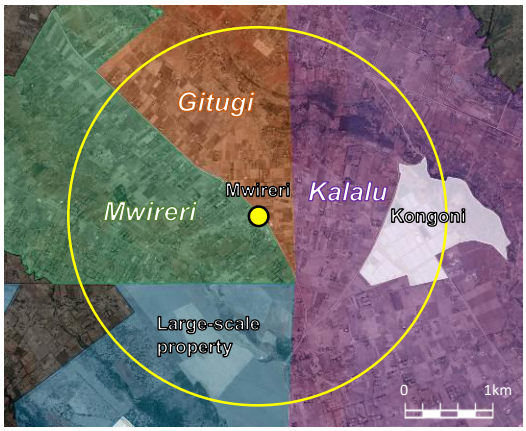


Figure 23: Map Settlement Schemes
This figure shows the three settlement schemes in the surrounding of Mwireri as well as the compound of Kongoni Flower Farms and the Lareg-scale property South of Mwieri. Drawn by the author with GoogleMaps. The satellite images were taken in March 2017.

Current Population in the vicinity of Mwireri

The settlement of the region in the vicinity of Mwireri led to a heterogeneous mix of people of different origin and of different ethnic groups. Most people currently living around Mwireri have been moving there since the 1980s. Only slightly more than one-third of the people interviewed for the household survey were born in Laikipia County. Half of them have both parents born outside this County. Approximately 5 in 6 inhabitants moved by themselves or have parents who moved to Laikipia County. Most of those moving to Laikipia or having parents who moved to Laikipia came from the neighbouring counties Nyeri and Meru. The others who moved to Laikipia or had parents who did so, came from counties in the relative vicinity south or south west of Laikipia (see map on figure 24).[74]

[74] In comparison, in the Socio-Economic Atlas of Kenya in the sub-locations Kalalu and Nyariginu 30-50% of the people were born in another county. This number is below the results shown from the household survey, especially if the migration of the parents is included. The finding that many people have moved to Laikipia however is in line with other studies (see Kohler 1987, Wiesmann 1998)

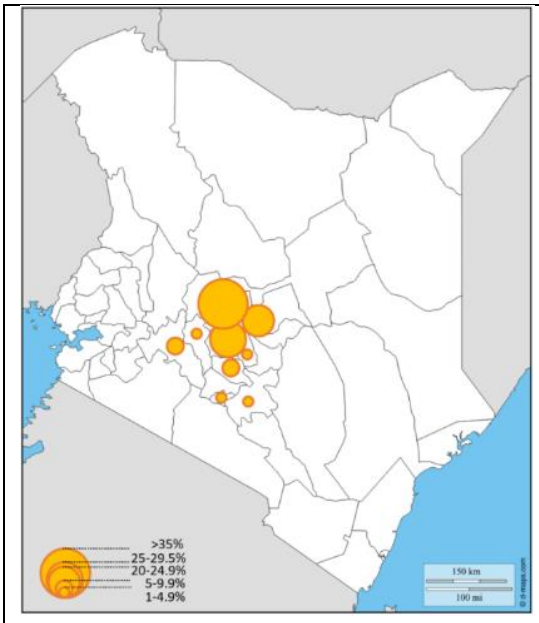


Figure 24: Map of County of Origin of People and Their Parents Living In and Around Mwireri
Drawn by the author, map with County Boundaries of Kenya from d-maps.com[75]

According to the socio-economic atlas of Kenya by Wiesmann et al. (2014) in the year 2009 the population density in Nyariginu and Kalalu Sub-Locations was 200-500 people per square kilometre. In compliance with the socio-economic atlas, the household survey has shown that the sex-ration around Mwireri is approximately equal (1.05) and most people living around Mwireri are Kikuyu (78%), followed by Meru (21%) and Kamba (1%). Furthermore, the socio-economic atlas describes a majority of protestant Christians in the two sub-locations. In addition to an official protestant and a catholic church, several smaller protestant churches can be found in the area around Mwireri. Christian faith plays an important role for many people living in this area.

In addition to different origin and ethnicity, people living in the vicinity of Mwireri can be distinguished by a local socio-economic stratification. As described above, peasants have plots with a size generally between 1 and 7 acres. Land is an important indicator for the economic position of a peasant household. Peasants with larger plots have generally also more money. Other features of the socio-economic stratification are reputation (i.e. age or what one has done for the community), possibility to earn money in off-farm activities, or good social relationships to other peasants that are socio-economically well situated. Peasants with a large plot, more money, a good reputation, possibilities to earn money in off-farm activities and good social relationships are generally socio-economically better situated. However, not all socio-economically better situated peasants have all these features. With a

[75] d-maps.com. free maps: <www.d-maps.com>, accessed June 12, 2017.

good socio-economic position, peasants have also generally a better ability to influence negotiation processes of institutions to derive benefit from their distributional effects (see chapter 5.2).

Peasant Production and other economic activities

Most people living in the vicinity of Mwireri engage in peasant production. Peasant grow crops and keep livestock on land that they had acquired through a private or governmental settlement scheme or purchased from somebody who got it through such a scheme. Peasants mainly grow maize, beans, potatoes, and peas. Almost all peasants keep livestock, such as cows, sheep, goats and chicken. This production requires various inputs, such as seeds, synthetic fertilizer and other agro-chemicals, work forces and agricultural services. Nowadays the acquisition of most of these inputs requires monetary means. Money is earned by selling agricultural product but also through off-farm activities, such as working for a large-scale export oriented flori- or horticultural company, working for the government, petty trade, etc. Some of the crops grown by peasants are used for self-consumption, others are sold to neighbours, local shops, middlemen or even exporting companies.

Farming in the vicinity of Mwireri is hazardous. As described above, precipitation is limited and unpredictable. This results in regular crop failures. Moreover, crops and livestock are prone to disease, insect infestation and fungi pests. Lack of money to acquire work forces and material inputs, further hampers successful production. Low and volatile prices for farm products, lack of storage facilities and theft of animals or crops further reduce benefits from agricultural production (for a detailed account of small-scale peasant agricultural production, see chapter nine).

To cope with these challenges of agricultural production, peasants try not to rely on farming only. Some peasants work for export-oriented agricultural production companies. Others have a small shop to sell petty commodities, work at a sawmill, have a motorbike to work as taxi driver, have a small restaurant, sell agro-chemicals or produce and repair machines. The need for off-farm income and the lack of employment possibilities force peasants to accept exploitative employment conditions or self-exploitation in own businesses.

8.3 External Organisations Supporting Peasants

Several development aid, governmental and companies' corporate social responsibility programmes support peasants in this region. Some of these programmes are linked with each other, others operate rather parallel or even in opposition to each other. Some programmes help peasants to build and maintain water supply systems, others teach farming technologies and practices, some support peasants in marketing agricultural products, some provide agricultural inputs, agricultural services or soil analysis and others support school feeding programmes or building agricultural infrastructure, churches or houses. The most prevalent support programmes are organised by World Vision, Syngenta

Foundation, KENDAT, Caritas, JICA, SNV, FAO and ACT as well as the Constituency Development Fund, the Department of Water and Natural Resources of Laikipia and the Department of Livestock and Fisheries Department of Laikipia (in short: Agricultural Department of Laikipia). All these programmes are linked with a broad number of international development organisations.

Food and Agricultural Organisation of the United Nations (FAO) and African Conservation Tillage Network (ACT) sensitised peasants for new agricultural practices and offered trainings in the new so-called conservation agriculture practices. To train peasants in these agricultural practices the organisations trained selected local peasants in seminars to become trainers for peasants. The trainers were mainly selected by Agricultural Extension Officers from the Agricultural Department of Laikipia. These officers generally selected the same peasants for different trainings because these peasants already had profound knowledge in farming technologies and knew how to train other peasants. For example, one trainer told me that he had been selected for an FAO training because he was known to have good knowledge in agricultural practices and use of inputs because he had been trained by the Syngenta Foundation and the Monsanto Foundation before. In the seminars the organisations taught the trainers about the new agricultural practices, new varieties and new input products developed in research, safe use of agro-chemicals, how to store and market products, etc. Closely monitored by the organisations, the trainers taught groups of peasants what they had learned in the seminars. Therefore, they were provided with teaching materials that clearly structured the lessons. For the training, they often used a demonstration plot where peasants could see how well crops would grow if they apply the new crops, farming technologies and inputs as taught by their trainer. However, not all demonstration plots worked well and peasants adapt new farming technologies not always as intended by the trainers. For a detailed account of how these training programmes were implemented (see chapter 12).

Stichting Nederlandse Vrijwilligers (SNV), also thought new agricultural technologies. One peasant was provided with a modern greenhouse to demonstrate how to grow tomatoes in greenhouses. In another programme they thought peasants on a demonstration plot how to grow potatoes. The training of growing potatoes was provided through an Extension Officer of the Agricultural Department of Laikipia. Moreover, SNV supported peasants in marketing their products. They supported the foundation of so called Product Marketing Organisations and linked peasants with exporting companies (see chapter 14.6).

Kenya Network for Dissemination of Agricultural Technologies (KENDAT) is a Kenyan organisation supporting peasants in Mwireri since the late 1990s. At the time I carried out my research, they stared offering engine powered agricultural services such as ploughing, rigging, ripping, harrowing, seeding, spraying agro-chemicals, shredding maize, transporting goods, etc. at reduced rates. Therefore, they

built and started to operate a machine park in Mwireri at the time of my research. A peasant from the area carried out the agricultural services for KENDAT. This peasant had already worked with KENDAT in a previous programme in the 1990s (see chapter 13). In addition to the agricultural services offered by KENDAT, they promoted conservation agriculture as a new agricultural technology and they advised peasants when they had problems with pests or poor soil quality. KENDAT offered to carry out soil analysis in a laboratory and they taught pupils at a primary school how to carry out agricultural production. Moreover, they supported the formation of a peasant credit self-help group that was headed by the peasant operating the machine park and they sold water for domestic use.

KENDAT was supported by a broad range of international partner organisations. USAid was their most important donor. However, USAid only supports organisations that have already implemented some programmes. To raise money to implement programmes, KENDAT had approached other donors and sold self-made bricks for the construction of houses in the area.

Caritas initially distributed food relief in the area during severe droughts. Later on, they changed their premise and started to support peasant production in semi-arid areas. Caritas sensitized the peasants for better farming technologies in semi-arid areas, such as mulching and sustainable use of water. At the time of my research Caritas handed out dam-liners and irrigation kits to build water ponds and small irrigation systems for kitchen gardens. These items were handed out if peasants had dug the pit for the water pond and planted the grass seeds they were handed out by Caritas before on at least half an acre. The grass should allow peasant to have enough fodder for their cows to allow them to use plant remains from the field as mulch. This programme by Caritas was organised similarly to the programmes by FAO and ACT. For additional motivation to implement their programme, they paid incentives to those peasants who first implemented their programme.

Syngenta Foundation for Sustainable Agriculture (Syngenta Foundation)[76] implemented several programmes such as building greenhouses with locally available materials, they implemented a crop insurance, linked peasants with companies through out-grower arrangements, thought peasants in new agricultural technologies, the management of credit self-help groups and sensitized peasants for safe uses of agro-chemicals. The greenhouse programme failed because the greenhouses were destroyed during heavy winds (see chapter 9.2). With *Kilimo Salama*, they founded a crop insurance. However, only few peasants participated in this programme because it compensated estimated and not real losses (see chapter 9.7). At the time of my research the Syngenta Foundation carried out a programme to support a small number of peasants to produce crops for export. Thereby, they

[76] Syngenta Foundation is non-profit organisation, established by Syngenta. Syngenta is a known Swiss based global company producing and distributing agro-chemicals. Syngenta Kenya is the Kenyan subsidiary of Syngenta (see Syngenta Foundation: <www.syngentafoundation.org>, Syngenta: <www.syngenta.com> and Syngenta Kenya: <www.yngenta.co.ke>, all accessed February 2, 2018).

provided agro-chemical inputs for the production that met the standard required for export production. Moreover, they linked the peasants with financial institutes that provided the capital to purchase the inputs required for export-oriented production linked peasants with exporting companies. This programme had a difficult start because almost the entire first harvest was destroyed by frost.

World Vision supported several water projects in the study area between the years 1997 and 2013. They helped to build the infrastructure of water projects. To support the projects, they paid contractors to build the infrastructure. Whereas the members of the water projects had to provide manual labour force. The same water projects are also supported by the Department of Water and Natural Resources of Laikipia. During my research the committee of one water project wrote an application to seek support from the Water Service Trust Fund for a further development of its infrastructure (for a detailed account on water projects, see chapter 8.5).

According to a peasant living in the area, Japan International Cooperation Agency (JICA) supported the sinking of a local borehole in the year 1999 to fetch water for domestic use. A Member of Parliament selected the area where the supported boreholes were built. JICA explored suitable locations for boreholes and carried out the work. Once the boreholes were ready they handed them over to a self-help group that had to raise a certain amount of money to maintain the borehole. According to the peasant currently operating a JICA borehole close to Mwireri, most boreholes drilled by JICA are not in operation anymore.

Most of the organisations that operate in the region are linked with a broad network of international development organisations (see figure 24 and 25). These international development organisations carry out research on how to improve local production and provide knowledge, methodologies and money to carry out programmes. As shown in figure 25 and figure 26 through programmes that are designed in this way local peasants are linked with global organisations. However, it is often a rather unidirectional link from the international organisations to the peasants. Such links provide few opportunities for feedbacks from the peasants or even participation of peasants in the negotiation of how to carry out such programmes. This results in programmes that only partially consider the needs and the potentials of the peasants for which they are designed. For example, for some programmes, peasants needed to be able to read and write but not all peasants were literate, or peasants were told how to grow crops by using specific inputs but not all peasants were able to purchase these inputs.

At the other hand, some peasants also developed strategies to greatly benefit from these programmes. Some peasants got a greenhouse for free, others earn money as a Trainer, or they receive some inputs for a demonstration plot. Interestingly, the peasants who are able to benefit most from these programmes are peasants that are already better off in the local context (e.g. who had a rather stable

access to water for irrigation, who were already supported by other programmes or had money to pay for agricultural services). However, those peasants with less education, small plots, limited or no access to water for irrigation, no direct personal relationships with Agricultural Extension Officers or Trainers, etc. can barely benefit from such programmes. The programmes are not structured in ways that considered their needs. For example, mainly poorer peasants are illiterate, do not have access to irrigation water, or cannot afford inputs that are required to implement what they were told in these programmes. In chapter 12, I will explain more in detail how trainings through such programmes are organised and implemented in practice.

Figure 25: Map of External Organisations and Partner-organisations Supporting Peasants around Mwireri

Location of organisations supporting peasants

Location of partner-organisations

Drawn by the author with GoogleMaps

Kenyan Non-governmental Organisations Supporting Peasants		
African Conservation Tillage Network (ACT)		Kenya
Partner Organisations of ACT	The Norwegian Agency for Development Cooperation	Norway
	Agence Française de Développement	France
	Catholic Relief Services	USA
	European Union	EU
	Cirad	France
	World Agroforestry Centre	Kenya
	Deutsche Gesellschaft für International Zusammenarbeit	Germany
	FAO	Italy
	Common Market for Eastern and Southern Africa	Zambia
	No-till club	South Africa
	KARI	Kenya
Kenya Network for Dissemination of Agricultural Technologies (KENDAT)		Kenya
Partner Organisations of Kendat	USAid	USA
	Farm Concern International	Kenya
	Brooke	UK
	Cirad	France
	Department for International Development	UK
	German Institute for Tropical and Subtropical Agriculture	Germany
	Ecoagriculture Partners	USA
	FAO	Italy
	Private Sector Development in Agriculture	Kenya
	Biovision	Switzerland
	International Fund for Agricultural Development	Italy
	Applications for Technology Challenging Poverty	UK
	Swedish International Development Agency	Sweden
	International Fertilizer Development Centre	USA
International Organisations Supporting Peasants		
World Vision		USA
Caritas		Vatican City
Food and Agricultural Organisation of the United Nations (FAO)		Italy
Japan International Cooperation Agency (JICA)		Japan
Stichting Nederlandse Vrijwilligers (SNV)		Netherlands
Syngenta Foundation for Sustainable Agriculture (Syngenta Foundation)		Switzerland
Kenyan Governmental Organisations Supporting Peasants		
Constituency Development Fund		Kenya
Water Service Trust Fund		Kenya
Department of Water and Natural Resources of Laikipia		Kenya
Agriculture, Livestock and Fisheries Department of Laikipia (Agricultural Department)		Kenya

Figure 26: Table of External Organisations Supporting Peasants Around Mwireri

8.4 Export Oriented Flower Production in the Vicinity of Mwireri

In addition to the peasant production, a flower exporting company operates a production site in the vicinity of Mwireri. This production site is called Kongoni Flower Farm. The farm occupies an area of roughly 100 hectares and is located approximately 1 km west of Mwireri (see figure 20 in chapter 8). Their entire compound is fenced off with high impenetrable wires and guards patrol day and night. Almost half of the site is covered by large white greenhouses that can be seen from afar. Under these greenhouses workers in company uniforms or plastic overalls and respiratory protective equipment grow roses for export to European flower auctions. In addition, an irrigation system provides water for the roses. This system consists of ground water boreholes, rainwater collection and large on-site ponds to store the water. Moreover, an area towards the Gakeu Stream is fenced off as an ecological compensation site. This land had already been forest-like under the former owner and could be accessed by peasants for walking through, grazing and firewood collection with or without permission by the owner. However, it also served as a hideout for people stealing from peasants. Since the establishment of the flower farm this area can no longer be accessed. Overall, the compound of the Kongoni Flower Farm with its large white greenhouses and complex irrigation system is in sharp contrast to the small diverse farming plots of the peasants in the vicinity and at night, the safety lighting illuminates the entire environment – also during power cuts that plunge the rest of region into darkness.

Figure 27: Picture of the Kongoni Flower Farm

picture taken by the author

According to people living in the area, Kongoni Flower Farm belongs to a Kenyan owner of Indian descent.[77] Kongoni started its operation in the late 1990s. Most land for the farm was acquired from another Kenyan large-scale land-owner who previously used the land as grazing area for his cows. Only few plots of peasants were bought later on to extend the farm size.

The Kongoni Farm provides mainly short term employment at low salaries for people living in the vicinity of the farm or at stops along the company's bus line that transports workers to the farm. Some former worker told me that employment is often given out backhandedly to people known or to those paying a bribe to supervisors. Despite these difficulties, some people recounted having moved to Mwireri because they were employed by Kongoni. Other export-oriented agricultural production farms in the study area provided further employment opportunities for people living in the vicinity of Mwireri. According to the household survey, approximately 11% of the adult people living in the vicinity of Mwireri worked for an agro-industrial production company. Almost half of them worked for Kongoni. As such, agro-industrial production can be seen as an important employer in the vicinity of Mwireri.

People living in the vicinity of the Kongoni Flower Farm complained that the use of agro-chemicals in the greenhouses pollutes the air and excess water leaving the farm compound causing potentially negative health impacts for people and animals. Moreover, some people complained that the company is doing little for the community and has a bad Corporate Social Responsibility performance compared to other similar production companies operating in the area. The company provides water for domestic use for free at their farm gate. But people have to carry the water from the farm gate to their homes. In addition, peasants can buy and re-use old equipment from the company, such as irrigation drip-kits, cherry cans used to store agro-chemicals or old greenhouse folia. Peasants use this equipment to build their own irrigation systems, carry water or to build their own greenhouses. I observed many peasant using cherry cans in which agro-chemicals were delivered to transport water for domestic use. At several farms I saw piles of old plastic pipes or folia. Often they could not be used or were no longer used and were dumped somewhere on the peasants' farms.

A large tract of land South of Mwirier belonging to a single owner used for hay production does not provide economic opportunities or greatly affects people living in its vicinity. However, I have been told that during severe droughts people used to invade the land in large numbers to graze their animals at night.

[77] At the turn to the 20th century people from the British colony in India were brought to the British colony in Kenya to build a railway from Kenya to Uganda. With the independence of Kenya, these Indians and their descendants became Kenyans. Today, the Indian Kenyans are known to be successful business men.

8.5 Water Projects

Three water projects provide water from nearby streams for domestic use. About 60% of the peasants stated in the household survey to be member of one of these tree water projects. In addition, a borehole can be used to fetch ground water and a new water project was constructed at the time of my research by the Catholic Church to access ground water for the Church and some people living in the vicinity.

The first water project that provided water from a nearby stream was founded in the 1980s. Two peasants with comparatively large farms wanted to construct a water supply system to provide water from a nearby river to irrigate their fields. To get a permit to withdraw water from the river, the Department of Water and Natural Resources of Laikipia demanded to open their project to other peasants in their vicinity. In order to do so, they founded a self-help group with written by-laws for a commonly owned water supply system. Peasants who wanted to join the project had to provide an initial membership fee and workforce to build the necessary infrastructure. Initially, the project had about 500 members. First, they built a furrow of roughly 10 km length from a valley at the slopes of Mount Kenya to the area where they lived. Later on, a commercial horticultural farm supported the water project with financial means and construction materials on the condition to get a share of the water to irrigate their farm. In addition, World Vision supported the project by paying contractors to build infrastructure. The support from these two actors allowed the project to replace the furrow with a pipe and to build the infrastructure to gradually disperse the water to the individual members. During this time, the number of members grew to more than 5,000. However, peasants who join the project later have to pay a huge fee because they did not contribute the same amount of workforce as the initial members.

As the project is planned, it has a main pipe from the intake at the slope of Mount Kenya to a distribution chamber. From there three sub-branches, the horticultural company and the two founders of the project have their own pipes. The sub-branches have other distribution chambers from where the water is piped to the ordinary members of the project. The water project is headed by a committee of 27 elected members, nine from each sub-branch. In addition, the two funders and the company are also represented in the committee.

As mentioned in chapter 7.4, this project is not the only one withdrawing water from the rivers. Myriad individuals, groups and commercial horti- and floricultural companies started to do so. This led to water scarcity during the dry season and conflicts among various water projects and downstream users. To mitigate these conflicts, the Water Awareness Creation Campaign Initiative supported the foundation of so-called Water Resources Users Associations (WRUAs). Through such WRUAs the different water projects, individual users and commercial companies managed, in collaboration with

government authorities, a collective use of river water, resembling the collective management of CPR as described in chapter 5.1.

Managing river water access of different user groups is not the only difficulty to organise individual water access. The distribution of water within a water project provides further challenges. The example project has grown from 500 to 5,000 members in about 20 years. This resulted in insufficient water availability at the project level. During the dry season, not all members could be supplied with water. This lack of water was addressed with rationing. Such rationing limits the water provided to each sub-branch to two days per week. Moreover, the infrastructure in the project discussed is not throughout built as planned. Some project members were allowed to tap main pipes before they reached the official distribution points. This prevents an equal distribution of water, especially within the sub-branches. Users with upstream broaches can access the piped water better if it is rationed. Some members at the end of the pipes started to feel disadvantaged and complained that they did not get the same share of water than others but would not have enough power to claim for an equal distribution of water within the project.

The commercial horticultural farm that was part of the project bailed out at one moment. Without the company's financial support, the project did not have enough money to maintain its infrastructure and to pay the annual water fee to the Department of Water and Natural Resources. Additionally, the members who felt to not get enough water stopped paying their monthly membership fee. This increased the lack of money to maintain the infrastructure and to pay the water fee. The project accumulated debts and the project's infrastructure degraded, especially in those sub-branches that did not have equal distribution of water. Obstacles in the management of the project resulted in the exclusion of some members who felt disadvantaged with regard to water access and possibilities to enforce their claim for an equal sharing of water within the project.

The internal distribution of water within water projects can be seen as a second level of water distribution. The first level is the distribution between the different water projects, individual users and commercial companies that withdraw water from the rivers. The second level is the distribution within a water project. The management of this commonly used resource only works well if both levels operate well. In the case of this water project, the second level seems to cause problems and as such the management of commonly used water does not work well. For the discussion on CPR management (see chapter 5.1), one could add that it is important to consider the management of a CPR at all levels and if it works well at one level, it does not ensure that it works well at all levels. In the vicinity of Mwireri, some members of the water project could not rely on a continuous provision of water during dry seasons. More than one-third of the members in this water project stated in the household that they are not provided water. Those who got water, only got enough for domestic use but not enough

to irrigate their *mashama*. Therefore, peasants could not rely on water projects as only source of water. Peasants had to combine different sources to ensure reliable access to water for domestic use and had to carry out agricultural production without irrigation.

The other two water project are perceived by local peasants to operate better and to distribute the sourced water more equally. Of one project, ever member stated in the household survey to receive water. This project was much smaller than the one that did not operate well. Moreover, people living in the vicinity of Mwireri are part of the project's upstream section, compared to the other project where people living in the vicinity of Mwireri are part of the project's downstream section. In the other project, only one out of ten complained to not be provided with water at the moment. Peasants who are not member of a water project said that they lack the money to join the project, they do not trust the management to get water if they join the project or they have access to water through other sources (e.g. they can use water from neighbours).

In addition, an engine powered borehole provides water in the vicinity of Mwireri. This borehole was donated by the Japan International Cooperation Agency (JICA). A self-help group operates the borehole. Members of the group pay a monthly fee for maintenance but can fetch water for free. People who are not member of this group have to pay for each cherry can they fetch from the borehole. Every day, the pump is operated once in the morning and once in the evening. About 30-35 people fetch water every day. To get water, people have to queue. Everybody is allowed to take tree cherry cans per person. Otherwise, it would take too long for the others to queue. After everybody has water, people can fetch additional water if they want. However, the water is slightly salty and thus not good for irrigating crops.

These different collectively managed sources of water are important for peasants' access to water. However, not all water projects are operated well and not all peasants can get access to water through such projects. Some peasants are members of projects that do not provide water to all members, others could not join the projects because they do not have enough money to pay the membership fee. These peasants had to find other ways to access water.

In addition to the collectively operated water sources, some peasants and organisations (e.g. KENDAT) store water for sale. They sell water per cherry can to neighbours. Moreover, people living in the vicinity of the entrance to Kongoni Flower farm can fetch water there for domestic use for free. Many peasants collect rainwater for domestic use and few peasants have own water wells or a permit to fetch water directly from a stream. Some peasants also fetch water illegally from streams at night. Some have rain-water fed ponds to store water for some irrigation during the dry season. This combination of collective and individual water sources enables all peasants to access enough water for domestic use and watering their livestock. However, most peasants do not have enough water to

irrigate their fields. In combination with unpredictable and unreliable rainfall, this causes heavy crop failures from time to time.

8.6 Food Systems

The different land-uses and economic activities of people living in and around Mwireri are related to three co-existing major food systems (see figure 28). Local food production by peasants on small plots can be classified as stronghold in a domestic and local food system if the locally produced food is processed, distributed and consumed by the peasant household or the community in the surrounding of Mwireri. On the other hand, local food production of peasants can also be classified as part of a regional food system if the food is sold for consumption in urban centres within Kenya, such as Nanyuki,[78] Nairobi or Mombasa. Regional food systems that include food that is produced by peasants and consumed in urban centres should not be mistaken with regional food systems that includes food that is produced within the study area by large-scale wheat farms, ranches or pastoralists (see chapter seven). The latter is one of the food systems that are analysed by the research project. I am not considering this regional food system because there are no large-scale wheat farms, ranches or pastoralists in the surroundings of Mwireri. Therefore, with my focus on a regional food system of peasant products, I look at a different regional food system than others from the research project. Even though the regional food system of peasant-products is not part of the analysis of the research project, I consider this food system because it is an important component of local small-scale peasant horticultural production and livestock keeping.

In addition to peasant horticultural production and livestock keeping on small plots, an export-oriented floricultural production company operates in the surroundings of Mwireri. This export-oriented production can be classified as part of an agro-industrial food system. Approximately 11% of the adult people living in the surrounding of Mwireri work or worked for this export-oriented production company or for another agro-industrial company in the vicinity. Some peasants also used to grow horticultural crops for sale to export-oriented companies (e.g. Kenya Horticultural Exporters). However, in the vicinity of Mwireri almost all peasants stopped this endeavour because they struggled to benefit from arrangements with these companies.

[78] In the definition of the study area on figure 11 in chapter 7, Nanyuki is part of the confined production area. With the confinement of the study area to the surroundings of Mwireri, Nanyuki becomes an external city and thus food sold for consumption there is no longer part of a local food system in which food is consumed locally but part of a regional food system in which food is consumed outside the confined production area.

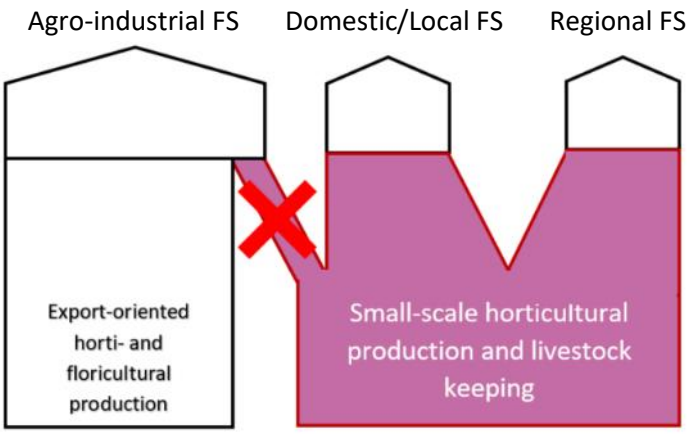


Figure 28: Schematic Figure of Production in the Surrounding of Mwireri for Various Food Systems
Export-oriented horti- and floricultural production is exclusively for agro-industrial food systems. Small-scale horticultural production and livestock keeping is for domestic, local and regional food systems. Since almost no peasant in the vicinity of Mwireri produces crops for export, no food of small-scale horticultural production enters agro-industrial food systems.

drawn by the author

9. Characteristics of the small-scale peasant crop and livestock production around Mwireri

Most people living in the vicinity of Mwireri engage in peasant agricultural production. As mentioned in the last chapter, this agricultural production is generally linked with other economic activities. In this chapter, I describe the agricultural production of peasants living in the vicinity of Mwireri. This description elucidates the agricultural production of local peasants to enables a detailed analysis of selected characteristics of this production and links with other economic activities in the following chapters.

As stated in the last chapter, people livening in the vicinity of Mwireri have *mashamba* (Swahili for fields or plots), mainly with a size between 1-7 acres. On these *mashamba* most peasants have a house in which they live. Such houses range from simple wooden shelters to large brick-built houses. Most *mashamba* are fenced off with a barbed wire or hedges. Some trees provide shade. Some peasants have cow-sheds or chicken-sheds on their plots. Pipes to collect water from the roofs and water tanks remind of the water scarcity in this region. Peasants grow different agricultural products and kept livestock. Peasants mainly intercrop potatoes, beans, peas and maize. Some peasants also grow wheat. Additionally, most peasants grow different vegetables and herbs in small kitchen gardens. Farming under the climatic conditions in the study area is challenging but if conditions are good, the climate allows for two harvesting seasons per year. Peasants keep harvested crops for self-consumption and they sell some products to neighbours and traders in order to generate some cash income for the peasant household. In addition to crop production, most peasants keep livestock, mainly cows, sheep, goats, chicken and rabbits. In the household survey, more than 90% stated to keep animals. To feed cows and sheep, peasants use a part of their land as pasture or they feed the animals with harvest by-products. Peasants also buy feedings at local agro-vet stores or exchanged feed stuff with neighbours. Animal products such as milk, eggs or meat are consumed by the peasant families or they are sold to neighbours and traders. From animal dung and harvest by-products, some peasants produce manure or mulch to improve the soil fertility.

Peasant agricultural production and livestock keeping greatly depends on rainfall. As stated in chapter 7.1, three rain-seasons provide the precipitation in the study area. However, rainfall in this region is lower compared similar areas at the other side of Mount Kenya and the occurrence of rain-seasons is unpredictable. The amount and moment of precipitation varies greatly from year to year. Lack of precipitation causes droughts regularly. Moreover, river water, artificially stored water or ground water are not sufficiently available for widespread irrigation on peasants' farmland, especially during dry spells. This exposes agricultural production and livestock keeping to the unpredictable and varying

rainfall. As explained by most peasants with whom I spoke, droughts are the major treat to peasant agricultural production and livestock keeping.

Small-scale peasant farms in the vicinity of Mwireri. The greenhouses in the background belong to Kongoni.

Ploughing for potato production

Ploughing for maize production, the stems from the last season are still on the land.

Applying agro-chemicals

Direct seeding with a specialised machine

Figure 29: Pictures of Peasant Agricultural Production

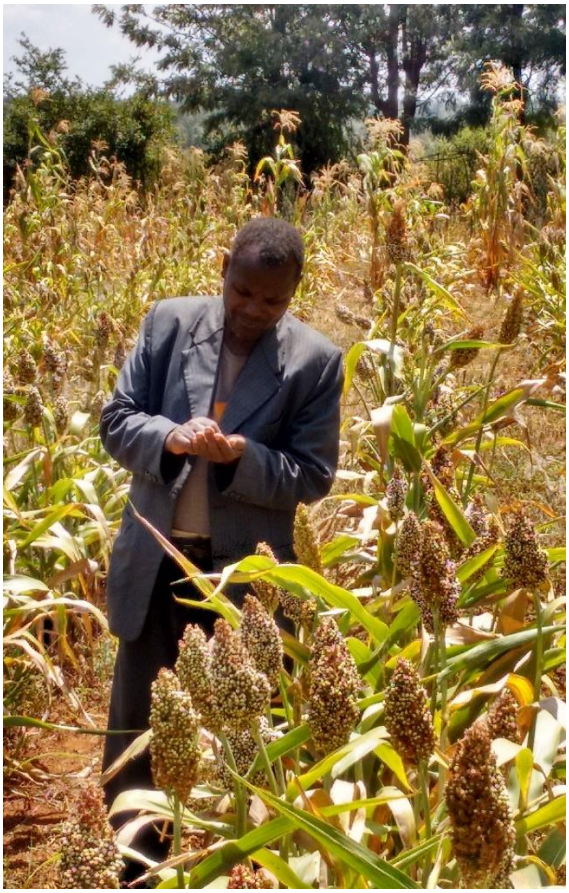
all pictures taken by the author

Several peasants whom I interviewed explained that at the time they started farming in this area the soil quality was very bad. The land had formerly been used as grazing area for large-scale cattle ranches. Peasants accounted that the soil was compact and unfertile in the first years they practiced farming. To improve the soil quality, they had to aerate the soil and fertilise it. Moreover, the peasants had to adapt their farming technologies to the local climatic conditions. As mentioned in the chapter 7.2, some peasants came from ecologically high-potential areas in nowadays Nyery, Muranga and Kiambu Counties with much more rainfall. Others explained that they lived in the forest of Mount Kenya to practice a specific type of government organised shifting cultivation. Also there, precipitation is higher than in the study area. Only few peasants lived previously in the area as squatters to work on the colonial ranches (see chapter 7.2). Further ecological challenges in the area around Mwireri are plant diseases and insect and fungus pests as well as animal diseases and pests. As indicated by many elder peasant, the first year after arriving in this region were the most difficult because they had to improve the soil quality of their *mashamba* and they had to develop new agricultural practices that were adapted to this area. With the adaptation of their agricultural production to the local ecological context and the improvement of the same through aerating and fertilising the soil, peasants adopt their use and improve the provision of the ecological environment to achieve an equilibrium between human use and ecological provision (see chapter 4.3).

9.1 Peasant Agricultural Production

To plant crops, peasants first prepare the *shamba*. Depending on the type of agricultural production (see further below), peasants plough and harrow the *shamba* to prepare it for seeding or they just spray some herbicides before seeing directly. Ploughing and harrowing is either done by hand or by animal or engine powered ploughs and harrows. Ploughing by hand is either done by members of the peasant household or by employed workers. Some peasants employ other peasants from their neighbourhood to work at their *shamba*. The employment of neighbours enables peasants to carry out agricultural tasks if they can or do not want source the required work force from their own household. At the other hand, it enables peasants who do not have much money to earn additional cash. KENDAT and some peasant in the vicinity of Mwireri own animal and engine powered ploughs and harrows. Together with people moving around with agricultural machines they offer agricultural extension services. In addition to ploughing and harrowing agricultural extension services can include seeding and harvesting with specialised machines, applying agro-chemicals, crushing maize, milling grains, chopping plant remains, etc. At the time of my research, KENDAT put a machine park into operation to provide agricultural services in Mwireri (see chapter 8.3).

After preparing the *shamba*, peasants seed different crops at their *shamba*. Seeding is either done by hand or by agricultural extension service providers. Seeds are either kept from the last harvest, exchanged with neighbours or purchased from agro-vet stores. While seeding, some peasants apply purchased synthetic fertilizer to increase yields. Seeding has to coincide with the weather and should



A peasant critically analysing the harvest of sorghum

Maize-harvest by hand

A peasant showing some maize cobs

Figure 30: Pictures of Peasant Agricultural Production

all pictures are taken by the author

be done shortly before the rain-season starts. But as mentioned above, forecasting the start and intensity of a rain-season is difficult and seeding at the right moment a matter of luck.

If the seeds germinated, the crops compete with weeds. Weeds are either removed by hand or by applying selective herbicides. Weeding by hand is a time consuming task for which some peasants employed again other peasants from the neighbourhood. Herbicides can be purchased at local agro-vet stores. Peasants mix the purchased products with water and applied them with a pump sprayer carried on a backpack. Depending on the crop and infestation of plants, specific insecticides or herbicides can be applied to reduce crop failures. Such inputs can be locally produced or purchased at agro-vet stores. The purchase of synthetic agro-chemicals requires money and links peasants in the vicinity of Mwireri with global supply chains and the global capitalist economy.

With the liberalisation of the fertilizer market in Kenya in 1994 peasants' access to synthetic fertilizer increased greatly (Omamo and Mose 2001, Freeman and Kaguongo 2003). In the wake of this liberalisation, small agro-vet stores were opened everywhere in the rural areas of Kenya (IFDC 2003). Also in Mwireri two small agro-vet stores sell agro-chemicals. Some peasants also buy agro-chemicals from Nanyuki, especially if they purchase larger quantities or travel to Nanyuki anyway. Seller at agro-vet stores are not officially trained but local peasant told me that they have good knowledge on agro-chemical products and agricultural production.

Harvesting crops is mainly done by hand either by household members or employed workers. Depending on the weather, prevalence of pests and plant disease peasants can harvest more or less. A part of the harvest is used for self-consumption, a part is sold to neighbours or traders. Depending on cash needs at the time of harvesting, peasants sell a smaller or larger share of their harvest. To sell agricultural products at higher prices, some peasants organised a collective sale of their products through so-called product marketing organisations. Plant remains are used as fodder for livestock. Therefore, plant remains are either chopped with a *panga* (Swahili for a machete knife) or a chaff cutter, a mechanic device for cutting plant remains into feed stuff. Alternatively, plant remains can also be used as mulch to improve soil fertility and moisture.

Some peasants also engage in so-called out-grower schemes. They grew horticultural products according to strict standards required for exporting products. If the products met the required standards they can be sold to export companies (out-grower schemes are described in detail in chapter 7.2). Syngenta Foundation linked peasants with out-growers and supported peasants to access the required inputs for this specific production (see chapter 8.3). However, producing for export is expensive and difficult and purchase is not guaranteed in practice. Thus, most peasants in the vicinity of Mwieri stopped producing for out-growers.

9.2 Use of Technology and Equipment

Peasants use various kinds of tools and technologies for agricultural production. In addition to simple agricultural tools, such as *panga* and hoes, specifically developed tools for small-scale peasant farming facilitate agricultural production. Such specific tools are jump-planter, animal powered ploughs, specific harrows, small mechanic seeders, pump sprayers, combined harvesters, maize-driers, chuff-cutter, etc. Some of these tools are produced in local metal workshops and owned by peasants, others have to be hired from agricultural service providers (see above).

Some peasants built irrigation facilities or greenhouses. These technologies were either provided by NGOs or horti- and floricultural companies. Most peasants have a system to collect rain-water for domestic use in large cement or plastic tanks. Some peasants also have water pounds to store some

water for watering their animals and irrigating a part of their *shamba* during the dry season. At the time of my research, Caritas handed out dam-liners and irrigation kits to build water pounds and small irrigation systems for kitchen gardens (see chapter 8.3). Some politicians donated water tanks or dam-liners to local peasants shortly before elections. Peasants could also purchase old irrigation pipes and sprinklers from horti- and floricultural companies who renewed their irrigation systems (see chapter 8.4). Though, most peasants who bought such irrigation kits were not able to install them and the plastic pipes and sprinklers were dumped somewhere at the peasants' *shamba*.

Syngenta Foundation once had supported peasants to build greenhouses with locally available materials. The frames for these greenhouses were built with wood and the plastic to cover the greenhouses could be bought from horti- and floricultural companies who renewed the coverage of their own greenhouses. However, most of these greenhouses were destroyed by heavy wind. At the time of my research, the broken frames and flapping plastic folia still recounted the failure of this programme. Only one peasant had a very robust modern greenhouse at his *shamba*. This greenhouse was provided to him by SNV to demonstrate to other peasants how to grow tomatoes in greenhouses. Despite admiring this greenhouse and its benefits, other peasants could not afford such expensive greenhouses (see chapter 12).

9.3 Conservation Agriculture and Organic Agriculture

Various organisations and the Agricultural Department of Laikipia aim at modernising the so-called conventional agricultural production of peasants. Small yields, drought-related crop failures as well as soil degradation and erosion related to conventional agricultural production shall be overcome with new agricultural technologies. Conservation agricultural is one of these new agricultural technologies. Conservation agriculture is an array of specific agricultural technologies locally taught by NGOs and governmental organisations (see chapter 8.3). Conservation agricultural technologies had been developed by the FAO as "a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment".[79] According to the FAO, conservation agriculture is based on three main principles:

- Minimum mechanical soil disturbance
- Permanent organic soil cover
- Diversification of crop species

[79] FAO: Conservation Agriculture. <www.fao.org/ag/ca/>, accessed October 29, 2017.

To reduce mechanic soil disturbance, peasants spare ploughing and harrowing of the conventional production. In turn, they apply total herbicides (e.g. Glyphosate) to remove weeds and insert seeds directly. This direct seeding is done with a *panga*, a jump-planter (a tool designed for easy direct seeding by hand) or a direct seeding machine that is pulled by an oxen or tractor. The feature of conservation agriculture is that the soil is only minimally opened to plant the seed. Seeds are often inserted together with a synthetic fertilizer. Potatoes, which are commonly grown in the area, cannot be grown with conservation agriculture technics. Weeding, is done similarly to conventional farming by hand or by spraying a selective herbicide. The treatment of invested plants and harvesting is also done similar to conventional farming. However, plant remains should not be used as feed but as mulch to cover the soil. Mulching shall reduce weeds and increase the soil moisture and fertility. Peasants applying conservation agriculture are often torn between using the plant remains as mulch to preserve the soil or to use them as feed stuff for their animals, especially during droughts when fodder is short and animals are starving. Therefore, some NGOs promoting conservation agriculture advise the peasants to grow additional fodder for their animals. However, growing fodder also competes with crop production for the limited available farm land. In combination with the promotion of conservation agriculture, some organisations introduced new crops or varieties which were more drought-resistant (e.g. sorghum or sunflower).

According to local peasants who applies conservation agriculture, these technics are better than conventional farming because soil-disturbance is minimised. In addition, agricultural extension services required for conservation agriculture are cheaper because ploughing and harrowing, the most expensive tasks of conventional farming, can be avoided. Moreover, if applied correctly, conservation agriculture is assumed to require less agro-chemicals than conventional farming because mulching reduces the need of herbicides to prepare the *shamba*. KENDAT also supported the dissemination of conservation agriculture (see chapter 8.3). Their goal is even to develop an organic conservation agriculture technology. However, only one in six peasants stated in the household survey to apply conservation agriculture partially or totally. According to a KENDAT expert in conservation agriculture, peasants resist conservation agriculture “because of cultural believes”.[80] Others give up conservation agriculture before it yields its benefits. They slide back to conventional farming after the training ends because they do not implement conservation agriculture well, they are not willing or able to wait long enough for the yields of conservation to materialize or they only participated in trainings because they wanted to get the incentives promised for participation.

[80] This vague explanation can be associated with a concept of development and modernisation that associates cling to tradition as a hindrance to development, as described by Rostow (see chapter 4.2).

Despite a fast increase in organic farming in Kenya (Willer and Lernoud 2017), organic farming is not well known and almost not applied in the vicinity of Mwireri. Technologies in organic farming are only taught by NGOs that do not operate in the vicinity of Mwireri (e.g. Kenya Organic Agricultural Network). Nevertheless, one peasant in the vicinity tried an organic farming approach at the time of my research. He explained that his organic farming approach does not use any agro-chemical, such as synthetic fertilizers, or chemical herbicides and pesticides. Instead of using synthetic fertilizer, he uses manure from his rabbits. Weeding is done by hand and insect or fungi pests are prevented through a good mix of crops. This makes peasant farming more labour intensive but costs for production can be reduced because less externally produced inputs have to be purchased. However, there is no market for organic crops for peasants producing in the vicinity of Mwireri. The peasant with whom I spoke sells his organically produced crops at the same price as non-organic crops. When I went to visit this peasant the next time, I observed that he used nonetheless synthetic fertilizer. Upon request he explained that he has to use a little bit of synthetic fertilizer. Without using synthetic fertilizer, crops do not grow large enough to compete with non-organic crops. But the peasant explained that even if organic production is not applied strictly, the benefits of organic farming, lower costs for production and less negative impacts of agro-chemicals on the soil, remain. Even if some peasants try organic farming approaches partially, organic farming is generally not well known in the vicinity of Mwireri.

9.4 Main crops grown by peasants

Peasants grow crops mainly during two rain seasons, the long rains and the short rains (for a detailed account of weather conditions, see chapter 7.1). The crops grown during these two seasons vary. During the long rains, peasants mainly grow maize, beans, potatoes, peas and some grow wheat. During the short rains, peasants mainly grow potatoes, beans, maize and peas. Potatoes are more prevalent during the short rains but maize is grown by fewer households during the short rains because, as they explained, there is a higher risk of insufficient rainfall during the short rains. This can cause too early withering of the plants. During the short rains peasants seldom plant wheat. Vegetables, such as *sukuma wiki* (Swahili for colewort), onions or cabbage are grown throughout the year if some water can be stored for the irrigation of the kitchen garden. Some peasants also grow *sukuma wiki*, onions, cabbage, tomatoes or garlic for local sale. In addition, some peasants grow grass for hay, sorghum, soy, kath, sunflower, dolichos lablab, capsicum, etc. In the following, the most important crops grown in the vicinity of Mwireri are shorty described.

Maize was grown almost by every peasant during the long rains in 2016. Less than half of the peasants grew maize during the last short rains 2016 because they fear crop failures if the short rains provide too little rain. Various maize varieties are used locally. Peasants constantly tested different varieties to

see which variety is best with regard to output quantity and resistance to climatic and other adversities. Most of these varieties are certified hybrid varieties bred by seed companies in other places of Kenya. These varieties can only be used once. Thus, most varieties have to be bought anew for every season. Some peasants described strategies to re-use the seeds they harvest by keeping them for the use in the over next year (see chapter 11.4). Maize can be planted conventionally or with conservation agriculture technologies. Moreover, maize can be intercropped with other crops, such as beans or peas. Approximately 10kg of seeds are needed to plant maize on a plot of one acre. Prices for seed maize vary by time (190-240 KSH/kg). During the seeding time, prices are highest. For maize, up to 100 kilogramme of synthetic fertilizer are applied per acre. During the maturing time, weeding is done by hand or by using selective herbicides. Some peasants further spray fungicides or insecticides to protect the maize from pests. Under best circumstances up to 1,300 kilogramme of maize cab be harvested from an acre. However, in practice harvests are generally much lower, depending on the weather, amount of fertilizer applied and pests affecting the plants. Some peasants have machines to separate the maize from the cobs. Those who own such machines also rent them to others. Roughly one-third of the peasants stated in the household survey that they sold parts of the last maize harvest (see figure 39 on page 199). Maize can be sold at 25-30 KSH per kilogramme. The high number of peasants keeping their entire harvest shows that maize is rather utilised for self-consumption than for sale. The cobs of the maize can be used as cow fodder or firewood.

Beans are grown almost by all peasants during the long and the short rains. Beans can be intercropped with maize or other crops. Seeds can be bought at local agro-vet stores but most peasants keep seeds of so called “local varieties” from their last harvest and exchange seeds with neighbours based on generalized reciprocity. There is only one variety of seed beans that is produced by seed breeding companies (KAT X 56). Local varieties can also be purchased from neighbours or at local agro-vet stores and are much cheaper (60-100 KSH/kg) than the variety produced by the breeding companies (200-250KSH/kg). Beans can be planted conventionally or with conservation agriculture technologies. Planting one acre of beans requires about 16-20 kilogramme of seeds. Some varieties with small seeds only require 10 kilogrammes per acre. Seeds can be planted directly with a *panga* or a direct planter, or after ripping lines with a ripper (an agricultural extension service offered by some providers). Some peasants also add synthetic fertilizer. Various pests such as fungi and insects can affect beans. These pests can be handled with various agro-chemicals. Weeding can be done by hand or with specific chemicals. Especially in combination with maize, only one specific herbicide can be applied to avoid harming other crops. Three to four months after seeding, 6-10 bags of harvest can be expected. According to a peasant, the high altitude and cold climate delays maturing in the region. A bag can be sold at 3,500 KSH (39 KSH/kg). But most peasants (almost nine out of ten) keep beans for self-consumption because beans do not account for high benefits (see figure 39 in chapter 14.1).

Potatoes are also grown by approximately 70% of the peasants. Potatoes are grown during both the long and the short rains. Potatoes can be intercropped with peas or other crops. Potatoes are the crops with the highest cost for production but they also result in high benefits from sale. Potatoes can only be grown economically in the conventional way[81] and preparing the *shamba* for potatoes is rather labour intensive and cost intensive. Potatoes seeds are expensive, especially if they are certified by the Kenya Plant Health Inspectorate Service, a parastatal organization.[82] Prices for potatoes for planting vary by the time they are purchased between 25-50 KSH/kg. Approximately 800 kilogrammes are required for one acre. In addition, potatoes require up to 200 kilogramme of synthetic fertilizer per acre if no other means to ensure high soil fertility are implemented. Potatoes are affected greatly by fungi and require regular spraying of fungicides. Harvesting potatoes is again very labour intensive. After harvesting, potatoes perish quickly and keeping potatoes for sale requires sophisticated storage facilities that can only be afforded by economically better off peasants. Peasants can more easily store potatoes for self-consumption but if they are stored this way, they will not look good enough for sale. Because of these storage difficulties, prices for potatoes drop greatly during the harvesting time. Peasants quoted prices at which they sold potatoes that range from 8-20 KSH/kg. With a harvest of 7,000 to 12,0000 kilogramme per acre, peasants can earn 56,000-240,000 KSH per acre. However, some peasants also lost their entire harvest to pests. Of the peasants who grow potatoes, approximately one third sold parts of their harvest (see figure 39 in chapter 14.1). Potato production in larger scale for sale is only done by peasants with more economic means.

Peas were grown by approximately one-third of the peasants during both seasons of the year 2016. Peasants do not differentiate varieties of peas. They used non-hybrid varieties that can be re-used in the next season. Most peasant reused peas or received seeds from neighbours. Only few peasants bought seed peas at the local agro-vet stores. There seed peas are sold at 150-200 KSH/kg. Approximately 16-20 kilogrammes are needed per acre to plant peas if they are intercropped with other crops. Peas are generally planted with other crops, such as maize or potatoes. Peas do not need fertilizer because they can fix atmospheric nitrogen. However, some peasants still add synthetic fertilizer on their farm to boost their peas production. Otherwise, peas are cultivated and utilised similar to beans. Two-third of the peasants who grew peas during the last season kept them for self-consumption. Only one-third sold parts of their peas-harvest (see figure 39 in chapter 14.1).

During the long rain season, some peasants (17%) grew wheat. Wheat is grown as a monoculture on small plots. Wheat can only be harvested with a combined harvester. Peasants with small plots do not

[81] According to peasants, growing potatoes with conservation agricultural technologies is theoretically possible but not practically feasible.

[82] For further information, see: Kenya Plant Health Inspectorate Service. <www.kephis.org>, accessed October 29, 2017.

grow enough wheat to hire a combined harvester. They can only ask an operator of such a machine to harvest their plot if they are already around to collect the harvest of a larger field in the vicinity. This makes it difficult for peasants with smaller plots to grow wheat. Two-third of the peasants who grew wheat during the last season sold their harvest (see figure 39 in chapter 14.1). This shows that wheat is more commonly grown as a cash crop than other crops. However, as shown by Veronica Mwangi (2017), a PhD student in our research project focusing at different value chains from an economic perspective, peasants earn less money from selling wheat compared to large-scale wheat producers in the study area. Moreover, peasants only produce half the amount of wheat per acer compared to the large-scale producers. This might be explained by their inability to purchase as much agro-chemical inputs as are used by large-scale producers.

9.5 Livestock

More than 90% of the peasants stated in the household survey that they keep livestock. Most households kept one or two cows. No household had more than five cows. From interviews I learned that some peasants keep zero grazing high-breed cows while others keep so called local cows that graze on marginal lands. Cows are kept to produce milk for self-consumption and sale. According to the household survey, not all peasants who kept cows at this time could milk their cows. Approximately two-third of the households could milk at least one cow on a daily basis. The average of milk provided per cow, as stated in the household survey, was 2,6 litres per day.[83] Slightly more than half (53%) of the peasants who keep cows stated in the household survey to sell some milk (see figure 40 in chapter 14.2). They sell milk to neighbours, local shops and restaurants or nearby processing companies. Cow milk can be sold at 30-45 KSH per litre to neighbours or local restaurants. Large processing companies that collect the milk at the farm gate pay up to 30 KSH per litre.

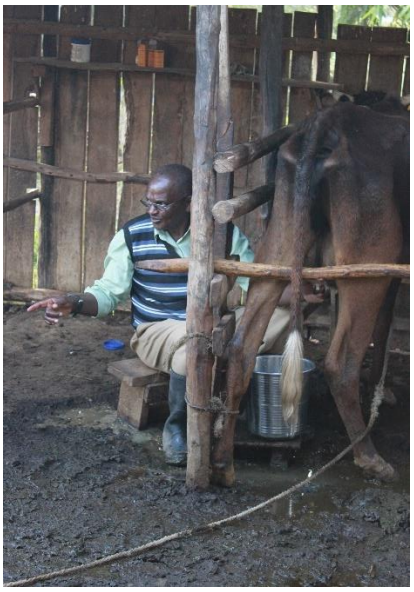
Some organisations support peasants to start dairy production. An organisation built demonstration cow-sheds for two members of a peasant group and showed the members how to produce manure from cow-dung. Thereafter, every month the group members provided money and work force to build a cow-shed for a member of the group – until every member had been supported. The manure production did not work because the pitches in which they produced the manure were flooded during the rain-season and some pitches collapsed. However, most peasants to whom I spoke perceived cow-keeping as very beneficial. Cows produce milk on a daily basis, allowing for a much more regular

[83] This figure has to be taken with caution because peasants who use the milk for self-consumption might not measure its quantity and the amount of milk provided by the cows is based on a rough estimate by the peasants.

income than growing agricultural crops. Moreover, cows improve peasants' resilience in the way that they could sell cows to cover unexpected high immediate cash needs.

driving animals to their pasture

grazing cows and sheep at the edge of a *shamba*



milking a cow by hand

Figure 31: Pictures of Peasant Agricultural Production all pictures taken by the author

Cows are grazed on privately owned land that is not suitable for agricultural production. Moreover, everybody can graze sheep, goats or cows along the roads and on other public places. There, somebody has to accompany the animals to protect them from stealing. Grass along the roads and on public places is sparsely available. Most peasants also feed plant remains from their crop production or

branches of trees to their livestock. With a *panga* or engine powered chuff-cutter[84] they mince plant remains to help animals to better digest the fodder and to prevent them from rejecting any part of the fodder. As mentioned above, peasants who applied conservation agriculture were often torn between using the plant remains as mulch to preserve the soil or to use them as feed stuff for their animals. Therefore, some NGOs that promote conservation agriculture advised the peasants to grow additional fodder for their animals. Some peasants also purchase hay, animal feed or feed additives for their cows. One peasant in the area specialised on hay production to sell it to neighbours. Food supplements can be bought at local agro-vet stores or in Nanyuki. Also veterinary products, such as vitamins, heaters, dewormers, ixodicides, antiseptics, antibiotics, etc. are sold at different agro-vet stores. These products are given orally, sprayed at animals' skin or injected. Shop keepers advise peasants on using these products.

Cow-keeping is less drudgery and weather-dependent than growing crops. Keeping cows does not require all the hard work of crop production and if water gets scarce, cows can be brought to rivers or water to supply the animals can be purchased. However, during severe droughts also fodder for cows gets scarce. One peasant told me that during a severe drought in 2009 they invaded the large property south of Mwireri (see chapter 8.4) to prevent their animals from starving. At night they sneaked into the property and overbore the watchmen. Before dawn they left the property and could not be convicted by the land-owner.

Some peasants also keep goats and sheep. Goat milk is said to be more nutritious than cow milk and it can be sold at a higher price. However, most peasants have too few goats to sell the milk. A group of peasants was given some goats and a he-goat by an NGO. They breed additional goats until most of the group had a goat. To speed up the process of issuing a goat to every member, the group started to collect money from its member to buy additional goats. At the time of my research, the dairy group had issued a goat to every member. After issuing a goat to every member, they continued the group as a credit self-help group (for further explanations on credit self-help groups see chapter 15.4). They still have the he-goat to allow the members to breed additional goats. However, the he-goat has become aggressive over time and the member who took care of the he-goat did no longer want him. In a lengthy discussion, the members of the group discussed what to do with the he-goat. Some wanted to slaughter him, others wanted to keep him for further breeding – but those who wanted to keep the he-goat did not want to take care of him. Finally, a member who struggled to pay back loan he owned to the credit-group agreed to take care of the he-goat for some time. This incident shows trenchantly how a negotiation process is influenced by power-relations. The peasant who struggled to pay back a loan to the group was in a weak bargaining position. As explained in chapter 15.4, credit-groups

[84] A chuff cutter is a device to cut plant remains into small pieces.

generally discuss the punishment for somebody who fails to repay a loan. To avoid a harsh punishment by the group for not repaying his loan, he had to offer to take care of the he-goat for some time. Therewith, he is the one who has to carry the costs of taking care of the he-goat of which every member of the group can equally benefit for breeding additional goats.

Most peasants keep a few chicken to harvest eggs for self-consumption. Only one-quarter of the peasants stated in the household survey to sell some eggs to local shops, middlemen or neighbours. Some peasants keep a great number of chicken to produce eggs and chickens for sale. One of these peasants explained in an interview that she has about one-hundred chicken. She has a number of henhouses where she keeps the chicken. She breeds the chickens by herself but buys entire bags of chicken fodder every few weeks at a local agro-vet store. Every day she harvests some dozens of eggs which she sells to a local shop in Mwireri. She sells eggs at 12 KSH per egg. Some peasants also keep rabbits for meat or grow fish in their water pounds. Many peasants have dogs and cats.

Several peasants told me in interviews that they plan to shift the focus of their agricultural production from crop production to livestock-keeping. Livestock-keeping is associated with less drudgery of work, a more regular cash-income less weather-dependence. Up to now, lack of money to buy additional cows and build cow-sheds prevented most peasants to quickly undertake this transformation.

9.6 Role of National, International and Governmental Organisations

Peasant agricultural production is supported by various national, international and governmental organisations. These organisations teach new agricultural technologies and practices, they sensitise peasants for safe use of agro-chemicals, they hand out construction material for water storage facilities, greenhouses, cow-sheds etc., they offer agricultural services, they supported the foundation and operation of self-help groups, they pay some peasants to teach other peasants and they support peasants in many other ways. However, these programmes are not always well coordinated with each other and sometimes even work against each other. Moreover, not all programmes effectively support the peasants because they only partially consider the needs and potentials of peasants living in this area. Nevertheless, especially already better-off peasants found ways to benefit from these programmes while poorer households struggl more to benefit from these programmes. The role of national, international and governmental organisations is further discussed in chapter 12.

9.7 Difficulties to Farm in this Area

Farming in the vicinity of Mwireri is hazardous: Small plot sizes, poor soil quality, limited and unpredictable precipitation, and lack of water for irrigation threat successful agricultural production. Several times when I passed a *shamba*, a peasant told me that this *shamba* will not produce much

yields in this season because weather conditions were not favourable or crops were sown at the wrong moment. For example, a splash of rain after sowing followed by a dry period destroys the crops. With the splash of rain, seeds germinate but if this is followed by a dry period the sprouts wither quickly. Extended droughts can destroy entire harvests and also reduce the availability of fodder. The lack of fodder can result in undernourishment and even starvation of livestock. Too much rain at the other hand can result in crop losses due to mould. Plant and animal disease, insects and fungi further threaten successful agricultural production and livestock keeping. A further challenge is lack of money to access agro-chemicals and synthetic fertilizer that are perceived as necessary for agricultural production by most peasants. However, also wrongly applied agro-chemicals can result in crop losses or injuries of people and animals. This occurred quite frequently, despite trainings by various organisations on safe use of agro-chemicals and instructions on product labels. Furthermore, the use of synthetic fertilizer and agro-chemicals is expected to have negative environmental impacts that might reduce the productivity of peasant production in this area.

In addition to production hazards, theft of animals, lack of harvest storage facilities, low market prices for agricultural products or fraudulent middlemen threat rewards from peasant agricultural production. Last but not least, sickness, accidents or material damage caused by fire, floods or wind can put peasants in difficult economic situations.

To cope with all these hazards, peasants developed various strategies. To reduce crop failures, peasants use resistant varieties and intercropped different crops – a common mini-max strategy as descried by Liption (1982 [1968]). Moreover, they try to enhance and secure productivity by applying synthetic fertilizer and agro-chemicals. Praying is a further common strategy to prevent crop failures and other adversaries. To sell agricultural products at higher prices, some peasants organised collective sales of their products through product marketing organisations.

To cope with crop failures or low product prices, peasants try not to rely on farming only. Some peasants work for export-oriented agricultural production companies. Others have a small shop to sell petty commodities, some work at a sawmill, some have a motorbike to work as taxi driver, some have a small restaurant, some sell agro-chemicals or produce and repair machines. The problem of working for an export-oriented agricultural production company is that droughts do not only hamper local peasant production, but also large-scale export oriented production. Therefore, droughts lead to layoff of the employed work force and people lose income from peasant farming and working for the export oriented company. Other income strategies are more drought resistant, such as selling agro-chemicals or all engagements in non-agricultural sectors. Different peasants have different abilities to cope with crop failures and not all peasants have the same ability to engage in off-farm activities. The diversification of income strategies can be seen as a minimax-strategy, similarly to the diversification

of planted crops. However, as will be shown later, this diversification of income strategies is not only a minimax-strategy, it is also a basic requirement for the peasant agricultural production in the vicinity of Mwireri.

Some insurances promise a compensation for crop failures. One of these insurances is *Kilimo Salama* (Swahili for Safe Farming). *Kilimo Salama* is offered to peasants in collaboration with Syngenta Foundation. According to a Project Officer of Syngenta Foundation *Kilimo Salama* covers investment in agricultural production of peasants. Analysing data from weather stations, *Kilimo Salama* estimates crop losses of insured peasants and compensated them accordingly. At accredited agro-vet stores, peasants can effect a policy for a choosable amount of which they have to pay 10%. Alternatively, selected products can be bought at these stores with an additional fee of 5%. If weather conditions are estimated to have caused partial or total crop losses, the peasant is cashed out the total or a partial amount of the insured value or the costs for the products if he or she paid the 5% fee (for further details see: Syngenta Foundation (n.d.)).[85] According to the Project Officer, "this insurance takes away the weather risk. If it does not rain and you have a premium insurance, you are compensated. You are brought back to the state at which you have been before. A farmer who does not has the insurance has a total loss if he plants crops and the weather is bad". However, several peasants in the vicinity of Mwireri told me that they did not effect this insurance because the estimation of crop failures is not transparent and the weather at their *shamba* can be different from the weather measured at the next weather station. Therefore, one can be compensated without actually experiencing a crop failure and one who experiences a crop failure might not be compensated. One peasant explained that they would wish for an insurance that compensates real losses observed on the ground and not theoretical losses.

Another insurance covers losses in livestock. The insurance compensates cows that die or are stolen. If a cow dies, a veterinary has to proof that the cow did not die because of bad treatment and if a cow was stolen, the peasant has to proof that it was well protected against theft. In addition to potential compensations, the insurance provides a service package including a block of licking salt, milking fat, de-wormer, a tick repellent and vaccinations. If peasants sell milk to one of the processing companies, they can deduce the insurance fee directly from the money paid for the milk. However, the insurance is perceived by most peasants as being rather expensive.

To provide for health risks, people living in the vicinity of Mwireri organised informal health insurances. These informal health insurances are organised as so-called welfare self-help groups. Members of a clearly defined group obliged themselves to pay a previously defined amount of money to other

[85] For further details on *Kilimo Salama* see: Syngenta Foundation: Agriculutral Insurance – East Africa. <https://www.syngentafoundation.org/agricultural-insurance-east-africa>, and Syngenta Foundation: *Kilimo Salama* Fact Sheet. <https://www.syngentafoundation.org/file/2446/download?token=cKF6NSF_>, both accessed December 7, 2017.

members who suffered from certain adversaries (e.g. if somebody had to go to the hospital, if a close relative died or if the house of a member burned down). Written by-laws of the group clearly define who is a member of the group, which adversaries are covered by the group and how much money each member has to pay for which adversary and if members have other duties if one of the group members suffers from an adversary (e.g. to comfort the supported group member through a joint visit). These by-laws were drafted by the members of the group through more or less participatory processes. For most groups, the by-laws were written by an elected committee. Then the by-laws had to be accepted by all group members. Moreover, the by-laws can be adapted in monthly or annual group meetings. Despite the clearly written by-laws, the concrete dealing with an adversary often leads to discussions among the group members. Sometimes, the group members struggle to raise the required amount of money foreseen for a specific adversary that afflicted one of the group members. In some villages, participation in a welfare self-help group is compulsory. The organisation of such welfare self-help groups has many similarities with the eight design principles for the management of common pool resources as described by Ostrom (1990) in chapter 5.1. Only that in this case, the common pool resource is not a corral or a hut but a health insurance. This aspect is further discussed in chapter 15.3.

In addition to these informal health insurances, peasants can effect a policy with an official health insurance, such as the National Hospital Insurance Found. This insurance found covers medical treatment up to a certain amount.[86] People working for the export oriented horticultural companies are covered by this insurance but peasants do generally not use this insurance.

9.8 Environmental and Health Impacts of Peasant Farming and Livestock Keeping

Peasants use a broad range of agro-chemicals for farming and livestock keeping. Some of the chemicals that are applied contain ingredients that are highly hazardous according to the WHO toxicity classification, some are said to be possibly carcinogen and some are potentially ground water contaminants or harmful to beneficial insects (for a detailed analysis of potential environmental impacts of pesticide use in Kenya, see Macharia et al. 2009, and more detailled for the study area, see Ottiger 2018). Peasants generally stated that if they handle the agro-chemicals properly, contamination could be prevented and the chemicals they use are not as toxic as the ones used by the export oriented production companies. However, one peasant noted that due to the use of agro-chemicals in this region, bees would be sparse compared to other regions. Furthermore, peasants told me about incidents where people or animals were injured by wrongly applied agro chemicals (see chapter 11.5).

[86] For further details on the National Hospital Insurance Fund see: National Hospital Insurance Fund. <www.nhif.or.ke>, accessed December 7, 2017.

The use of engine powered agricultural machines, the transport of agricultural inputs and their production as well as the transport of crops have negative ecological impacts such as air pollution and the production of greenhouse gases for example (for an estimate of these ecological impacts see Ottiger 2017).

As mentioned above, peasants explained initially the soil in this region was very bad for agricultural production. Through mechanic aerating and the application of manure and synthetic fertilizer, the soil quality improved. Some actors of non-governmental organisations that promote conservation agriculture also accused peasant agricultural production of being responsible for soil degradation and soil erosion. Some peasants mentioned in interviews that the soil fertility has decreased because it has been overused by agricultural production. Conservation agriculture aims at reducing negative impacts of local peasant production on the soil by reducing ploughing and increasing constant soil cover. However, it is not widely applied in the region so far (see above). The recent reduction of soil quality can probably be associated with increased use of synthetic fertilizer (96% of the peasants interviewed with the household survey stated to use synthetic fertilizer for their production and 63% stated that their use of fertilizer had increased in the last year). According to peasants and non-governmental organisations, soil analysis have shown that the excessive use of cheap synthetic fertilizer acidifies the soil. Peasants at the other hand also said that they depend on cheap synthetic fertilizer for their production (the use of synthetic fertilizer and its environmental impact is analysed more in detail in the chapter 11.5).

Last but not least, river water abstraction has greatly improved since the arrival of the first peasants in this area. The reduced flow of water during the dry season has ecological impacts, especially in the regions downstream of the study area (see chapter 7.4).

9.9 Conclusion

In this chapter, I described the agricultural production of peasants living in the vicinity of Mwireri. This provided a broad overview about agricultural production of peasants. To carry out agricultural production, peasants need many things, such as access to land and water, material inputs, knowledge, work force, agricultural services and money. Thereby, peasant production is influenced by the ecological environment (that is in turn affected by their activities and activities of others), and various actors and institutions operating at different levels. I will not further discuss the specific features of peasant production or impacts on them here. In the next chapters, I analyse different features of peasant production more in detail to describe how peasant production is linked with different food and non-food systems and how peasants operate in this specific context to engage in agricultural production. First, I look at peasants' access to land. Then I describe how peasants access different

material inputs required for their agricultural production. Thereafter, I analyse access to knowledge, know-how and information, access to work force and services before describing what peasants do with their products and how they access money needed for their livelihoods and agricultural production. This detailed analysis enables me to describe how food systems influence economic activities and generally livelihoods of peasant and how peasants influence these food systems with regard to their sustainability.

10 Peasant Access to Land

Access to land is an inevitable requirement to carry out any kind of agricultural production. Agricultural production requires a physical place where it can be carried out. In addition to the physical place, various natural resources have to be available at the place where agricultural production is carried out. Important natural resources are a fertile soil, water, a suitable climate and sunlight. Different forms of agricultural production and different crops depend on these resources to varying degrees. To a certain extent, these natural resources can be manually provided, improved or preserved (e.g. with irrigation systems or soil protection technologies). As shown nicely by Haller (2001), with the investment in labour, the natural resource base can be enhanced. Therefore, when talking about land, one does not only talk about the physical place where agricultural production can be carried out but generally about access to natural resources required for the production.

It is recounted that in the pre-colonial time Kikuyu peasants mainly lived and used land and natural resources in a region in nowadays Meru, Nyeri, Muranga and Kiambu County (Kenyatta 1962 [1938]). During the colonial era, access to land and natural resources in this region became scarce due to colonial land acquisitions and resettlements of Kikuyu peasants. Some impoverished landless Kikuyu moved to live as squatters on ranches and farms of colonial settlers in the study area. As squatters, they were allocated small plots where they could grow subsistence crops. The men had to work for the colonial land-owners and their wives farmed on their plots to feed the family (Wacker 1996). Other displaced peasants started to live in so-called *shamba*-systems in the forests at the foot of Mount Kenya. There, they performed shifting cultivation in cooperation with the government (see chapter 7.2).

After the independence of Kenya in 1963 the land of the colonial owners was designated to be given back to the Africans. According to Kohler (1987), land of colonial owners was bought by the Kenyan Government to be subdivided into small plots for allocation to Kenyan peasants. These land transfers were carried out through the so-called governmental settlement schemes. These programmes were funded with British and German money. Some argue that the programmes were rather designed to allow colonial land-owners who wished to leave the country and sell their land at a good price than providing Kenyans with land. The land purchased by the government was then subdivided into plots that were calculated to provide for subsistence and surplus cash production. Thereby, the calculation included the availability of natural resources on this land. As I learned during my research, peasants that were allocated a plot had to gradually refund the money paid by the government for the plot. The repayment included a high interest rate. Some peasants were not able to pay all the money and lost their plot and access to land for farming. This indicates again that these schemes might have been

rather oriented on the demands of those selling the land and those providing credits than those being allocated the land.

Access to land in the study area did not change immediately after independence. Colonial land-owners sold their farms and ranches not immediately and first governmental settlement schemes were initiated in other regions of Kenya. The Kalalu Government Settlement Scheme, the only government settlement scheme in the study area, had only been implemented in the years 1972-1974.[87] The Kalalu Government Settlement Scheme had been implemented in the vicinity of Mwireri (see figure 32 on the next page). In this scheme people were allocated plots by government representatives. Most people paid the money for the land in instalments with high interest rates. Once people cleared their debts, they were issued a private land title that was registered at the Laikipia District Office of Land.[88] According to the household survey, today half of the people living in the area of the Kalalu Government Settlement Scheme in the surroundings of Mwieri got their land through the settlement scheme. The other half of the peasants had bought the land later from somebody who initially got the land through the settlement scheme. This shows that both, access to land through the settlement scheme and access to land through later purchase are important for the analysis of access to land.

The governmental settlement schemes did not provide land for everybody. Therefore, people also started to buy land from colonial owners directly. However, colonial land-owners generally sold their land in large tracts. To be able to buy such a large tract, people started to pool money in groups (so-called private settlement schemes) to buy large tracts of land designated for subdivision among the group members. Such land-buying groups resemble self-help groups (see chapter 15.3). Such groups could include a few dozen or several thousand land seeking members. Some groups took years to collect sufficient money from their members to buy land, others even failed to collect enough money to buy land (Kohler 1987, Wiesmann 1998). Once the land was bought it was allocated to the group members according to how much money one was able to contribute to the group's land purchase. Thus, the land allocation by these groups was not based on subsistence and cash crop production calculation but economic means – the ability of members to contribute money. Members with less abilities to contribute money received smaller plots than those with full pockets. For most groups it was foreseen that after all plots were allocated to the members and disputes are settled, land titles are issued and registered under the Laikipia County Office of Land and the land group as an organisation to buy land is dissolved. However, up to the present day, not all private settlement

[87] According to Kohler (1987) the Kalalu Governmental Settlement Scheme was implemented in the year 1978. However, several peasants in the study region independently mentioned to have been given land through the Kalalu Government Settlement Scheme in the years 1972-1974.

[88] The 2010 Constitution of Kenya transferred this task to the Laikipia County Office of Land. Every County has its County Office of Land that is headed by the National Ministry of Lands and Physical Planning (see: <www.ardhi.go.ke>, accessed November 8, 2017).

schemes reached the state of land title issuing. As show in figure 32, two private settlement schemes were implemented in the surroundings of Mwireri: Gitugi Settlement Scheme and Mwireri Settlement Scheme (see also chapter eight).

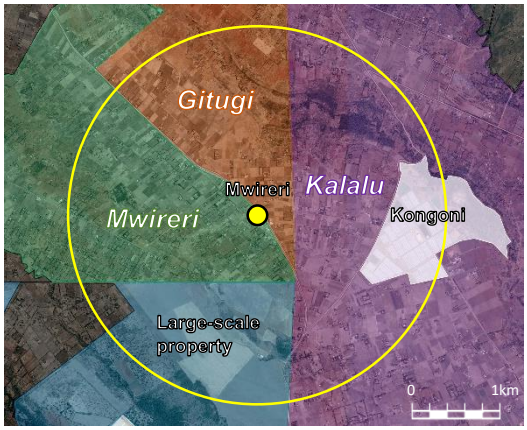


Figure 32: Map of Settlement Schemes
This figure shows the three settlement schemes in the surrounding of Mwireri as well as the compound of Kongoni Flower Farms and the Large-scale property South of Mwireri. Drawn by the author with GoogleMaps. The satellite images were taken in March 2017.

With these settlement schemes a rush for land set in. People tried to get a piece of land either through a governmental settlement scheme or through a private settlement scheme. According to their abilities people applied different strategies to get a piece of land. Prices for land started to re-increase and immediately after being allocated their plot, some people sold it again. Often, remaining debts were transferred to the new owner. Once people were issued land titles they could use them as collaterals for credits, losing the land if they are not able to pay back the credit. Over the time land prices rose greatly.[89] According to Hornsby (2012) the land distribution processes in place favoured people with money, education and contacts. This generally favoured Kikuyu settlers and led and still leads to ethnic and violent tensions around the issue of land (see chapter 7.2).

In practice this land allocation process included many obstacles and indirections. How these obstacles and indirections were dealt with greatly influenced who could finally get land and under which conditions. Therefore, the explanations on the next pages show how the three settlement schemes

[89] Stated land prices vary greatly. If a plot is at a good location or connected to a water project, prices are extremely high. At the other hand, if somebody has to sell the land because one cannot pay outstanding debts, prices might be lower. Overall, it can be rated that prices for land have increased by a multiple of increases in salaries during the same time. Prices for land increased by up to more than 1,000 times of the initial price. At the same time, average salaries increased by no more than 200 times.

were implemented in practice and how this implementation process was perceived by different actors being allocated a piece of land.

10.1 A Governmental Settlement Scheme in Practice

The Kalalu Governmental Settlement Scheme was initiated and managed by the government. According to Kohler (1987) the Kalalu Governmental Settlement Scheme was part of the Shiriaka Settlement Scheme, one of the last settlement schemes to be implemented by the government. Settlement Schemes of the Shiriaka Settlement Scheme provided less favourable land allocations than former Governmental Settlement Schemes. Despite marginal rainfall in the region of the Kalalu Governmental Settlement Scheme, peasants told me in interviews that plots were initially only approximately 2 ½ acres in size. Such small plots barely lasted for subsistence and cash crop production but all owed to settle as many people as possible.[90]

Peasants living on plots of the Kalalu Governmental Settlement Scheme explained that representatives of the Laikipia District Government[91] implemented the settlement scheme. Together with the land, the Kalalu Governmental Settlement Scheme bought the buildings, water supply systems and livestock that belonged to the former owner. The buildings were used by the government representatives as offices to organise the land allocation. The livestock was intended to be further multiplied and finally given to the settling peasants. What was intended to be done with the water supply system was not known by the peasants to whom I spoke. However, when the peasants arrived on their newly allocated land, the water supply system and the cows bought along with the land were gone. In interviews peasant alleged the government representatives to have sold the water supply system infrastructure and the livestock to improve their own benefit from the scheme.

The government representatives selected peasants for land allocation according to prescribed criteria. According to Wangari Gikenye (1992) who analysed governmental settlement schemes in Nyandarua County, poor people that were desperately in need of land and former squatters were given priority in land allocations. Moreover, they had to proof that they did not own land somewhere else and were capable of peasant farming. Sometimes ethnic affiliation and engagement in the fight for independence were considered as well. In practice these criteria were vague and gave space for a margin of discretion or in some cases abuse of power to allocate land or to deny an allocation. As

[90] As mentioned in a footnote above, the stated time of the implementation of the Kalalu Governmental Settlement Scheme does not coincide with the stated time of peasants living on land of the settlement scheme. Therefore, also the statement of Kohler that the government tried to allocate land to as many peasants as possible as a political goal in the pre-1979 parliamentary election time has to be questioned. Despite these difference, one can say that initially plots of the Kalalu Governmental Settlement Scheme were barely large enough to produce for self-consumption and sale.

[91] With the New Constitution of Kenya of 2010 today this would be the Laikipia County Government.

stated above, in the Kalalu Governmental Settlement Scheme initially selected peasants were allocated approximately 2 ½ acres of arable land. Rocky areas, riverbeds of small streams and steep slopes – generally where tractors could not pass – were not counted as arable land and were spared out as so called "free land". These free lands could be used to graze animals. Despite the name "free lands", these areas can be seen as common pool resources with specific access regulations as described in chapter 5.1. Some peasant assumed that they were given the land for free and did not expect to pay for it. After living on the land for years, they were confronted with a huge bill to be paid for the land. Despite the rather low initial land price, the high interest rates and long loan periods, multiplied the price by many times. Thus most peasants had to pay a high amount of money to finally get title deeds. Moreover, in 1992 the size of the plots of the Kalalu Governmental Settlement Scheme was enlarged to a minimum of 5 acres because the government assumed that 2 ½ acres were too small. Many people were allocated a new plot in order to enlarge the plots. At the same time the spared out "free lands" were affiliated to plots in in the settlement scheme. One peasant explained that Daniel arap Moi, the Kenyan President at this time, declared that there are no "free lands" in Kenya. The affiliation of these lands privatised these "free lands" and lead to an increase of some people's plots to sizes of up to 11 or more acres. This provided people with larger plots but also increased the amount of money to be paid for the land. Some were not able to pay this amount of money and had to sell their plot. At the other hand, people depending on access to these grazing areas could no longer access them for free but had to sought permission by the new owners. New owners who had to pay additional money for this land often requested a fee for grazing on their land. Today only few public land is left that allows for free grazing. This public land is so little that it is barely important for peasant production.

The institutions that regulated the allocation of the land through this settlement scheme and as such the conditions under which people got access to land were made by governmental representatives and not by those getting access to land. The institutions favoured mainly political considerations (the allocation of land to as many people as possible) and demands by the former colonial land-owners (to sell the land at good prices) and credit providers (to get high interests) instead of serving those being allocated the land. Moreover, the way the land allocation process was designed gave power to governmental representatives that allegedly misused this power for personal benefits. Those being allocated the land had little to no say in the crafting of the institutions that regulated the allocation of the land. Moreover, the process of the land allocation was not clear to the all people getting land (e.g. some did not expect to have to pay that much money for the land) and the basic parameters were changed significantly several times (e.g. when the size of the plots was doubled or the former "free lands" were allocated to individual plots). This made it difficult for people soughing land through this scheme to know how to do so and to anticipate under which condition they will get or lose the land. Moreover, initial access to "free lands" was privatised. This access seems to have been important as

common pool resources for some peasants as grazing area. Thereby, the conditions under which they could access these lands were changed.

If principles for participatory approaches in crafting the institutions that regulated the land allocation through this settlement scheme would had been applied, the needs of the peasants acquiring the land could have been better considered. This could have resulted in institutions that better fit the peasants' needs with regard to access to land – the vital basis of their peasant agricultural and livestock production. In private settlement schemes, people acquiring the land had more say in the crafting of institutions that regulated the access to land.

10.2 Private Settlement Schemes in Practice

In the private settlement schemes, people could decide themselves how to organise the scheme – at least partially. Instead of a throughout participatory process, heads of the schemes mainly defined the institutions that regulated access to land and how a land purchasing group is organised.

The Gitugi Farmers Company Limited was one of these private settlement schemes. During long interviews with the former head of Gitugi Farmers I learned that the company was founded in the early 1970s. As many others, he could not stay at his father's land in nowadays Meru County because plots were too small for further subdivision among his brothers. To settle new lands, he approached other people to found a company with the goal of collecting money for jointly buying land somewhere. According to him, he selected trustworthy people who had money and who also trusted him. They trusted each other because they already knew each other and were born together. Trust was important because "taking your money from your pocket and give it to somebody, you must have a big good trust", as he said. Finally, they were seven people to found the company.

After founding the company, they had to decide if they want to buy land for sub-division among the members or to buy land to establish a shareholding agricultural company that would operate at the entire land paying out dividends to the members. They decided for the first option because they feared that the second one would be difficult to manage.[92] Once the founder of Gitugi decided to found a company to distribute the land, they discussed and wrote their by-laws. For this task they braced on the help of an Advocate. Then they registered the company officially. Officially registered companies have to follow certain regulations set by the government. These regulations concern accountings and

[92] During my research I heard from several people that some companies in the study region (e.g. the Embori Farm) choose the second option and operate as a shareholder company up to the present day – despite management difficulties.

the management of the company (e.g. an annual general meeting has to be held whereby the members of the company are informed about the company's account and can elect the management).

After the registration of the company, they started to recruit members for their company, even though they did not have a specific piece of land in view at this time. According to the head of the company, "recruiting the members was a hard job. Because you tell the people to join that company and nothing is there to be seen". To convince people to join the company they had to show that they are trustworthy leaders. To build trust, the official company registration certificate helped to enhanced the credibility that this company operates transparently and will not misappropriated money. To join the company, recruited members had to pay an initial registration fee and regular contribution for the operation of the company. Whenever they had additional money they could buy shares of the company to enlarge the plot they would be allocated once the land is bought.

At the same time, the heads of the company started looking for a piece of land. In their eyes, land at the fertile Eastern slopes of Mount Kenya or the wet Aberdare Range was too expensive. Thus the management decided to buy land from colonial land-owners in Laikipia. Even though they collected money as a company, they were not able to raise enough money to buy the land of a colonial land-owner with whom they had an agreement. To be able to buy the land, they had to combine seven land buying companies that were in a similar situation. The heads of the land buying companies did barely dare to ask the colonial land-owner if they could buy some land. However, as a group of companies they could convince the colonial owner that they would be able to save sufficient money to buy the land. Each company collected money at a separate account and once they would have enough money in total to buy the land, every company would get its share of the land according to how much money they were able to collect in their separate account.

In 1981 they had enough money to buy the land. At the moment they wanted to buy the land, a commercial company outbid their offer. However, according to the head of Gitugi Farmers, the President of Kenya himself stopped the sale of the land to the commercial company by saying that this group of companies are the peoples of Kenya and if they want to buy land, nobody can refuse or stop them from doing so. In 1983 the president signed the land-transaction and they got the land.

Once they got the land, they subdivided it the among the companies according to the amount each company collected to buy the land. Then every company surveyed the land and sub-divided it among their members according to how much they had contributed to the savings of the company. In 1986, the members of the company decided by ballot where they will get their piece of land.

As I heard from others, at some moment discrepancies came to light. This caused conflicts among the members of the Gitugi Company that cause antagonisms up to the present day. Some members of the

company accused the head of the company of having sold a large tract of land without the member's approval. This land could not be claimed back because it had already been further sub-divided and sold to new owners. The sale of this land resulted in a lack of land for subdivision among the members and roughly forty members could not be allocated their share of land. In 2004 the company wanted to issue individual private land titles for all its members and dissolve the company afterwards. However, because of this conflict, in the same year the head of the company was voted out during the annual general meeting. This resulted in further disputes and violent conflicts. Since then, no general annual meeting was held, the title issuing came to a halt and up to the present day members of this company are not issued individual private land titles. In 2016, during my third field trip, the Registrar of Companies started to investigate the performance of the new management and the former head of the company sued the new management for repayment of money the company owns him.

The other private settlement scheme in the study area is the Mwireri Land Company. They were one of the companies buying land together with the Gitugi Land Buying Company. In the 1970s some people in the Ontulili Forest Area (a region not far from Mwireri towards Mount Kenya) had the idea of founding a land buying company. People in the Ontulili Forest Area engaged in the *shamba*-system through which they were allocated forest patches regularly for shifting cultivation by the government (see chapter 7.2). Some people in this region feared that the *shamba*-system might come to an end soon. They thought they should look for land with better property rights. When rumours of an imminent stop of the *shamba*-system spread, many people joined the Mwireri Company. But also people from other regions joined the company. People saved money for more than ten years. To buy the land the company also took a loan. Once they bought the land, they had to pay three-quarter of the price for the land. The rest could be paid later on. Similarly to the Gitugi Company, they distributed the plots according to how much somebody saved with the company and allocated the plots by ballot. However, people were not allowed to enter the land before it was surveyed. Only people who had nowhere to stay and already paid off the entire price of the land were allowed to use half of an acre before the survey took place. An official surveyor surveyed and demarcated the land. Out of every acre one bought, one-quarter was deduced for roads, schools, churches, etc. There were some minor conflicts about demarcations, plot sizes etc. that had to be settled. Once a member paid the entire price for his or her land, she or he was issued an individual private title deed. In 2010, after the last conflict was settled and the last member got his title deed the company dissolved. According to one peasant owning a plot in the Mwireri Company the founders of the company became very rich with this company and could even acquire some of land that was deducted from the other members. The rules on how to collect money, how much the members have to pay per acre, how the land will be allocated, how much land is to be used for roads, schools, and the Directors was set by the Directors and a Meeting Board of the company. There was little or no member consultation. Despite less

member participation and an alleged great profit allocation by the company management, the Mwireri Company seems to have performed much smoother than the Gitugi Company.

The examples of these two settlement schemes show that in private settlement schemes institutions to regulate the distribution of land were mainly set by those acquiring land. However, the institutions were mostly defined by the heads of the companies and not in a participatory process that included all people acquiring land. This led to a land allocation that benefited those in power to define the institutions that regulated the allocation. Nevertheless, the formulation of the regulations by those acquiring land allowed that some regulations were well adapted to the local context and the realities of those acquiring land (e.g. that those having nowhere to live could already live in the land before it was surveyed). However, in both private settlements schemes conflicts emerged and not all conflicts could be solved internally and courts had to sort out conflicts. In one company conflicts threat a successful land allocation.

In both private and governmental settlement schemes, some land was demarcated for common use. In the governmental settlement scheme the government acquired the whole land and allocated plots directly to the peasants. Land for common use (for roads, schools, churches etc.) was withdrawn from the entire scheme before the plots were allocated and peasants only had to buy their privately owned plots. As such, commonly used lands remained in the hand of the government. Later on, some commonly used land was privatised and allocated to neighbouring plots. In the private settlement schemes at the other hand, everybody had to contribute a share of the acquired land for common use (roads, schools, churches etc.). As such, everybody contributed some land for common use. In other terms, in the governmental settlement scheme, peasants could acquire plots in between commonly used lands while in private schemes, peasants also had to acquire the commonly owned land and donate it to the public.

Both, the government and the private settlement schemes were governed by institutions that were defined by powerful actors who acquired themselves land or not (government representatives, the President of Kenya, heads of land companies etc.). The institutions were shaped in ways benefited the powerful actors. However, the institutions could also be changed and the way they were implemented was affected by various actors. In this context of institutional settings, peasants applied different strategies to acquire a piece of land for themselves and their family.

10.3 Accessing Land Through Settlement Schemes

One peasant living on the land of the Kalalu Governmental Settlement Scheme explained that his family got the land through his father. Initially, the family lived as peasants in the *shamba*-system in the Ontulili Forest Area. His father also worked for the government. He planted trees on the land that had

been cleared by peasants in the *shamba*-system. Thereby, he worked with somebody from the government who could allocate plots in the Kalalu Governmental Settlement Scheme. This person allocated him a plot in the Kalalu Governmental Settlement Scheme. In 1974 they got their land, but in the same year the father who was allocated the plot died. The family could stay on the new land, but in the following years the family did not had enough money to pay for the land and the growing interest rates. Once the peasant who told me how they got the land finished High School, he started working for the government. With the salary from his work for the government he could pay the money for the land. By that time, the amount to be paid for the land had already greatly increased due to the unpaid interest rates and because the size of the land had been increased through the addition of barren lands. Once the money for the land was paid, they were issued a land title for 9,5 acres on the name of the mother who was the next relative of the father who was initially allocated the land. Later on, the family subdivided the land to allocate 1,2 to 2 acre large plots to all sons and daughters. One plot was not allocated to any family member but belongs to the family as a whole. Today this plot is occupied by the peasant who provided the money to pay for the eland. As such, he now has the largest plot of the family. Their mother declared that the land belonging to the siblings cannot be sold to anybody who is not from the family. Today, two sisters of the peasant whom I interviewed still live at their allocated plots next to him and the mother, reaching almost hundred years, lives with one of the sisters. With money from his work for the government, the peasant acquired additional land for his three sons because a further subdivision of the land would have led to all too small plots. One son is now living on the plot given by his father and works for the nearby Kongoni Flower Company. The other two sons left the study area, but one of them stays in close contact with the family.

Another peasant explained in an interview that he was working for a District Commissioner of Lamu,[93] in the coastal region of Kenya. One day the District Commissioner asked him whether he wants a *shamba* and explained that the government is allocating plots for a small amount of money to be paid within twenty years. The peasant agreed and gave his ID to the District Commissioner. Later, the District Commissioner told him to go to a place called Kalalu in the vicinity of Nanyuki where he would get a *shamba*. When he went there, he got his *shamba*. The peasant explained “you see, if you work somewhere, you have to work well. If you work with your whole heart the employer will see that you are a good man and he can give you anything you like. You see, I got my *shamba* because I did my work well”. Once he retired, he built a house on his *shamba*. Today he lives as a peasant on his *shamba* and during the time of my research he additionally rented some land for agricultural production.

[93] A District Commissioner is the equivalent of the nowadays County Commissioner according to the 2010 Constitution of Kenya.

One of the few female land-owners in the study area explained that she got her land while she lived as a single mother in Nanyuki working at a petrol station. She did not own land before getting a plot in the Kalalu Governmental Settlement Scheme because her mother was raised by her uncle and worked, also as a single mother, for a British family. The family of the women never got land. However, the women wanted her children to inherit land from her. Thus, she started to look for a way to get land for them. Initially, governmental settlement schemes were implemented in other parts of the County. She could not get land there because "people did not understand why should a girl get a *shamba*", as she said. Because she could not get land thorough the first governmental settlement schemes, she tried to get a piece of land through a private settlement scheme. There, she was more successful and by saving as much money as possible from her work in the petrol station over years, she could acquire 3 acres. At the same time, she tried again to get additional land through a governmental settlement scheme. To do so, she did not officially apply for a plot at the Laikipia District Office of Land because she did not expect any success by doing so. But whenever she met the District Officer fuelling his car, she asked him to be given a *shamba*. One day when the District Officer came to fill jerry cans, she asked him again "what is now about the land?" The District Officer answered that he would not have time because he is traveling to some distant places but even if he would have time he would not take her to the Lands Office to give her a plot. The same day, she went to his office and asked him again if he could give her a plot. He first refused ruggedly and asked her if she would be one of the people who had recently occupied plots illegally in Nanyuki. She denied and explained that she was living in a small house with all her children and her grandfather of whom she would take care and that he could come to see and verify this. Upon this statement the District Officer relent and agreed to give her a piece of land. He noted her name and asked her to leave. Some weeks later an assistant of the District Officer came to the petrol station and asked her to go to the office of the Kalalu Governmental Settlement Scheme the next day. There she got her *shamba*. At this time, she felt very lucky to get this *shamba* because it was much cheaper than the land she got through the private settlement scheme. However, she also mentioned that she only got the *shamba* because she was stubborn and insisted for so many times to be given a *shamba*. The woman continued working at the petrol station and with money she earned there, she built a house at her *shamba*. However, the final price she had to pay for the land was much higher than expected. First, the high interest rate multiplied the initial price by many times. Moreover, she did not know that she also had to pay for the barren land that was initially not included in her plot. Only when she went to Nairobi to the National Ministry of Lands to pay the remaining debts for her plot to get the title deed she learned that she was to pay for the additional barren land as well. She tried to explain to the people at the office that she was told that her land has the size of five acres but they were laughing and making fun of her and asked if no surveyor came to her land. She said that one came but she did not know what he was doing. They told her that her land had now a registered

size of 12 acres and “if you feel you cannot pay for the that, other people are interested in the land as well”. She had to go home again to save more money to pay for this additional land. Some years later she had enough money to pay for the entire land and she could finally get her title deed. Today the woman is still living in her small house in Nanyuki but since she retired, she nearly comes every day to her plot in Kalalu to oversee the agricultural work carried out on her land by employed workers. The land she acquired through the private settlement scheme is rented out to somebody else and as such provides some additional income.

A peasant who got his land through a private settlement scheme explained aptly for land allocations through private settlement schemes that to join a private land buying companies one has over all to get money first. This peasant owns probably the most land around Mwireri. He owns a construction company that worked in different places in Kenya and even in Somalia. He earned a lot of money with this company. One tender was for the former President Daniel arap Moi. This tender was given to him by a friend and provided him with a salary that was higher than the President’s salary as he proudly asserted. Last but not least he also started to gain money through trading land. Another peasant owning much less land in a private settlement scheme explained that he got money from working for other peasants at their farm, working as a land surveyor for the government and working as a construction worker in Nanyuki. He was the only one mentioning an economic activity that was related with agriculture to support him buying the land. It took him more than five years to collect enough money to buy four acres of land of which one acre was again deduced for roads, schools and a benefit for the head of the land company.

All peasants whose land allocation is described above and got land through the governmental settlement scheme knew somebody or had a regular contact with somebody who could allocated land. One got his land as a reward from his boss, one got it as a favour from a friend and one had to stubbornly insist on a favour by a government representative she met regularly. Once they were allocated the land, they lack information about the institutions that regulate the purchase of the land and these institutions changed without the peasants’ notice (e.g. that they were allocated more land and that prices for the land grew this high due to the high interest rates). Money to pay the land was not earned through agricultural activities but through other economic activities such as working for the government, having an own lucrative business or being employed. The need to earn money through non-farming activities to acquire land was mentioned by many other peasants. One peasant formulated trenchant, not only for acquiring land, but generally for farming, “if you do not have money, you cannot make money from the soil”. Moreover, land in other parts of Kenya is much more expensive. People who sell land there can buy much more land in the study area. If they inherit a piece of land that would be too small for agricultural production, they can sell their land there and buy a much bigger piece in the study area.

10.4 Land Transactions

Today, most of the peasants owning land did not get it through a settlement scheme. They bought land from somebody who got it through a settlement scheme or inherited it from their parents who got it through a settlement scheme or already bought it from somebody.[94] This indicates that land transactions are important for access to land. People buy land from other land-owners. Others transfer or bequeath land to their offspring. From statements in interviews and comparing figures stated in interviews, I learned that since the implementation of the settlement schemes, prices for land have increased greatly, by a multiple of increases in salaries during the same. Indications on current land prices vary greatly. If a plot is in the vicinity of Mwireri or connected to a water project or the electricity network, prices are extremely high. In addition, ideological reasons (the ideal of acquiring and managing land, see chapter 7.2) affected statements of peasants on the price to which they would sell their land. At the other hand, if somebody has to sell the land because one cannot pay outstanding debts, prices might be lower.[95]

To buy land one has to find a plot at sale. In the study area people go around as brokers to identify land that might be for sale to bring together potential seller and buyer. If one wants to buy land, he or she has to verify the effectively registered size of the plot, the registered owner of the plot and that there is no court order barring a land transaction by the County Office of Land or if the land is still not officially registered by the office of the private land company. If the former land-owner still owns money for the land to the government or a private land company, the new buyer has to clear the remaining debts and pay a negotiated price to the former owner. If the seller and buyer find an agreement, they have to sign a written sales agreement. Then, the former owner and his family have to appear in front of the Land Board of the Sub-County. The Land Control Board ensures that a land transaction is transparent. Therefore, it asks the spouse and the children of a willing seller if they agree on the land sale. Only if they agree, land can be sold. Often the Land Board additionally asked local authorities whether to allow a land deal or not. The Land Board consist of different persons from the Sub-County and somebody from the County Office of Land. To avoid that the Land Board has particular interests or too close links with the ones interviewed, the board consists of members from different parts of the region. This inquiry by the Land Board aims at ensuring that family heads cannot sell the land over the heads of other family members. Therewith, women and children's rights shall be protected. The effectivity of this process can be questioned as it might overlook pressure that can be

[94] According to the statements in the household survey, 46% of the current land-owners bought their land from other peasants, 19% inherited their land from their parents who bought it from other peasants or through a settlement scheme and only 21% themselves bought the land through a settlement scheme.

[95] Overall, it can be rated that prices for land have increased by a multiple of increases in salaries during the same time. Prices for land increased by up to more than 1,000 times of the initial price. At the same time, average salaries increased by no more than 200 times.

built up within the family outside the sight of the board. Once the Land Board is convinced that all family members agree to the sale of the land, the land deal can be registered by the County Office of Land and a new title deed is issued. The County Office of Land also collects a tax on the land transaction (2%-4% of the land price).

In practice, land-ownership and land transactions are often not as straight forward as assumed by this description. During my research, several peasants told me that they once had or still have problems with title deeds. From several peasants I learned that several title deeds had been issued to different people for their land and they had to proof at the court that they were the rightful owners of their plots.

A peasant explained in a lengthy interview how he got his *shamba* in the 1990s. The man, for whom he was working at this time, told him that he would buy him a piece of land but he would have to look for the land and arrange the sale. From living in the area around Mwireri, the peasant knew that a land-owner was not staying in his plot in the governmental settlement scheme. He sent the neighbour of this plot who knew the owner to ask him if he would sell his land. The owner agreed to sell the land. Though, he asked for a very high price for the land to get money to buy land for himself somewhere else. Fortunately, the boss of the peasant agreed to pay this high price.

To sell the land, the land-owner and his family had to go to the Land Board. First his wife refused to sell the land because the sale agreement referred to 11 acres but the plot had an actual size of 11.2 acres. To smoothen the process, the peasant agreed to pay by himself some money for the additional 0.2 acres. The peasant did not had this additional money and did not dare to ask his boss for additional money. Thus, he had to borrow this money from the neighbour who initiated the land deal. Furthermore, the former owner had not cleared all debts for the land. They agreed that the costs to clear the remaining debts were deduced from the previously agreed price for the land. Once the peasant went to hand over the check from his boss to pay for the land, the former owner wanted additional money for some big trees that he had planted on the land. The peasant did not had enough money carried to this appointment to pay for these trees and thus the former owner did not accept the check to pay for the land. Some days later, they went to see the District Office of Land even the land-owner did not had accepted the check. Due to some misunderstandings at the District Office of Land, the land-owner signed the papers to complete the land deal without having received the check. At the District Office of Land, the land-owner was confused and did not dare to ask what he just had signed. Once the land-owner had left, the Officer realised what happened and told the peasant: “if you are a bad man, you can go with the money and the land” because the former owner just had signed all these papers without having received the check. However, the peasant felt very bad about this. The next day he sent the neighbour to bring the check to the former land-owner and to tell him that he

could come to log off the trees if they would be so important to him to risk losing all the money for the land but that he could not pay for the trees because he would not have enough money and would not dare to ask his boss for additional money. According to the peasant, the former owner was shocked when he learned that he almost lost the entire money for the land. Nevertheless, his wife insisted on additional money for the trees. Because the peasant did not had money to buy the trees, they agreed that the trees remained the property of the former land-owner and the neighbour would take care of them on his behalf.

After all this quarrelling, the peasant wanted to apply for the title deed. However, also applying for the title deed was not an easy task the peasant explained:

> "Getting the title deed, because of the corruption, getting a title deed is not a joke. If you are not careful and you go the *Ardhi House in Nairobi* [the National Ministry of Lands[96]], you end up paying to corrupt people who are not working for the government. They give you false receipts. I was lucky that my cousin was working in that building. So, I was going through him. He knew where to go and whom to ask. My neighbour also took advantage of that. When I told him that my cousin is there, he also gave him his papers to apply for the title deed. My cousin helped us, he helped me and my neighbour. Because, if you go by yourself... [the peasant shacked his head disparately] – unless this has changed now."

Moreover, they had to apply for the title deed in Nairobi but the responsible Land Board and District Office of Land were in Meru at this time. Due to these complications, they had to travel between the plot in the study area, Meru and Nairobi several times until all documents were signed, stamped and seen by the respective offices. Initially, the boss who paid for the land got the title deed and allowed the peasant to stay at the plot. When the peasant retired his boss gave him the title deed for his gratification. Once the peasant wanted to start farming on his new land, he had to remove the trees that still belonged to the former owner. At this moment the peasant had some money. To prevent further quarrelling, he bought the trees.

This example shows that buying land can become a very complicated endeavour. Scarce economic means hampered negotiations between the seller and buyer. Moreover, the difficult and opaque bureaucratic to register land and to get title deeds enable scams and corruption. The peasant did not had enough money himself to buy land. He was only able to get land because his boss generously bought land for him. To arrange the land deal, the peasant depend on a neighbour initiating and negotiating the land deal. However, the complicated process to accomplish a land deal confused both

[96] "*Ardhi*" is the Swahili word for "land". The National Ministry of Lands issues title deeds for all private properties in Kenya.

parties. Finally, a misunderstanding and unease by the seller to ask how the land transaction is carried out, he signed the deal what prevented him from further claims for additional money. Last but not least the peasant was only able to obtain the land title because he knew somebody who worked in the National Ministry of Lands. This clearly highlights the importance of access to money and contacts to authorities to buy land in this setting. The institutions regulating the land deal were set by external actors and made the land transaction very complicated, expensive and time consuming to an extent that the peasant could only acquire the land with the help of others.

Another peasant, the peasants owning probably the most land in the area around Mwireri, bought a piece of land in 2006. In 2016 when I carried out my research, he learned from his brother who works at the Laikipia County Office of Land that his plot was advertised for sale by another person. This person had a title deed issued in 2016. The peasant got warned early enough and with the help of his brother working at the County Office of Land he could prevent that the plot could be sold by the other owner. However, up to the end of my research the peasant had been arguing in court with the other owner about the rightful ownership of this plot. For the arguing in court, he depended on the representation by a lawyer. Going to court was a time consuming and expensive endeavour for the peasant.

To prevent such a time consuming and expensive endeavour in a similar case, the same peasant developed a different strategy. Several people claimed to own a plot that he had bought before. In order to avoid troubles and lengthy trials, the peasant quickly sub-divided the land and sold small parcels relatively cheap before claims were officially made by other people. The other people claiming to own the plot had to relinquish their claims because it would had been too complicated for them to reclaim the land from all the new owners.

These example show again that access to land or the ability to get and maintain private land titles depends on contacts to authorities. Not all peasants can afford such time consuming and expensive court cases and some lose the land if something like that happens to them. Nevertheless, access to land is not the only obstacle of agricultural production. Once peasants have access to land, they need to work on it. In Mwireri, many peasants depend on external material inputs to carry out agricultural production. In the next chapter, I look at how peasants access different material inputs they need to carry out agricultural production.

10.5 Conclusion

Governmental and private settlement schemes enabled peasants to purchase land from former colonial land-owners. In both types of settlement schemes, formal and informal (and even illicit) institutions that regulated the allocation of land were greatly influenced by creditors, politicians, former land-owners and governmental representatives or elites. The peasants acquiring the land had

little to no say in the crafting of institutions that organised the allocation of land. Therefore, the allocation of land did barely consider their needs. As a consequence, peasant had to buy land expensively in a context in which it is difficult to earn money. Moreover, peasants had to have good social relationships with politicians and governmental representatives that allocated the land. Not all peasants who wished to buy land were able to do so. Those who failed to buy land were often left with no choice than moving to the proliferating urban slums surrounding Kenyan cities. However, also peasants who were able to allocate a piece of land through one of these settlement schemes struggled with the need to earn money. Similarly, those who bought land from peasants, who were willing or forced to sell their land, required a huge amount of money and good social relationships. Generally, one can conclude that the way peasants allocated land made peasant production expensive already for the purchase of land. However, not only acquiring land makes peasant agricultural production expensive. Peasants also depend on numerous material inputs for their agricultural production. Purchasing these inputs makes peasant production even more expensive. Which material inputs peasants need for local production, how they get them and which implications this has on peasant production and generally the sustainability of food systems that depend on peasant production is elaborated in detail in the next chapter.

11. Material Inputs for Peasant Crop and Livestock Production

Peasants use various input products for agricultural production and livestock keeping, such as seeds, manure, synthetic fertilizer, herbicides, fungicides, insecticides, synthetic food preservers, animal feed and animal medicinal products. Some of these products are made locally, others are manufactured outside the study area. The use of locally produced as well as externally manufactured inputs is nothing new for this type of peasant production. Already peasants living in the *shamba*-system used externally manufactured inputs to improve their production. In this chapter I look at how peasants get the products that are vital for their production, how they are applied on the fields and what implication this has for the current peasant production. In the first part of this chapter, I explain how locally made inputs are exchanged among peasants. In the second part, I describe how peasants get products that are manufactured somewhere else in the world. Therefore, I describe the supply chain from agro-supply industries to the peasants' fields. Furthermore, I explain how these products are applied and what kind of economic and ecological implication this has.

11.1 Input Products

At the time they purchased land and arrived in this area, the soil was not suitable for peasant agricultural production because it was compact and not very fertile (see chapter 9). Peasants ploughed the land and several non-governmental organisations came to teach them how to produce manure from cow dung.[97] According to elder peasants, the application of manure helped to improve the soil quality on their *shamba*. Today, most peasants still produce manure and apply it on their fields. However, almost all peasants also use synthetic fertilizer. In the last five years, most peasants have increased the use of synthetic fertilizer (see figure 33 on the after next page) and some peasants stopped the production of manure because it was to tedious and purchasing synthetic fertilizer seemed easier.[98] Peasants stated in the household survey, that they have increased the use of synthetic fertilize to increase soil fertility and to improve agricultural production. Others explained to use more fertilizer because have more money to purchase synthetic fertilizer or they have less manure available and therefore need to buy more synthetic fertilizer. Reasons for reducing the amount of synthetic fertilizer are increased use of manure, increased knowledge of which fertilizer to use after analysing soil samples or a general reduction in their production. Moreover, some peasants argued

[97] Elder peasants told me, the fields in the *shamba* system for example were much more fertile and did not need manure because the forest had just been cleared from the fields and after some years the fields were overgrown be forest again (see chapter 7.2).

[98] In the household survey 91% of the peasants stated to produce and use manure (16% stated to produce and use lots of manure, 75% stated to produce and use some manure and only 9% stated not to use manure). At the other hand, 96% of the peasants stated to use synthetic fertilizer and 63% stated that the amount of applied synthetic fertilizer has increased in the last five years.

that they learned from external actors that using manure is better for the soil fertility than using synthetic fertilizer.

Seeds are purchased from seed multipliers or exchanged locally. Purchased seeds are generally certified hybrid seeds that can only be used once. Seeds of these varieties are know to be of good quality but they have to be bought anew every year. The following generation of these crops is not growing well anymore. But one peasant explained in an interview that he developed a strategy to re-use seeds from hybrid plants. According to him, seeds from hybrid plants can be used again if they are stored long enough. Moreover, for almost every crop, peasants also know so-called local varieties that are bred in the area and can be re-used unlimitedly. From experience and trainings by various governmental and non-governmental organisations, peasants know practices for seed multiplication and selection. For beans and peas, peasants generally use local varieties. However, maize, wheat and potato seeds are generally purchased anew every year from seed multipliers supplying local agro vet stores.

To remove weeds, peasants plough and weed their plots. Less than one-quarter (23%) of the peasants stated in the household survey to have used herbicides to kill weeds during the last production season. However, 56% assumed that the use of herbicides for production at their farm had generally increased in the last years. They explained this increase mainly with the opportunity to save time or labour costs for weeding. Ploughing and weeding is more time and labour intensive but does not depend on purchased inputs. New agricultural technologies, such as *conservation agriculture,* promoted in the study area, aim at reducing mechanic soil disturbances, such as ploughing and harrowing, to preserve the soil and reduce costs for these actions. The application of herbicides or the use of mulch to reduce weeds are recommended instead (see chapter 9.3).

A common way to protect crops from fungi or insects is to apply ash. However, more than half (54%) of the peasants stated in the household survey to have used synthetic insecticides or fungicides to protect their crops during the last production season. In over three-quarter (76%) of the farms, the use of insecticides has generally increased because peasants were confronted with more harmful insects of which some developed resistances against commonly used insecticides. As shown in figure 33, also fungicides were used more often by two-third (68%) of the peasants interviewed with the household survey. Peasants mainly accused changes in the climate for an additional appearance of fungi pests.[99] This indicates that generally, the use of purchased inputs has increased in the last years (see figure 33).

[99] I could not estimate meaningful figures of the quantities of agro-chemicals actually used by peasants. Neither peasants nor shop keepers of the small agro-vet stores in Mwireri keep regular records of the use or sale of agro-chemicals. Estimates by peasants or shop keepers of how much agro-chemicals are used or sold were very vague and did not allow to make a meaningful estimate. A sound methodology is required to make meaningful estimates. Figures based on facile estimates have to be taken with greatest caution.

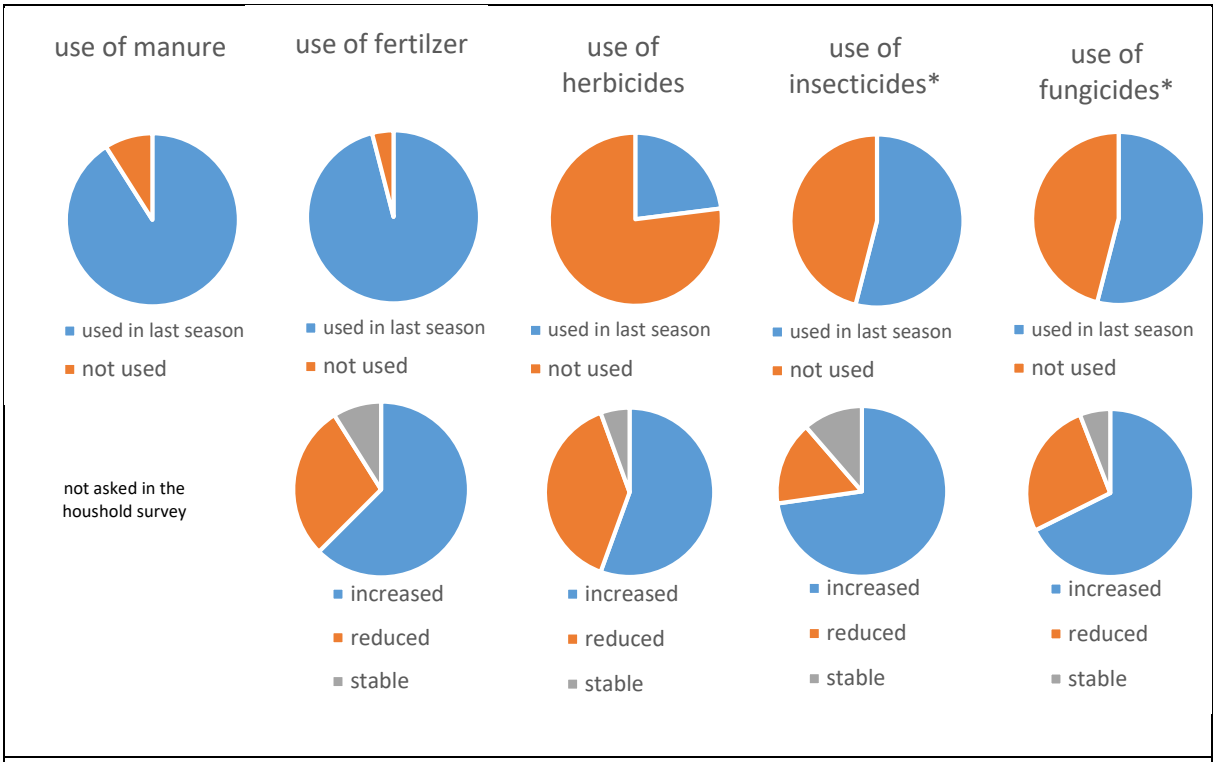


Figure 33: Diagrams of Use of Input Products in the Last Season and Changes in Use in the Last Years
The first row shows the proportion of peasants using specific input products during the last season. The second row shows the proportion of peasants increasing or reducing the use of the specific input product in the last five years according to their own assumption. All figures are according to statements in the household survey.
* the use of insecticides and fungicides during the last season was not differentiated in the household survey.

To preserve harvested crops, most peasants constructed storage facilities and most peasants purchase chemicals to be applied on the products. Some peasants also apply dried leaves of a specific bush that is common in the area to protect harvested crops.

Animals are grazed and fed with plant remains or branches of trees. Plant remains are also exchanged and traded among peasants. However, the use of plant remains as animal fodder competes with their use as mulch. Some peasants also grow hay to feed their animals or to sell it to neighbours. In addition, externally produced animal feed, feed additives and veterinary products are purchased at local agro-vet stores (see chapters 9.3 and 9.5).

Most peasants have a sound knowledge about which products to use for their production, how to apply them, where to get them from, or where to get necessary information from. If peasants buy agro-chemicals at agro-vet stores, they can ask for advice on which product to use or how to apply a specific product. The sellers at the agro-vet stores are not trained agronomists or veterinarians. Nevertheless, both shop owners in Mwireri have a distinct knowledge on agricultural practices and the products they sell. They acquired their knowledge in former jobs (one was working at the Agricultural Department of Laikipia) or through trainings offered by agro-chemical companies in collaboration with the government. In addition, they read brochures that are written in English or Swahili and were

handed out by the agro-chemical production companies. They also read the labels on the container of the agro-chemical products. Moreover, they learned from applying the agro-chemicals themselves and from feedbacks from their customers how these products work in practice (for a further elaboration of how the peasants know how to apply agro-chemicals, see chapter 12).

Peasants produce some input products for agricultural production locally (manure, animal feed). Locally produced inputs are mainly produced by the peasant household itself. Some products are also exchanged with neighbours or bought from them (e.g. hay to feed animals). The use of other externally produced inputs can be replaced by work (e.g. weeding instead of using herbicides). The use of locally produced input products reduces the need to import input products for agricultural production. Nevertheless, all peasants to whom I spoke depend to some extend on externally produced inputs to carry out agricultural production – most production, as it is currently done, would not be possible without these inputs. In the next sub-chapters, I elaborate how peasants get externally manufactured inputs and where they come from.

11.2 Origin of Manufactured Inputs

Peasants get externally manufactured inputs either from one of the two agro-vet stores in Mwireri, other small agro-vet stores in the vicinity, agro-vet wholesale shops in Nanyuki, or they get them through government programmes and from NGOs. In the household survey, nearly half of the interviewed peasants (47%) stated to have recently bought agro-chemicals from one of the two shops in Mwireri. Fertilizer, that was asked separately in the household survey, was bought by 42% in Mwireri. Others bought input products from agro-vet stores in the vicinity or from agro-vet wholesale shops in Nanyuki. Synthetic fertilizer could also be bought through a subsidized government program. However, only 8%[100] stated to have bought subsidised synthetic fertilizer from the government. The sale or distribution of agro-chemical products by NGOs is very sporadic.

To illustrate where manufactured inputs come from and how they are distributed, I analysed the origin and distribution of all available products at the two agro-vet stores in Mwireri. Including all sources from where peasants get inputs would have exceeded a manageable workload. The number of accessible products would increase slightly if more sources are included in the analysis but the general picture would not change much.

[100] Some peasants combined different sources to buy fertilizer, resulting in a total above 100%.

Company	no. of products from this company	Country
Agrichem Australia PTY Ltd.	1	Australia
Agrofeed Ltd.	1	Greece
Alfavet Animal Healthcare Ltd.	2	UK
Bayer Crop Science AG	2	Germany
Becton Dickinson S.A.	1	Spain
Beijing Green Leaf Century Daily-Use Chemicals Co. Ltd.	1	China
Betra Kimya Ltd.	1	Turkey
Biodeal Laboratories Ltd.	2	Kenya
Chemical Process Technologies (Pty) Ltd.	1	South Africa
Chongqing Fangton Animal Pharm. Co. Ltd.	1	China
Cooper K-Brand Ltd.	1	Kenya
Cosmos Ltd.	1	Kenya
Dawa Ltd.	2	Kenya
Eagle Vet Tech Co.	1	South Korea
East African Seed Co. Ltd.	3	Kenya
Excel Crop Care Ltd.	1	India
Falcon Fertilizer	5	USA
FMC Chemicals Corporation	1	USA
Green Tree	1	n.a.
Indofil Industries Ltd.	1	India
Jiangsu Fengdeng	1	China
Jojemi Agri Ventures Ltd.	3	Kenya
Kenya Seed Company Ltd.	10	Kenya
Limaru N.V.	1	Belgium

Company	no. of products from this company	Country
Monsanto Europe N.V.	3	Belgium
Nerix Pharma Ltd.	1	Kenya
NK Vet Supplies Ltd.	2	Kenya
Norbrook Laboratories Ltd.	12	UK
Novartis Animal Health care inc.	1	Switzerland
OMEX Agrifluids Ltd.	1	UK
Osho Chemical Industries Ltd.	2	Kenya
Rallis India Ltd.	3	India
Revital Healthcare Ltd.	1	Kenya
Rotam Agrochemicals Co. Ltd.	3	China
Royal Feed	8	Kenya
Sabero Organics Ltd.	1	India
Safari Seeds Ltd.	6	Kenya
Seed Co.	1	n.a.
Shandong Unite Pesticide Industry Co. Ltd	1	China
Simlaw Seeds	1	Kenya
Sulphur Mills Ltd.	1	India
Syngenta Crop Protection AG	12	Switzerland
T. Stanes & Co. Ltd.	1	India
Twiga Chemical Industries Ltd.	1	Kenya
Ultravetis East Africa Ltd.	2	Kenya
UPL	1	India
Vital Animal Healt	2	Kenya
Zagro	1	Singapore
Zhejiang Jinfanda Biochemical Co.Ltd.	1	China

Figure 34: Table of Production Companies of Agro-Chemicals and Veterinary Products Sold at the Two Agro-vet Stores in Mwireri

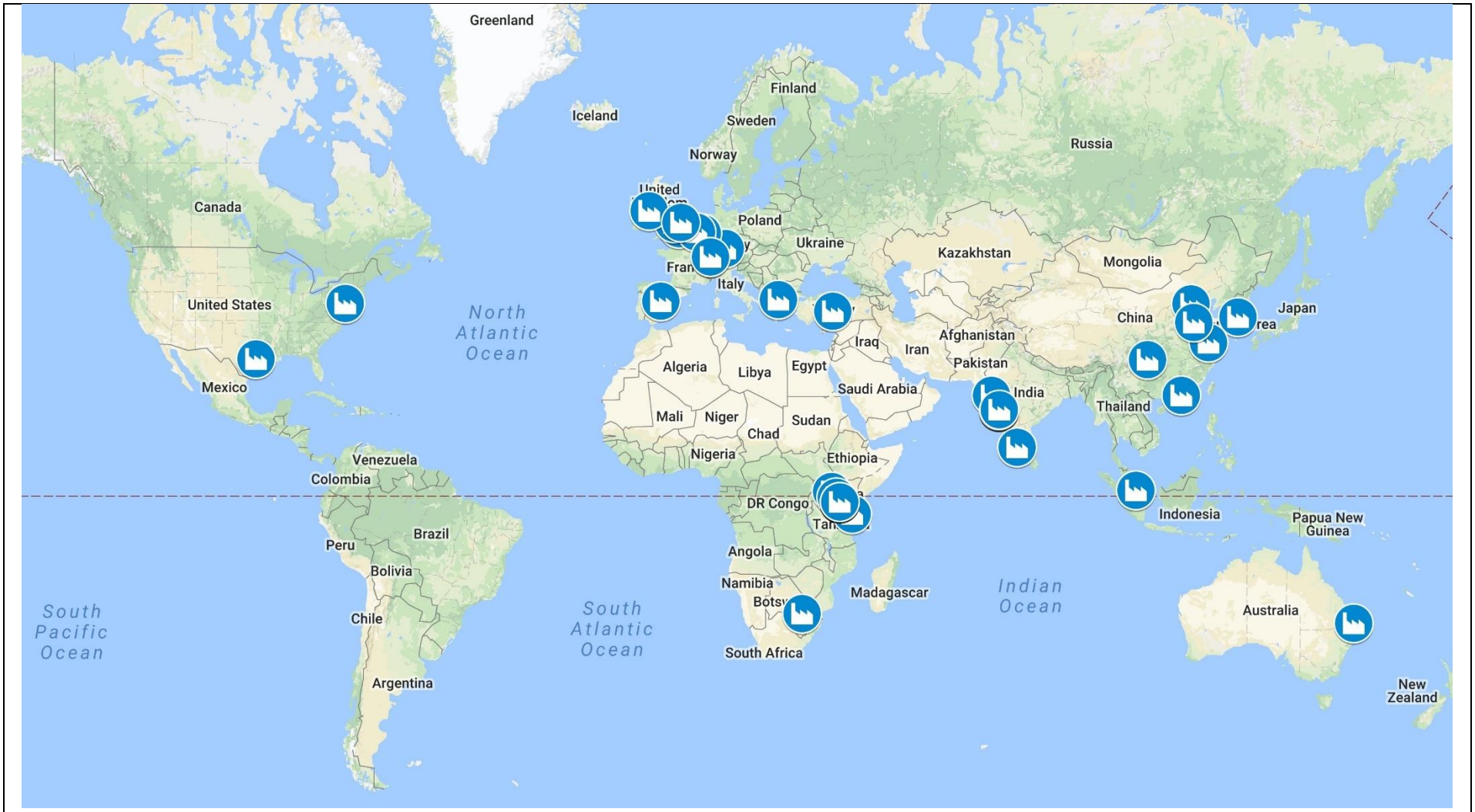


Figure 35: Map of Location of Production Companies of Agro-Chemical and Veterinary Products Sold at the Two Agro-vet Stores in Mwireri

Location of the 47 Production Companies' headquarter or manufacturing site delivering products to the two agro-vet stores in Mwireri.
Drawn by the author with GoogleMaps

At the two stores, I could identify 135 different available input products, such as seeds, fertilizer, herbicides, fungicides, insecticides, synthetic food preservers, animal feed and animal medicinal products. Approximately half of these products were used for agricultural production and half for livestock care. From the information on product labels and public available information, I learned who distributed these products in Kenya and by whom they were produced. For 114 of the 135 products I could identify the producing company. The 114 products were manufactured by 49 different companies, located in at least 15 countries worldwide[101] (see figure 34 and figure 35). As shown in figure 37, nearly half (42%) of the 114 products were produced by Kenyan companies. Another 13% of these products were produced by British companies, 11% by two Swiss companies, and 8% by Indian and 7% by a Chinese companies. Out of the 49 companies, more than one-third (35%) were located in Kenya, followed by India (14%) and China (12%). The companies providing the most products were Syngenta Crop Protection AG[102] from Switzerland and Norbrook Laboratories Ltd. from the UK. Each delivered twelve different products, followed by two Kenyan companies, Kenya Seed Company Ltd. (providing ten different products) and Royal Feed (providing eight different products).

	no. of products	no. of companies
Kenya	48	17
UK	15	3
Switzerland	13	2
India	9	7
China	8	6
USA	6	2
Belgium	4	2
Germany	2	1
Australia	1	1
Greece	1	1
Singapore	1	1
South Africa	1	1
South Korea	1	1
Spain	1	1
Turkey	1	1
n.a.	2	2
Total	114	49

Figure 36: Table Production Countries of Agro-chemical and Veterinary Products

[101] Information on some companies was difficult to get or to verify. The location of two producers could not be identified. Moreover, some producers are global companies with headquarters, production and research and development departments in different countries. As I could not always determine the exact county of production, I used the company's headquarter as reverence.

[102] Syngenta is a known Swiss based global company producing and distributing agro-chemicals. It has to be distinguished from Syngenta Foundation, a non-profit organisation established by Syngenta and active in Kenya among other countries (see chapter 8.3 and Syngenta: <www.syngenta.com>, Syngenta Foundation: <www.syngentafoundation.org>, all accessed February 2, 2018).

With regard to the different products, nearly 90% of all animal feeds were produced in Kenya (see figure 37). However, only 40% of the medicinal products for animals were produced in Kenya. Almost all seeds (more than 90%) were produced by Kenyan companies. Over 70% of all synthetic fertilizers, of which the producer could be identified, were produced by foreign companies. All fungicides, herbicides and insecticides were produced by foreign companies.

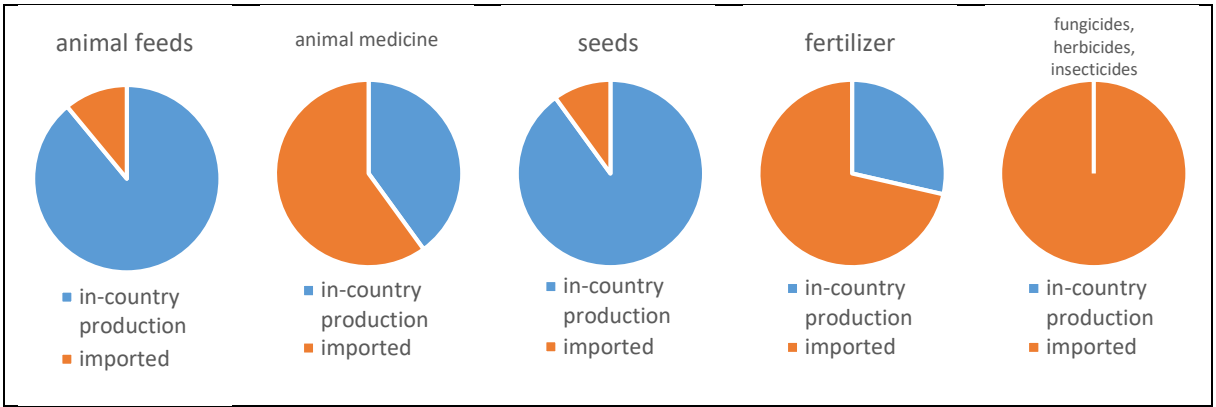


Figure 37: Diagrams for Origin of Purchased Agro-chemicals by Product Category

My analysis of the products sold in the two agro-vet stores in Mwireri shows that the bulk of products at sale is produced by Kenyan companies. However, more than half of the products are produced by foreign companies. Animal feeds and seeds are mainly produced by Kenyan companies. At the other hand, animal medicine, fertilizer and fungicides, herbicides and insecticides are mainly made by foreign companies. Foreign companies are mainly located in Asia and Europe. Only one production company is located in South Africa, one in Australia and two in the United States of America. As such, it can be concluded that nearly half of the externally produced agro-chemical inputs sold at the two agro-vet stores in Mwireri originate from a national market while the other half comes from the global market. With the dependence on externally produced inputs, local agricultural production is linked to national and global markets. How these links are operated in practice is the main topic of the next sub-chapter.

11.3 Path of Manufactured Inputs

As described in the last sub-chapter, externally produced inputs are either made in Kenya or imported from abroad. Both kind of products are sold at the two agro-vet stores in Mwireri and wholesale shops in Nanyuki. Following, I describe the most common paths of imported and domestic products used by peasants in the vicinity of Mwireri.

Imported products from abroad are mainly shipped to Kenya and arrive at the port of Mombasa.[103] From there they are sent to distributors in Nairobi. From Nairobi they are either brought directly to a wholesale in Nanyuki or via a wholesale in Nyeri. From the wholesale in Nanyuki, products are either delivered to the small shops in Mwireri or they are directly bought by peasants in the wholesale shop in Nanyuki.

Inputs that are made in Kenya are either sent from the production site via distributors in Nairobi and the wholesale shop in Nanyuki to the wholesale and retail shops in the study area or directly from the production site to wholesale and retail shops in the study area (see figure 38).

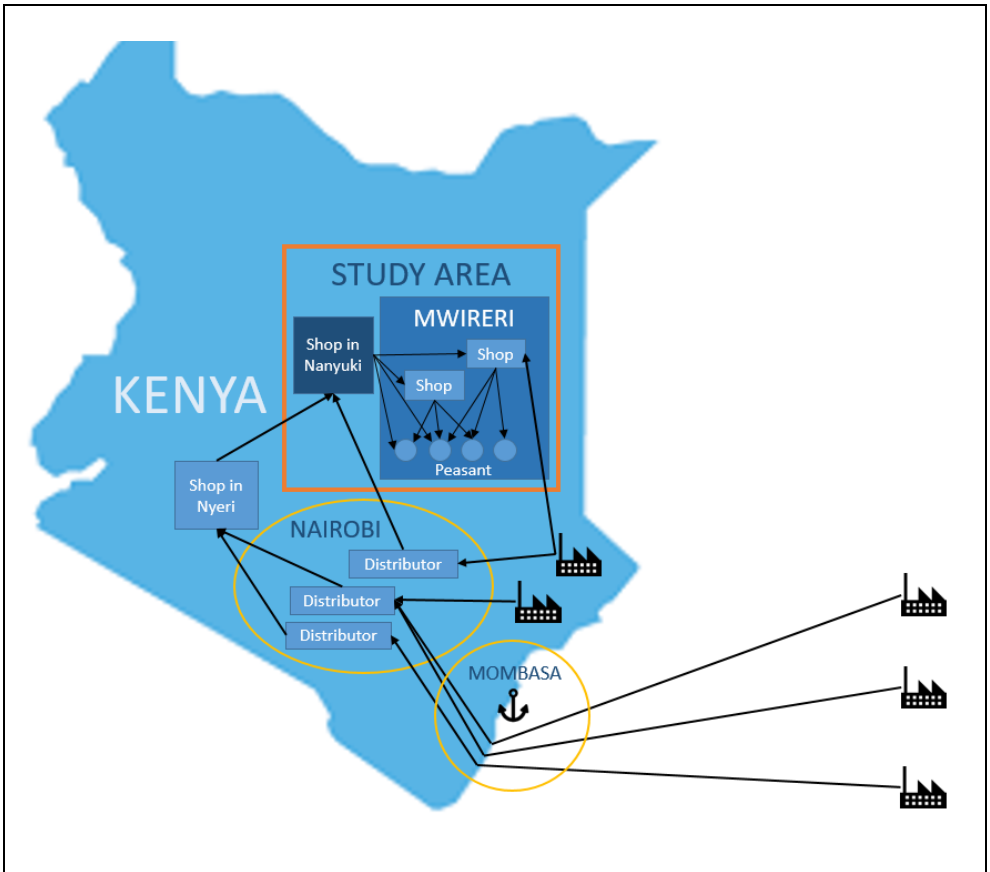


Figure 38: Schematic Illustration of Paths of Material Inputs Produced Outside the Study Area
Drawn by the author

[103] For the life-cycle assessments for his Master Thesis, Fabian Ottiger traced the path of selected agro-chemical input products from the port of origin all the way to the used by peasants in the study area (see also chapter 7.2). He observed that the input products considered were shipped from eight ports all over the world (Antwerp, Felixstowe, Hamburg, Istanbul, Jeddah, Karachi, Marseilles and Mumbai) to the port of Mombasa (2018: 83). Ottiger did not use the list of the same input products that I use for my analysis. However, it can be assumed that his list includes similar products though less in number. Therefore, the number of ports of origin for the products in the list of my analysis can be assumed to be higher.

For my research, I mainly focussed at the dispersion of inputs to peasants within the study area. To understand how these products arrive at the peasant farms, I did not only look at where they come from and where they pass by, but also under which conditions they are traded and who sets the rules and regulations for this trade. From interviews with the owners of the two shops in Mwireri, I learned where they got their products from and how they got these products. Additional interviews with a wholesaler in Nanyuki, from where the two shop have most of their products, allowed me to further trace the path of the products and to understand how they are traded.

Peasants around Mwireri either purchase inputs at small local shops or at wholesale shops in Nanyuki. There are two small agro-vet stores in Mwireri. The two shops in Mwireri have a selected choice of input products at their shops and order regularly products from a wholesale shop in Nanyuki. The sellers at the two agro-vet stores are not officially trained but had good knowledge on the application of agro-chemical products and agricultural production. They advise peasants on applying agro-chemical products to improve their production or reduce crop losses. Inputs at the small shops in Mwireri are more expensive but easier accessible because travels to Nanyuki can be avoided. Moreover, some peasants said that they purchase inputs locally to support the small shops. This shows that not only pure economic rationales govern economic activities of peasants. Sometimes, if peasants do not have money, they are given an advance by the shop owners. However, the shop owners only grant advances for some days or weeks and only if they assume that this peasant will be able to refund the advance. The estimation of the solvency of a peasant is thereby also based on specific cultural features, such as age or reputation. From living in the same area, they know the peasants very well and they know which peasant has a good reputation for repaying advances promptly and which one has a reputation of being a poor debtor.

The owners of the two small shops in Mwireri do not have much cash. Most of their assets are bonded in their product stock. They have most of the products from a so-called wholesale shop in Nanyuki or directly from producers in Kenya (mainly animal feeds). The small shop owners cannot order large quantities because they do not have enough cash. Both small shop owners had built trust relationships with a wholesale shop owner in Nanyuki. This allows them to get some products with an advance. These advances have to be repaid before the next order can be made. The interpersonal relationships to the wholesale shop owners allows them to order products by phone and repay advances with M-*Pesa*. Orders are delivered by *matatu* that pass Mwireri on their way to other places. This saves the costs and time to travel to Nanyuki for every order. However regular travels to Nanyuki remain important to maintain a good interpersonal relationship with the owner of the wholesale shop. Direct orders from producers are only possible for some products and have generally to be paid in cash. These orders are delivered directly to the shops. Only if the road is muddy from the rains, the shop owners have to organise the transport from the tarred main road to the shop by themselves.

The owner of the wholesale shop in Nanyuki gets the products for her shop either from distributors and producers in Kenya or, if she does not have an arrangement with a specific distributor, she orders the products through another wholesale shop in Nyeri. This shop has arrangements with more distributors. To be delivered by a distributor, one has to open an account with the distributor. To open an account, one has to make a first big order paid upon or even before delivery. Later on, orders can also be delivered on an advance. The more one orders, the higher advances one is guaranteed by the distributor – of course only if one also repays the advances on time. Some distributors have higher hurdles to make a first order than others. The owner of the wholesale shop in Nanyuki does not have much cash and struggled to open accounts with all the distributors from which she has products. Fortunately, she knows an owner of another wholesale shop in Nyeri very well. Thus, she can order some products through this wholesale shop that had accounts with more distributors.

The distributors in turn get the products from producers within or outside Kenya. However, my study does not reach into trade relationships on this level. Fabian Ottiger (2018) analysed these trade relationships briefly in his Master Thesis (see above).

My analysis shows that interpersonal trust relationships are important for economic transactions between peasants, small agro-vet shop owners and wholesale shop owners. Personal trust relationships enable peasants and small shop owners to access externally manufactured input products despite frequent lack of money. Relationships between wholesalers and distributors are more impersonal and in these trade relations, lack of money is more difficult to deal with. Only an interpersonal relationship with another wholesaler enabled the wholesaler in Nanyuki to cope with her lack of money required to open accounts with more distributors.

Small shop owners would get better prices if they could order directly from distributors or producers but their lack of money and small orders prevents that they engage directly in national and international trade. Wholesale shops are the connecting link between local trade for which interpersonal relationships are important and national and international trade that is mainly based on impersonal relationships. For purchasing input products, peasants are not directly linked with the national and global market but through intermediaries. Only this buffer of intermediaries enables peasants to interact with the national and global market.

Governmental Programme for Subsidised Synthetic Fertilizer

In addition to agro-chemicals sold at small shops and wholesale shops, the National Government provides synthetic fertilizer at a subsidised price. According to the Crop Officer of the Agricultural Department of Laikipia, with whom I had an interview, this synthetic fertilizer costs almost half of the price of synthetic fertilizer sold at small shops. For this programme, the national government has a large depot for different types of fertilizer in Nairobi, from where they are delivered to peasant.

Everybody in Kenya is eligible to apply for subsidised fertilizer. Peasants from the study area can apply for subsidised fertilizer by going to the Agricultural Department Office in Nanyuki or through an agricultural Extension Officer in Maili Nane (a village close to Mwireri). To make an application, the peasants have to fill in a form. Then, they have to deposit the money to pay for the fertilizer at the bank. To complete the application, they have to submit the bank slip proofing their payment. However, in the last years, there was not always enough fertilizer of the right kind at stock and overstretched logistics were not always able to deliver the right fertilizer in sufficient quantity at the right time. Moreover, agro-vet store owners tried to buy subsidised fertilizer to re-sell it at their shops at regular prices. This is not allowed but if the shop owners put the subsidised fertilizer form the government into new bags which do not have the logo of the government, this can almost not be prosecuted. All these obstacles prevented that there was always enough fertilizer of the right kind available for all peasants who applied and paid for it. Peasants were issued fertilizer on a first come, first served basis. Thus, peasants might have had paid for the fertilizer but had to wait for a long time to get it. Sometimes, the ordered fertilizer arrived so late that it could not be applied in the targeted season anymore. In this case, peasants had buy additional fertilizer for the targeted season at regular prices at small shops and kept the subsidised synthetic fertilizer for the next season. However, this is a problem for peasants with a tight budget. Peasants with a tight budget cannot afford to spend money on buying subsidised synthetic fertilizer that might arrive late, if they do not had enough money to also buy additional fertilizer if the subsidised fertilizer arrives late. At the other hand, peasants with more money can afford to buy subsidised fertilizer and additional fertilizer if the subsidised fertilizer arrives late. As such, those with more money can benefit from the subsidised fertilizer programme while those with a tight budget cannot afford the risk it entails and therefore cannot benefit from this programme. They have to buy fertilizer at market prices in small shops. This explains probably why only 8% of the peasants interviewed with the household survey stated to have bought subsidised synthetic fertilizer from the government. According to the County Crop Manager, it would be easier and more efficient if the government would make cheap fertilizer available through the small shops instead of the selling it through the government in ways that do not work well.

11.4 Economic Implications of Purchasing Manufactured Inputs

In interviews peasants explained that they did not always apply all agro-chemicals of which they think they would be necessary for peasant agricultural production because they are too expensive. Either peasants can simply not afford the products or the benefit of an input product is assumed to be worth less than its costs. In addition, the use of certified hybrid seeds forces peasants to buy seeds anew every year. This makes peasant production cost intensive and not all peasants could afford all inputs they perceived to be necessary or beneficial for their production. With regard to different crops

potatoes are most expensive to grow because seeds are rather expensive, they need a lot of fertilizer and fungicides. Beans are cheaper because seeds are often re-used and they do not require much agro-chemicals how they are grown locally. As mentioned above, sometimes shop owners gave peasants small advances to purchase input products, or, if peasants were members of a credit group, they could get advances to purchase inputs from these groups (see chapter 15).

To ease purchase of agro-chemicals, some companies started to pack their products into smaller packages. Smaller packages allow the peasants to buy the quantity they actually need on their small plots and smaller packages are cheaper than large packages. However, the price per gram is higher for a product in a smaller package than the price per gram of the same product in a larger package. Syngenta Kenya,[104] for example, developed a new product line called *Uwezo* (Swahili for capability/ability), with smaller packages. According to Syngenta Kenya "Syngenta launched the *Uwezo* Project in June 2008 to provide smallholder farmers with world-class crop protection products in uniquely designed and affordable packaging".[105] One peasant said that they launched this line to consider feedbacks of peasants asking to reduce the quantity in packages. However, one could also argue that they found a way to earn more money from selling these products to poor peasants.

11.5 Environmental and Health Impacts of Agro-chemical Products

As mentioned in chapter 9.8, some of the agro-chemical used for peasant agricultural production contain ingredients that are highly hazardous according to the WHO toxicity classification. Some ingredients are said to be possibly carcinogen and some are potentially ground water contaminant or harmful to beneficial insects. For example, the controversial Glyphosate is used regularly by peasants. The WHO recently classified this ingredient as potentially carcinogen (IARC 2015). Also Ottiger (2018) analysed the toxicity of agro-chemicals used by peasants. According to him, one product used by peasants is classified by the WHO as highly hazardous (class Ib) and several as moderately hazardous (class II). As I learned from peasants, some of the products they apply are not approved by the Pest Control Products Board of the Kenyan Government (PCPB) because of their toxicity (for an overview of approved products see PCPB 2015). However, other products used by the peasants are also classified by the WHO as unlikely to present acute hazard (see PCPB 2015 and Ottiger 2018).

Potential negative environmental and health impacts are discussed by peasants but a general statement is, if these products are handled properly contaminations can be prevented and agro-

[104] Syngenta Kenya is the Kenyan subsidiary of Syngenta. Syngenta Kenya distributes products of Syngenta. At the other hand, Syngenta Foundation is non-profit organisation, established by Syngenta (see Syngenta Foundation: <www.syngentafoundation.org>, Syngenta: <www.syngenta.com> and Syngenta Kenya: <www.yngenta.co.ke>, all accessed February 2, 2018).
[105] Syngenta Kenya: Uwezo, <www.syngenta.co.ke/uwezo>, accessed November 11, 2017.

industrial production companies apply much stronger agro-chemicals. However, safety instructions are seldom implemented as described in the brochures (peasants were seldom wearing protective gears, such as gloves, glasses, booths or masks when spraying agro-chemicals). One peasant once explained that they do not need protective gears because they do not apply chemicals that are as hazardous as the ones applied in the export oriented production companies that equip their sprayers with protective gears. Nevertheless, as shown above, some of the inputs applied by peasants are actually highly hazardous according to the WHO classification and peasants told me about incidents where people or animals were hurt or injured by wrongly applied agro chemicals. For example, one peasant has a blind cow. According to him, she became blind when he used a regular pump for spraying to spray an ixodicide against ticks at her. However, the pump was not cleaned properly after applying agro-chemicals at his what field before being used for the cow and from the agro-chemical residuals in the pump, the cow became blind.

In addition, some peasants fear negative health-impacts of agro-chemical residuals on food. Especially when they buy food, they fear that producers did not consider the required pre-harvest intervals[106] of agro-chemicals or that producers add agro-chemicals after harvesting to preserve the crops. To prevent eating vegetables or crops that are contaminated, peasants told me, they do not buy the vegetables that are very nice, but those that have some spoiled parts and are thus more likely not treated with too many agro-chemicals.

Moreover, peasants explained that soil analysis have shown that the use of cheap synthetic fertilizer increases the acidity of the soil. According to representatives of a non-governmental organisation, the use of manure or appropriate synthetic fertilizer prevents this. At the other hand, peasants explained that the application of cheap synthetic fertilizer is needed for a fruitful harvest. This also explains why 96% of all peasants interviewed in the household survey stated to use synthetic fertilizer for their production. One peasant once noted that due to the high amount of insecticides applied by their production, there would be less bees than in areas with pastoralist production. Moreover, some peasants mentioned that pests developed resistances against commonly used agro-chemicals.

It can be summarised that the use of agro-chemicals has negative environmental and health impacts that are noted by peasants. However, these impacts are not the greatest nor an urgent concern of most peasants. Peasants rather reduce the amount of agro-chemicals applied due to lack of money to purchase them than due to a concern that they might affect the environment or their health. Also the few peasants trying organic farming technologies rather reduce agro-chemical inputs to save money.

[106] Pre-harvest intervals describe the time in which agro-chemicals should not be applied before harvesting a crop in order to reduce harmful agro-chemical residuals on crops.

11.6 Conclusion

This chapter shows that peasant produce some inputs for local agricultural production and livestock keeping locally but they also depend on inputs produced outside the study area. Currently peasant agricultural production seems not possible without imported certified hybrid seeds and manufactured agro-chemical inputs because most peasants have developed a way of producing that depends on these inputs. As shown in the next chapter, external organisations that teach peasants new farming technologies and promotions by agro-chemical companies, currently further foster the use of these external inputs for production.

The dependence on certified hybrid seeds and manufactured agro-chemical inputs makes peasant production cost intensive. The productivity of some peasants was reduced because they could not afford all inputs they perceived to be necessary or beneficial for their production. Moreover, the dependence on input products ties peasants to national and global markets. Different actors are involved in the sale and retail of these products. These actors influence which products are locally available, how they reach the place of application and under which conditions peasants can acquire these products. On a local level, interpersonal relationships between peasants, retailers and wholesalers are important for the trade of input products. Wholesalers create a buffer between this local level and national and global markets. Only this buffer enables peasants to interact with the national and global market. Therewith, peasants in the vicinity of Mwireri can clearly be associated with an open peasant community as described by (Wolf 1955, 1957) but their relationship with the larger world is uniquely structured by specific features of this peasant community (e.g. how externally manufactured inputs arrive in the study region).

12. Knowledge, Know-How and Information for Peasant Production

To practice agricultural production, peasants need to know how to carry out their production. Therefore, they depend on knowledge, know-how and information on how to produce, where to get inputs from, how much they cost, for how much they can sell their products, etc. In this chapter, I describe from where and how peasants get this knowledge, know-how and information.

One peasant explained that when they arrived in this region, they did not know which crops would grow best in this area or how to best carry out agricultural production here. They tested various crops and varieties. Over the years they adapted the production technologies they knew from where they came to the local context. Moreover, they developed strategies to predict the weather on short and long terms. Also, they learned where and how to get inputs for agricultural production, how to use them and how to sell their products. Especially the conditions to buy inputs and to sell products changed regularly and required constant adaptation. However, not all peasants have the same abilities to access know-how, knowledge and information.

12.1 External Organisations Teaching Peasants

As mentioned in chapter 8.3, various national, international and governmental organisations provide trainings for peasants on how to improve agricultural production. Most of the recent training programmes teach peasants in so called conservation agricultural practices (see chapter 9.3). For these trainings local peasants are selected to be trained as local trainers of peasants. Moreover, the NGOs provide inputs to selected peasants to develop a model production that demonstrate other peasants how new production technologies are implemented. SNV, for example, selected local peasants to be given a greenhouse. With this greenhouse, they should demonstrate to other peasants how to grow tomatoes in greenhouses. In the vicinity of Mwireri an experienced peasant received such a greenhouse. This peasant had already been supported by other NGOs and had rather stable access to water for irrigation. Other peasants admired the new technology of this greenhouse and the yields produced there. However, they could not copy the example because they could not afford a similar greenhouse nor did they had stable access to water for irrigation.

During my research SNV supported another programme in which a governmental Agricultural Extension Officer of the Agricultural Department of Laikipia shows a peasant group how to grow potatoes.[107] In order to do so, they develop a demonstration plot. To develop the demonstration plot, they selected another peasant in the vicinity of Mwireri with a relative stable access to water.

[107] The peasant group that was targeted by this SNV programme was the Mwireri Commercial Village Group (see chapter 14).

However, this peasant is not provided everything for free. Today, SNV has the policy to share costs of programmes between the peasant groups receiving the training and the organisation providing the training. To share costs, the peasant hosting the demonstration plot has to carry out all the work to prepare the field and to plant the seeds. SNV provides all necessary material inputs for production through the Agricultural Extension Officer. This strategy of sharing costs shall create ownership for the project among the participants. However, for the first training of this programme, almost no peasant of the group showed up. According to the governmental Agricultural Extension Officer who taught the first training, it is difficult to convince peasants to participate in such trainings if they are not handed out an incentive, such as agro-chemical inputs for example.

Another program to sensitise peasants for new production technologies was launched by ACT. According to one peasant, ACT wants to demonstrate the benefits of so-called conservation agriculture on a demonstration plot. At the demonstration plot, peasants should see how crops grow if different production methods are applied. Therefore, on one part of the plot they request the peasants to grow as they did traditionally, on one part they should apply conservation agriculture technologies with and without mulching and with and without applying synthetic fertilizer. This should then enable the peasants to see with which technologies crops would grow best. However, their demonstrating resulted in an almost complete crop failure on all parts of the plot.

Also FAO teaches agricultural practices to perform conservation agriculture (see chapter 9.3). The FAO programme provides its trainings through local trainers. The local trainers are selected by a local Agricultural Extension Officer. According to the local Agricultural Extension Officer in the vicinity of Mwireri, she selects peasants of whom she knows that they have already profound knowledge of local peasant production and are capable in teaching other peasants for the programme. These selected Trainers are trained by so-called Master Trainers in seminars in Nanyuki. To train the peasants, the organisations have developed manuals and teaching materials (see FAO 2015). For the trainings of the peasants, the local trainer and the peasants are supposed to meet regularly at a demonstration plot. There the local trainer shows them the new agricultural technologies for conservation agriculture. Local Trainers are paid a small remuneration for teaching peasants but they have to proof the attendance of all peasants in every training by collecting their signature. Moreover, Trainers are monitored by the Master Trainers who are themselves closely monitored by the FAO Headquarter in Nairobi through a specific application on their mobile phone. Some peasants who provide land for demonstration plots are given inputs to carry out the agricultural production on these plots. For the FAO trainings, the inputs are distributed by the local Agricultural Extension Officers. According to one local Trainer, some technics taught by these organisations or newly implemented varieties are well received by the peasants (e.g. some peasants tried to apply new technologies for conservation agriculture, or some peasants tried new crops or new drought resist varieties of popular crops). Other

technics, crops or methodologies to teach peasants are barely adaptable in to the local context and cannot help to improve peasant production (e.g. seminars are held by crop scientist who knew little about farming in the specific context, learning materials are handed out as soft-copies even though nearly nobody has a computer, peasants are required to keep farm records albeit a great number of participants barely knows to read and write).[108] Moreover, organisational constraints seem to hamper successful implementation of this training programme. Promised inputs for demonstration plots did not arrive on time and the Trainer do not know which inputs will be provided. Moreover, I had been told of other Trainers who feared that they might lose their remuneration if they cannot provide a full list of peasants participating in the trainings. Thus, they are rather concerned to collect the signatures proofing peasants' participation than to teach lessons in agricultural production. The training programme is developed highly hierarchically and Trainers and Master Trainers are closely monitored by the FAO headquarter in Nairobi. However, the programme cannot be implemented throughout as planned. Additional efforts by local Trainers, Agricultural Extension Officers and peasants providing their land for the demonstration plots and good personal links between these actors are vital for an, at least partial, successful implementation of this training programme.

To participate in such trainings, peasants have to be members of so-called self-help groups. Such groups are founded to organize peasants for trainings and to receive inputs and incentives from organisations that supported the peasants. Some of these groups continue to exist after the training for which they are founded. Such groups can be used for other trainings by other organisations. Moreover, these groups are often transformed into micro-credit or welfare groups (see chapter 15.3). However, the effective participants in the trainings are not always as numerous as expected by the organisations organising these trainings. As mentioned in chapter 8.3, trainings of these organisations are not always well adapted to the local context and organisational constraints further hamper a successful implementation of these training programmes. Nevertheless, several peasants told me in interviews that these trainings provid important inputs to improve their agricultural production albeit they do not implement new technologies or crops unquestioned. As one peasant stated:

> "We learn from these trainings, but we do not accept everything. […] You know, farmers do their own research as well. If you learn [from the training], you go and make your own research at your land. You plant the new seeds, you follow it until you come to harvest. Then you see which type is doing best. Then you take the good type. So, we make our own

[108] It is difficult to determine, which impacts a specific training or demonstration of new technologies and crops has. Generally, it can be observed that the utilisation of engine-powered agricultural machines, certified hybrid seeds, manufactured agro-chemicals and, as a result, the commodification of agricultural production increased over the last years. This is, at least partially, a result of trainings by external actors.

> research. The best researcher is the farmer. He knows best. The only problem, he does not keep records."

While this peasant describes their selective adoption of new technologies with prudence and peasants' own research and adaptation to local contexts, other non-peasant actors explained this selective adoption with peasants' reluctance to learn and apply new technologies. Prudence to apply new technologies can be understood as a mini-max strategy as described by Lipton (1982 [1968]) in chapter 4.1. Peasants cannot afford the risk of losing too much of their harvest by trying new technologies that are not guaranteed to function reliably under the specific conditions in which they are applied. The peasant's claim to be the best researcher who knows best what works well and what does not work well in the specific local context endorses the demand of transdisciplinary research to include non-scientific actors. This example shows that it is important to include ordinary peasants and not only high-level representatives of peasants or other groups in transdisciplinary research projects. The explanation of non-peasant actors for peasants' reluctance to learn and apply new technologies is linked to peasants' cultural beliefs, cling to old practices, lack of education, lack of interest, insufficient participation in trainings or unwillingness or inability to wait long enough for the yields of new technologies and practices to materialize. Such explanations are in line with Rostow's (1960) idea of tradition and culture as hindrances to development (see chapter 4.2) and pay little attention to the specific situation of peasants.

Partial implementation of new technologies and practices that are developed by experts as comprehensive concepts can result in failures of these new technologies and practices. These failures can persuade peasants to shift back to old technologies and practices. These different perceptions of the problem show that the exchange between experts developing the technology and the peasants for whom they develop it is insufficient for a successful development of new functioning technologies and practices.

Even though it seemed that the peasants only partially benefit from these trainings as envisaged by the organisations making these trainings, at least those providing the land for demonstrations can benefit by getting a greenhouse or some inputs for the demonstration plots for free. Moreover, peasants teaching classes for other peasants get a small remuneration.

12.2 Other External Knowledge Provider

Also agro-chemical production companies use demonstration plots to show peasants how well crops would grow if their products are used. They also organise agricultural fares to advertise their products. Through such demonstrations peasants learned about new input products or mechanic services available for their production. Similar to trainings by the organisations, as described above, peasants

do not blindly adopt new technologies and products. They carefully balanced advantages and disadvantages as how they expect them and apply these new technologies and products only on trial if they can afford such endeavours.

Moreover, agro-chemical input producers train and inform small agro-vet shop keepers. Producers visit them, invite them for trainings and hand out brochures describing and advertising their products. Thereby, they tell the shop keepers how to handle agro-chemicals safely, for what problem which chemical solution (of their company) can be used and how to use the products safely and effectively. To advise peasants with a problem in their farm (e.g. a specific pest or disease), the shop keepers help the peasant to identify the specific problem and seek information by reading product labels or brochures provided by the agro-chemical input production companies. The small agro-vet shop owners are an important source of information for local peasants. The shop owners themselves have a broad knowledge of local agricultural production form former jobs or trainings by various organisations (see above). Moreover, they inform themselves by reading labels and brochures provided by the agro-chemical input producers. Product labels and brochures are mostly written in English, some also in Swahili.

To know which synthetic fertilizer to apply at their farm, peasants can take soil samples and analyse them at a laboratory. Various laboratories offer soil analysis at different prices. However, some laboratories are said to make poor soil analysis. KENDAT (see chapter 8.3) also offeres soil analysis in addition to other services provided for peasant production. From soil analysis peasants learned that their use of cheap synthetic fertilizer acidifies their soil. Despite this knowledge most peasants told me that they cannot forsake the use of cheap synthetic fertilizer because they depend on it for their production (see chapter 9.8).

Peasants accounted that they learned many useful skills for peasant farming at school. At school, they were told how to plan agricultural production, how select, keep and re-use seeds for the next agricultural season or how to build storages and sheds. Others learned additional agricultural practices and know-how in the seminars described above, at the Kenyan National Youth Service or from their job as Agricultural Extension Officer. At the time of my research, KENDAT taught the pupils at a primary school how to do conservation agriculture. They made a small demonstration plot at the school and taught them in agricultural practices. Harvest products are sold to purchase inputs for the next season but shall soon produce enough to provide a source of income for the school.

Last but not least, some peasants try to copy agricultural production practices and technologies from export oriented horticultural farms. They learn about these practices and technologies by working there or they were told about them by friends, neighbours or relatives working there.

Peasants do not only rely on knowledge and information provided by external actors. As mentioned in the statement above, peasants carry out their own research and develop their own knowledge and know-how. Peasants know, for example, how to plough by hand or that they can use ash or dried leaves of a specific plant to protect their crops and to preserve their harvest (see chapter 11). However, peasants' knowledge should not be seen as limited to such local or traditional practices nor as opposite to modern knowledge taught in trainings by national, international and governmental organisations. Generally, peasants combine new inputs, technologies and knowledge provided by external actors with experience, know-how and practices they already know. Such combinations can result in practices that are not assumed by those providing new knowledge, technologies and practices. One peasant told me that they developed a new method to kill millipedes that affect potatoes. To kill millipedes, they mix agro-chemicals with animal feed and sugar. This tincture attracts the millipedes who eat it and die. They developed this unconventional method to kill millipedes in a seminar, but not in a lesson told by the teachers but when discussing with other trainers during breaks. As mentioned in chapter 11.1, another peasant developed a method to keep and re-use hybrid seeds. As such, peasants have themselves, researched, developed and combined new methods and technologies that help them to carry out agricultural production. Therewith, peasants combine traditional methods and technologies with new external scientific knowledge and technologies, and new locally developed knowledge and technologies. How they combine different knowledge, technologies and methods is not always as envisaged by external actors who try to support peasants.

12.3 Access to Information

Peasants do not only need to know technologies and practices to carry out agricultural production, they also need a lot of information on where to get inputs from, which inputs to use, how to use them, where to get people to work at their farm, how much to pay these workers, to whom to sell products, at which prices to sell products, how the weather will be for production and where to get all this information from. They get such information from experience, talking with other peasants, talking with agro-vet shop owners, etc. To get information from neighbours, relatives, other members of self-help groups etc. good social relationships are important for peasants. Through experience and exchange peasants built a large collective knowledge and network to get the latest information. Peasants know, for example, when rain seasons start and how much rain they generally provide, that there are wet and dry cycles of several years in the study area, which weather will be brought by wind in a specific direction etc. One peasant explained such knowledge for example as following:

> "Every four years there is a drought year. Then there are three years with a lot of rain and again a break of a one-year drought. So, for the three years, the animals do very well and

> the crops do very well. But the leap year we always experienced droughts in this area. Sometimes the drought prolonged and our animals starved and even died. So, this leap year really affects the farming in this area. But God is good. And if only some animals die, you remain with a few. So, when the rainfall starts to come back, you start breeding more animals again. This is how we continue."

This shows, peasant knowledge does not only include knowledge about aspects that influence farming, such as the weather, it also includes knowledge of how these aspects will affect the farming and instructions of how to cope with them, how to plan agricultural practice and which strategies to apply if something influences farming.

They also know that prices for inputs are at highest at the moment everybody needs the inputs and prices for crops drop during the harvesting time. They know that they can sell products at higher prices if they organise themselves in groups to sell products collectively, etc. Much of these vital information is shared en passant when peasants meet. Today, modern communication technologies facilitate the exchange of information as people do not necessarily need to meet physically and can reach almost everybody at any time by mobile phone.

12.4 Conclusion

Since the first peasants arrived in this region, they developed new knowledge on how to successfully carry out agricultural production in this region, not only with regard to production but also with regard to accessing land, material inputs, selling crops, etc. Such knowledge had not been developed independently. Peasants learned from each other and from external organisations. External organisations implemented sensitisation and training programmes promote new externally developed agricultural knowledge and practices, such as the so-called conservation agriculture. As described in this chapter, such programmes and their content was not always well adapted to the local context. Therefore, peasants did not apply new technologies and knowledge as template for local production but amalgamated it with the know-how and experience they already had.

13. Access to Work Force and Services

Carrying out agricultural production and keeping livestock is very work-intensive. The workforce required for this undertaking can either be sourced from within the household – the productive unite – or outside the household. People from within the household carry out most agricultural tasks. In previous times, peasants had a system of supporting each other in farming tasks. Today peasants who can afford it, employ neighbours or people living in the vicinity on daily wages to carry out agricultural tasks for them. Moreover, peasants and organisations with specialised machines offer services to carry out agricultural tasks. In this chapter I describe how access to work force and services is organised in the vicinity of Mwireri. First, I describe the role of unpaid work from the own household or through mutual support. Then I describe paid work and access to agricultural services.

13.1 Work Force from the Household

Most tasks for peasant agricultural production and livestock keeping were done by members of the household and as such of the productive unite. Peasants planed and organized their production, they went to buy agro-chemical inputs, they seed, observe their crops, apply agro-chemicals, weed, harvest, organise the sale of their crops, graze their cows, milk them, bring the milk to their customers, etc. As shown by the household survey, at an average, 79% of agricultural tasks were carried out by the peasant household and only 21% of the work was delegated to employed workers. Slightly more than half of the households (55%) stated to have carried out all agricultural tasks by themselves.

In some families the men mainly planned the agricultural production and women carried out most tasks. In some families the production was planned jointly and carried out by both. In other families, the men carried out almost all agricultural tasks and the woman engaged in off-farm activities. The gender division of tasks for agricultural production varied from family to family.

Families with children living in the same household delegated some agricultural tasks to them. Some families also took care of other relatives such as grandchildren, nephews or even further distant relatives. These relatives also helped in the household. Sometimes, it could not clearly be distinguished whether a family took care of a relative to cater for him or her, or to obtain an additional worker in the household. One peasant told me that a nephew came to stay with them for some months to support them. For reward he could stay at their house for free and was provided food and soap. Moreover, he was paid a small remuneration. As he told me, he saved this money to build his own small house at his mother's place. Such an arrangement can be beneficial for both, the peasant getting additional work force and the young person earning money for a required investment. But such arrangements are

prone to exploitation of younger people through elder land-owning peasants, as described by Meillassoux (1975) for example.

In addition, I observed children carrying out agricultural tasks, such as grazing animals or helping on the farm, during school time. Some children left school early, either because there was lack of money to pay school fees or because their workforce was needed for agricultural production. It can be assumed that this is more common in poorer households. Other households can afford to subordinate agricultural production to the education of their offspring (see chapter 15.1).

13.2 Mutual Support

Some peasants told me in interviews that they supported each other at the time they moved to this area. On day one everybody went to work at somebody's *shamba*. The next day, they would go to somebody else and so on, until they would have worked at everybody's *shamba*. This mutual support took mainly place for heavy work, such as ploughing or weeding by hand. Those who's *shamba* was worked had to cater for the people working on the *shamba*. Moreover, they also supported each other if one built a house. If one was in need of support he or she could ask neighbours to assist them. This mutual support with work force was not directly measured. As one peasant stated "we were doing it as it was a friendly way of assisting each other […]. It was not a matter of payment, it was the nature of man who wanted to be friendly and socializing". However, people who did not go to work if they were asked by somebody had to have a good excuse. Whether an excuse is good enough or not was discussed by those who went to work.

This description of the organisation of mutual support shows that mutual support was not just a friendly or kind gesture. It was a structured organisation of work. Various temporarily accepted informal local institutions regulated this organisation. These institutions are expressed in norms, values and rules, as described in chapter 5. Such norms, values and rules are for example that one should be friendly and socializing. Being friendly and socializing can be achieved by supporting others. However, if one has a good reason for not supporting somebody, he or she does not have to. There is no exhaustive catalogue of good reasons for not supporting somebody, but through discussions among those who go to support somebody (but might not be able to go in another occasion), it is ensured that a certain standard is kept for reasons that allow the deny of support. These norms, values and rules are not universal. With these institutions, the organisation of work is temporarily structured for this group. Thereby, the institutions are the product of negotiations among the actors of this group and they are not universal but embedded in the culture of the particular group. Internal and external changes can affect power relations that influence the negotiation processes for these institutions. Power imbalances might result in the formulation of institutions that favour some peasant over others.

With the pervasion of wage-work for peasant agricultural tasks and increasing monetary needs many thought it would be more beneficial to work for somebody who pays them. With increasing numbers of people not working for free at other people's *shamba*, the system of mutual support fell apart and was gradually replaced by commodified wage-work arrangements. Nevertheless, I observed many occasion where people still supported each other. Women who visited neighbours helped to assort crops or to prepare food, relatives who came for a visit helped cleaning or repairing the house, one could ask a neighbour to assist in a small task, a neighbour brings back an escaped chicken or hint somebody at a plot that is at sale if one wants to buy land, etc. As such, mutual support still persists, but with the expansion of commodified wage-work arrangements (with their own institutions) it has lost importance in structuring the organisation of work. *Harambee*, a similar form of mutual support, but to collect money for a larger expenditure (to pay High-School or University fees, to pay a surgery, etc.), persists up to the present day. Comparably to mutual support for woke, a *harambee* is structured and regulated by various informal local institutions. The role of *harambee* is further explained in chapter 15.

13.3 Employment of Neighbours and Peasants from the Vicinity

Commodified wage-work existed for a long time and increased gradually. Today, peasants who can afford it employ people to help them in agricultural production and livestock keeping. Some peasants only employed people to carry out work that is consider hard. Others go as far as employing people for almost all agricultural tasks and rather become managers of their farm. Especially better off peasants, people owning a plot but mainly engage in off-farm activities or elder people living on their own led most agricultural tasks to be done by employed workers. One man who had a metal workshop and additionally worked at a small agro-vet store once told me that he has land but he is too busy with his two jobs to farm and he does not like agricultural work too much. Thus, as he said "you can use money instead of your hands" if you employ somebody to do the agricultural work for you. However, as shown in the household survey, most peasants did the bulk of work with workforce sourced from the own household (see above). Only one peasant stated in the household survey to have employed somebody for every agricultural tasks listed.

Peasants told me that it is not difficult to employ somebody. There are always people who look for some extra money. People with better agricultural skills are employed preferentially, especially by those who delegate most agricultural work to employed workers. Those delegating most agricultural work have their trusted workers whom they employ regularly. These trusted workers do not only carry out delegated tasks but also plan and organize the agricultural production.

Salaries of somebody with no extra skills seem to be rather fix and unnegotiable in this region. A worker is paid 200 KSH to work for a half-day from 8am to 1pm and 250 KSH to work for a full day from 8 am to 4 pm. In addition, as one peasant explained, “depending on your heart and humanity you also provide drinking water and lunch for the workers, but this is not a must”.

The employment of workers to carry out agricultural tasks for peasant production enables peasants to produce even if they cannot or do not want to carry out all tasks required for production. However, more than half of the peasants stated in the household survey that they did not employ anybody or any service to carry out agricultural tasks. At the other hand, the employment of peasants to carry out agricultural tasks enables peasants who do not have much money to earn additional cash, for example, to buy agro-chemical inputs for their own production. For some peasants working for other peasants is an important source of income to support their livelihoods. Some peasants who are well established today told me that in earlier days, they were not well established and depended greatly on the money earned from working for other peasants. Nevertheless, this type of work is not perceived as very profitable by those doing it and other employments, such as working for export oriented production companies or selling petty commodities is perceived as a better source of income by most peasants. Such sources of income are much more reliable than the casual work on other people’s *shamba*. This perception can be explained by a closer look at the sharing of benefits from such commodified labour arrangements. Despite local institutions (such as rather fixed salaries) that prevent an absolute exploitation in these wage-work arrangements power imbalances in the negotiation of these local institutions result in local institutions that favour powerful actors – in this case, those employing somebody to work – over weaker ones – those being employed. This aspect is discussed more in detail in chapter 13.5.

13.4 Agricultural Services

For some tasks, peasants also employ somebody to come with specialised machines. Specialised machines are used to plough, to rig, to rip, to harrow, to seed or to apply synthetic fertilizer, to spray agro-chemicals, to harvest wheat, to transport harvests, to crush maize, to mill grains or to cut plant remains for easier feeding to animals (all these tasks can also be carried out by hand). Some machines are owned by local peasants (e.g. spraying pumps, machines to crush maize, to mill grains or to cut plant remains). Deploying these machines is easy and cheap. Machines to plough, rig, rip, harrow or seed are owned locally only by one peasant and KENDAT, the NGO providing agricultural services in Mwireri (see chapter 8.3). In previous times, more peasants owned machines to offer agricultural services. Today, other people owning specialised machines visit the area to offer agricultural services during the harvest season. These people move around Kenya to offer their services during harvesting

or ploughing seasons that occur at different locations at different times. Services provided by such machines are more expensive than deploying machines that are owned by local peasants. Combined harvesters that are needed to bring in wheat have to be ordered from places further away. This makes ordering combined harvesters complicated and rather expensive (see chapter 9.4).

As a development project, an international seed and agricultural company supported a Kenyan non-governmental organisation to provide agricultural services with animal powered specialised machines in the late 1990s. To offer these services, KENDAT, the organisation who implemented the agricultural service project, trained a peasant self-help group in Mwireri to use animal powered machines for agricultural production. Moreover, with money from the international company, they equipped the self-help group with machines to offer animal powered agricultural services to other peasants. Once the support from the international company ended, KENDAT left the group to continue providing services at its own. However, the group's activities did not continue. One peasant of the group remained with all the equipment (some members said he pinched the equipment). With this equipment he continues to offer agricultural services to peasants living around Mwireri at his own.

During the time of my research, KENDAT came back to Mwireri to offer agricultural services with engine powered machines. One peasant noted that "KENDAT has come again with machines pulled by machines instead of donkeys". As mentioned in chapter 8.3, KENDAT builds and operates a machine park in Mwireri to offer the new agricultural services. The machine park in Mwireri is operated by the same peasant who remained with all the machines from the first project. Initially, the agricultural services offered by KENDAT were provided at a reduced rate to promote the services. In addition to these agricultural services, KENDAT offers other services, such as soil analysis to determine the correct use of synthetic fertilizer. Moreover, KENDAT supports a local self-help group and sells water for domestic use (see chapter 8.3).

The provision of agricultural services allows peasants to access machines for their production which they cannot buy by themselves. Machines that are bought by richer peasants are shared with others if they paid a small fee. However, not all peasants can afford agricultural services. Moreover, machines are not always available at the right time. This lack of access to machines makes manual labour remain prevalent in the region. According to the household survey, slightly less than half of the peasants (47%) used agricultural services to prepare the field in 2016 and only 15% used agricultural services to harvest any product.

The peasant offering agricultural services by himself and through KENDAT mentioned in an interview that agricultural service provision accounts for half of his income while agricultural production accounts for the other half. This shows that providing agricultural services can be an important source of income for peasants having these machines and the know-how to use them. However, a peasant

who once owned a tractor to offer agricultural services by himself said that offering such services is also a bit risky because if the weather is bad, less agricultural services are needed and less money can be earned by providing these services.

13.5 Conclusion

Most work for agricultural production and livestock keeping is done by members of the peasant household. How benefits of this work are shared within the household will be discussed in the next chapter. Some peasants additionally rely on workforce of other peasants. In earlier times, this work force was provided by other peasants in a way of generalised reciprocity that was structured by informal local institutions. Today the non-household workforce is mainly provided by employed workers. Informal local regulations for the remuneration of the workers have been established over time. The employment of workers to carry out agricultural tasks allows peasants to employ additional workers if they cannot or do not want to provide sufficient workforce by their own household. At the other hand, the employment of workers provides a welcomed source of income for poorer peasants. Instead of workers, peasants also employ agricultural services carried out by with animal or engine powered machines. Less than half of the peasants in the vicinity of Mwireri stated to have used such agricultural services for the last production season, but these services were greatly promoted by a non-governmental organisation at the time I carried out my research. For those who worked at other peasants' *mashamba* and especially for those provided agricultural services, earning money therewith was an important source of their livelihoods.

Generally, one can see that the growing importance of money and remunerated work transformed the organisation of agricultural work. The organisation of agricultural work through mutual support became challenged by an organisation of work through wage-arrangements. Wage work, the working for money, has generally prevailed, but mutual support remains important. The co-existence of two types of organising work leads to institutional pluralism but with the dominance of wage-work and agricultural services, peasant agricultural production became even more commodified. One has to have money not only for accessing land (see chapter 10) and material agricultural inputs (see chapter 11), but also to acquire agricultural work force or agricultural services. However, the salary based agricultural work does not follow pure economic rationales as described in chapter 4.1. Informal local regulations set fix salaries for agricultural work. This prevents that an increased availability of workers (i.e. a reserve army of labourers) leads to diminishing salaries – or a scarcity of workers would lead to an increase in salaries and therewith higher costs for agricultural production.

Moreover, peasant production still depends to a great extent on work provided by unpaid members of the household and different forms of non-monetised mutual support between household.

Therewith, agricultural production of peasants – even if it includes wage-work – does not follow unconfined economic rationales as described in chapter 4.1. Informal local institutions with their specific features, as described in chapter 5, greatly affect the interactions between those working and those employing workers.

However, the existence of informal local regulations with their specific features does not guarantee arrangements of mutual support or wage-work arrangement that are free of exploitation. Depending on how and by whom the local regulations are defined, the mutual support or fixed salaries might still enable exploitation. As described in chapter 5.1, the negotiation of institutions and their distributional effects are the affected by power relations. If power relations are asymmetric the probability is higher that the negotiation results in institutions that favour powerful actors and enable exploitation. As such, exploitation is not limited to wage-work arrangements (as one would assume from Marxist Theories, see chapter 4.2) but can also exist in non-capitalist work arrangements. At the other hand, local institutions can prevent excessive exploitation – also in wage-work arrangements. For the specific context, I argue that already in the organisation of work through mutual support favoured some peasants over others. With the new organisation of work through wage-work the imbalance between those employing workers and those being employed increased, but local institutions prevent an absolute exploitation of workers as it is described in Marxist Theories.

14. Utilisation of farm products

As described in chapter nine, peasant keep livestock and produce agricultural corps. Both, livestock keeping and peasant agricultural production provides farm products that can be used by the peasants. Peasants mainly use these products for self-consumption, sale or again as farm inputs (e.g. manure for cultivation or plant remains for livestock). In this chapter I describe how peasant utilise crops from agricultural production and products from livestock keeping. Thereby, I focus on self-consumption and sale of products from agricultural production and livestock keeping.

14.1 Crops

Agricultural crops can be harvested two times per year. However, a reward for the hard work and high financial investments is not guaranteed. Many adversaries can narrow or even totally destroy the harvest. What can be harvested is used by the peasants for self-consumption or to generate a cash income. As shown in figure 39, more than two-third of the harvest products from the long rain season were used for self-consumption. Thereby, maize, beans, potatoes and peas were principally used for self-consumption. Wheat and other vegetables at the other hand were mainly used for sale.

All peasants with very largest plots (above 10acres) sold some parts of their harvest but also peasants with small (below 2 acres) or very small (below 1 acre) sold some parts of their harvest. The sale of products by peasants with small or very small plots indicates that they do not sell surplus production which they cannot consume by themselves. It seems that they sell parts of their harvest if they are in need of cash. Later on, they have to purchase food to cover the food needs of the household. Despite these cash-needs, most production is used for self-consumption, whether peasants invested much or little money into production.

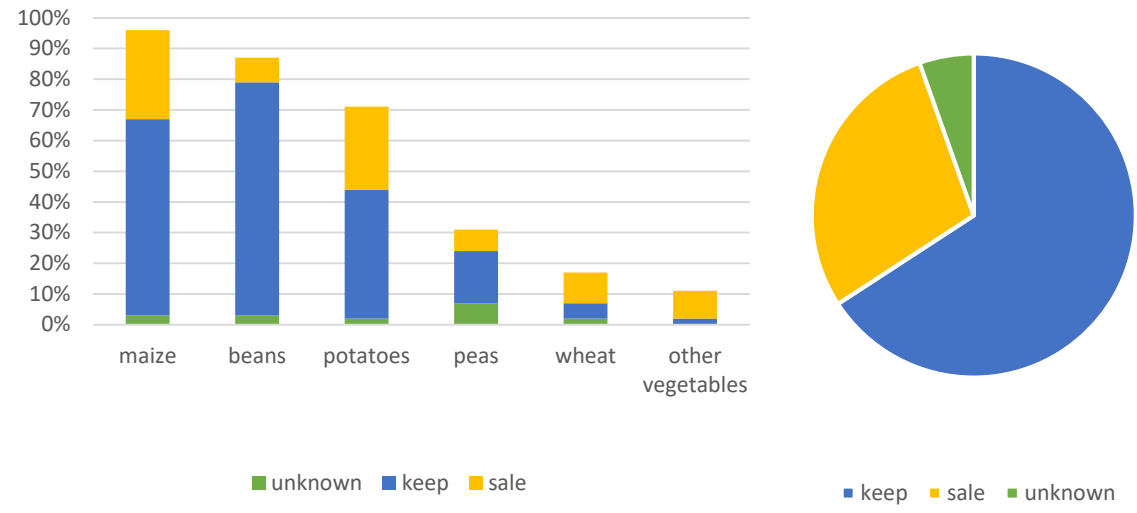


Figure 39: Diagrams for Crop Production and Utilisation of the long-rain season 2016
The diagram at the left shows the total proportion of peasants who grew a certain crop during the long rains of 2016. Moreover, it shows the proportion of peasants who sold parts or all crops grown from their harvest and the proportion of peasants who kept the harvest for self-consumption within the household. The diagram at the right shows the total proportion of crops kept and sold by peasants.

According to the household survey:

- Maize was grown by 96% of the peasants. 69% of them used the maize for self-consumption and 31% sold parts of their harvest.
- Beans were grown by 87% of the peasants. 90% of them used the beans for self-consumption and only 10% sold parts of their harvest.
- Potatoes were grown by 71% of the peasants. 61% of them have kept the potatoes for self-consumption and 39% sold parts of their harvest.
- Peas were grown by 31% of the peasants. 71% of them have kept the peas for self-consumption and 29% sold parts of their harvest.
- Wheat was grown by 17% of the peasants. Only one-third of them have kept the wheat for self-consumption and two-third sold parts of their harvest.

Other vegetables were grown by 11% of the peasants. 18% of them have kept the vegetables for self-consumption and 82% sold parts of their harvest.

14.2 Egg, Milk and Meat

Compared to agricultural crops, eggs, milk and meat can almost not be stored but were harvested on a daily basis. While peasants can harvest and sell crops two times per year, eggs and milk can be harvested and sold on a daily basis. Therefore, selling eggs or milk provides a much more regular income.

Approximately two-third of the peasants stated in the household survey that they have at least one cow which they can milk on a daily basis (see chapter 9.5). As shown in figure 40, slightly less than half of these peasants use the milk from their cows for self-consumption within the household. The other

peasants sold or exchanged a portion of the milk. Those selling milk sell it to neighbours, local shops and restaurants or processing companies within the study area.

Almost all peasants keep chicken. Approximately one-quarter stated in the household survey to sell some of the eggs they harvest (see figure 40). They stated to sell eggs mainly to local shops (73%), middlemen (18%) and neighbours (9%).

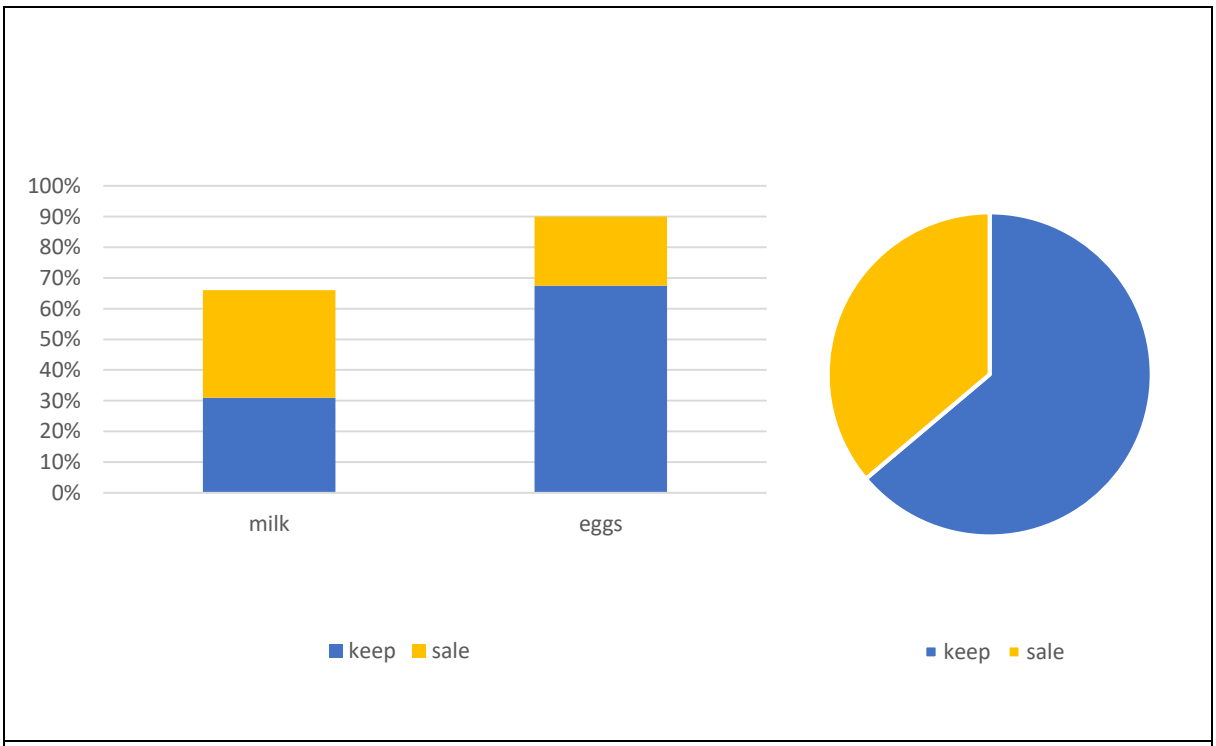


Figure 40: Diagrams for Production and Utilisation of Dairy Products and Eggs
The diagram at the left shows the total proportion of peasants who produced milk or eggs. Moreover, it shows the proportion of peasants who sold parts or all milk and eggs and the proportion keeping them for self-consumption. The diagram at the right shows the total proportion of milk and eggs kept and sold by peasants.

Dairy products and eggs are used by peasants for self-consumption. They provide a daily source of food to cover some food-needs of the household. To cover cash-needs, peasants sell milk and eggs to neighbours, locals shops and restaurants as well as to processing companies in the region. As shown in figure 40, most peasants keep eggs for self-consumption, especially if they have few chicken only. Milk is sold by more than half of the peasants. However, most peasants who sell milk also keep some milk for self-consumption. Milk has to be sold daily because peasants do not have cooling facilities to store milk. After milking, peasants decant milk into plastic bottles of two litres or other containers. The milk that is not kept for self-consumption is brought to neighbours or local shops and restaurants or picked up by processing companies.

Peasants can also sell sheep, goats or cows to local butchers or butchers in Nanyuki. Peasants sell animals to the butcher if they are in need of immediate cash. To sell an animal, the butcher estimated

the quantity of meat and negotiated a price with the peasant. Because peasants know local prices for meat at the butchery, the margins of the butchers are small. As such, peasants also keep animals to reserve money.

In addition to animals from local peasants, butchers also purchase animals from Maasais at markets in Timau, Nanyuki or other places. Both butchers in Mwireri have a car to go around to buy animals. Purchased animals are kept alive until they are needed by the butcher. To ensure food safety, animals can only be slaughtered in an official slaughterhouse. An official slaughterhouse in Mwireri is open and supervised by a veterinary some days of the week. Small animals, such as chicken or rabbits are slaughtered and consumed mainly by the peasants themselves or sold locally to neighbours and people living in the vicinity.

14.3 Self-consumption

Producing food is considered by many peasants as cheaper and better than purchasing food for the own consumption. Despite the costs and hardship of producing food, peasants mainly considered this a cheaper source of food, especially if the work force for production is sourced from the own household. Therefore, everybody with a piece of land tries to produce at least some food on his or her plot. As stated before, more than two-third of the food (crops, dairy products and eggs) produced by peasants is used for self-consumption. To process maize or wheat for self-consumption, peasants bring the crops to a local *posho* mill[109] where they are processed at a small price. Peasants can also sell their grains to this *posho* mill (see further below).

However, peasants do not only consume food which they produced at their farm, they also buy food from neighbours or buy food at local shops. Food at local shops is locally produced or imported from outside the study area. Shops in Mwireri, markets along the main road and shops in Nanyuki offer all kind of food produced outside the study area. Fruits and vegetables coming from outside the study area are mainly grown by peasants in Meru and Nyeri County. Processed food, such as maize or wheat flour, cooking oil, salt, soft drinks, coffee, sweets etc. is generally produced by companies in Kenya.[110] Moreover, peasants also exchange food with relatives that live rather far from the study region (for example, in Nairobi). It can be concluded that peasants consume food that is produced at their own farm, by neighbours or imported to the area (but mainly from within Kenya). As such, peasants consume food of a domestic food system (produced by the household), a local food system (produced

[109] *Posho* is Swahili for allowance. *Posho* mills are small engine powered local mills that are common in Kenya.
[110] Of the 98 food products sold at two shops analysed in Mwireri only two were produced by foreign companies (one from Uganda and one from Pakistan).

by neighbours or people living in the vicinity) and a regional food system (produced and processed outside the study area but within Kenya).

Transporting goods in the study area

A fruit and vegetable shop in Nanyuki

The market in Nanyuki

A shop at the market in Nanyuki

Figure 41: Pictures of Transporting Goods and Local Markets in the Study Area

All pictures taken by the author

I could not estimate the share of food produced by the peasants themselves and purchased or exchanged with neighbours. When I asked peasants how much food they purchase and how much food they keep from their production, most peasants admitted that they do not know this. They just keep as much food as possible for self-consumption and only sell food to cover immediate cash-needs. Moreover, they do not keep records of how much food they purchase.

Maire-Luise Hertkom (2016) analysed in her Master Thesis peasants' perceptions of good food. Her Thesis is part of the research project Towards Food Sustainability. According to her analysis, peasants in Mwireri describe good food as food that provides energy, makes one strong and contributes to a long and healthy life. Beans, maize, potatoes or meat are associated with food that provides energy. Dishes that are described as traditional, such as *ugali, githeri or kenieji*[111] are perceived to provide energy and contribute to a long and healthy life. Especially elder generations complain that they do not have sufficient access to "good food" anymore because prices to purchase good food are too high and reduced precipitation hampers the production of good food by the peasants themselves. Younger generations also seem to have changed preferences towards food that is associated less with qualities of good food but is easier to prepare, tastes better and is associated with a modern lifestyle. Even though young people have similar concepts of good food, they feel that they do not feed themselves accordingly. In the last years, the Kenyan Government and NGOs started to promote traditional food, such as *ugali, githeri or kenieji*, as healthy and good food.

With regard to healthy food, some peasants also fear negative health-impacts of agro-chemical residuals. Therefore, food that is from domestic production where peasants can control the use of agro-chemicals is perceived as healthier than food that is purchased. As mentioned in chapter 11.5, especially when they buy food, peasants fear that products might contain agro-chemical residuals. To prevent eating vegetables or crops that are contaminated, they buy vegetables that have some spoiled parts and are thus more likely not treated with too many agro-chemicals.

14.4 Exchange with Neighbours, Direct Sale and Sale to Local Shops

Peasants use to sale or give food to neighbours or people living in the vicinity. But because most peasants harvest at the same time, everybody has an excess of food at the same time. This might reduce food exchange among peasants. However, I observed, for example, that one peasant sorted out bad wheat seeds even though this household did not produce wheat at their farm. When I asked

[111] *Ugali* is a dish that is made of maize flour in this region of Kenya. *Githeri* is a dish made of maize and beans that are boiled together. *Kenieji* is a dish made of maize, beans, mashed potato and greens.

her where she got the wheat from, she explained that she was given a bag of wheat by a friend who lives in the vicinity. This shows that generalised reciprocity exists in the study area.

Another peasant sells vegetables from his farm every evening on a small blanket in the muddy streets of Mwireri. Desolately he advertises his products. Often he leaves the scene after some hours carrying home most of his products. Nevertheless, he is able to sell some of his products locally to other peasants.

Other peasants try to sell crops through local shops to people living in the vicinity. However, these shops only take small quantities because most of them have their own family peasant farm from which they source most products for sale. Only the *posho* mill in Mwireri purchases maize grains in larger quantity from people living in the vicinity. As mentioned above, at this *posho* mill, peasants can mill their grains for self-consumption at a small cost, but they can also sell their grains to the *posho* mill or purchase flour there. Even though the *posho* mill sources most of its grains from local peasants, they also purchase grains at the market in Nanyuki. To mill the grains, they have an electricity powered mill and employ some people for the work. Every time they start the engine to mill grains, the lights phased down in Mwireri. Several peasants in the vicinity of Mwireri explained in interviews that they prefer to sell their grains to the local *posho* mill even though prices for grains are higher if they would sell in Nanyuki. But the owner of the *posho* mill has a lorry to collect the grains directly at the farm. This is much easier and cheaper than to organise a transport to Nanyuki. The owner of the *posho* mill told me that they sell the flour at their own shop, to other shops in Mwireri but also to shops in Nanyuki, Timau and Naro Moru (all within the study area, see map on the right side on figure 16 in chapter 7.3).

Peasants with larger production can also sell products directly to shops or restaurants in Nanyuki. The peasant who was given a greenhouse by SNV to show other peasants how to grow tomatoes in greenhouses (see chapter 12) sells his tomatoes to a supermarket and a restaurant in Nanyuki because prices for tomatoes are higher there. But the peasant has to organise the transport of his products to Nanyuki. A friend of him who has a *matatu* collects his products on the way carrying passengers to Nanyuki. Nevertheless, this peasant also sells some tomatoes at a local shop in Mwireri because the customers in Nanyuki do not buy all his products. A friend of him sells tomatoes for him at his shop in Mwireri. Because they are friends, he does not charge any commission for the sale of his tomatoes. This shows that peasants who can produce larger quantities have an advantage compared to peasants that only produce small quantities. Peasants who produce large quantities can sell their products at higher prices in Nanyuki because they can organise a direct sale and transport of their products. Moreover, social relationships can become important for the sale of farm products or the organisation of transports for farm products.

Because milk is harvested on a daily basis and has to be consumed within a short period, there is always a local demand for milk. Peasants can sell milk to neighbours who do not have cows to milk or want to buy additional milk. Others sell milk to local shops or restaurants with a constant demand. One peasant also sells his milk to the priest of the catholic church in the study area. Generally, peasants arrange a regular provision of milk to their customers. The price and amount of milk to be delivered every day is scheduled for some time and not negotiated daily. Some customers pay the milk daily, others weekly or monthly. Milk is sold locally at 30-45 KSH per litre.

14.5 Sale Through Middlemen

Peasants who cannot sell their crops directly to shops or restaurants sell their harvest to so-called middlemen or brokers. Middlemen either live in the vicinity of Mwireri or come from other places. At the time of the harvest, they go around to buy crops from peasants to store them and to sell them in Nanyuki, Nairobi or even Mombasa. Middlemen have a bad reputation in organisations that support

Crops

	Harvest per acre	Salt to middlemen	Direct local sale	Prices in Nairobi
Maize	up to 1300 kg/acre (intercropped)	25-30 KSH/kg	25-30 KSH/kg	50 KSH/kg 80 KSH/kg
Beans	540-900 kg/acre (intercropped)	39 KSH/kg	60-100 KSH/kg	70-100 KSH/kg 140-200 KSH/kg
Potatoes	7,000-12,000 kg/acre (intercropped)	8-20 KSH/kg		25 KSH/kg 70 KSH/kg
Peas	270-360 kg/acre (intercropped)	150-200 KSH/kg		200 KSH/kg 300-350 KSH/kg
Wheat	1600-2700 kg/acre (monoculture)	30-35 KSH/kg		60-75 KSH/kg (price for processed wheat)
Tomato		20-100 KSH/kg	50 KSH/kg	70-100 KSH/kg 175-200 KSH/kg
Cabbage		10-15 KSH/head	25 KSH/kg	20-30 KSH/head 60-100 KSH/head

Milk

	harvest	Sale to Sirimon Chees Factory	Direct local sale	Sale through self-help group
Milk	average: 2,6 litres per cow per day	30 KSH/l	30-45 KSH/l	35 KSH/l

Figure 42: Table of harvesting and prices for crops
The table above shows prices paid by middlemen to collect crops at the farm gate, prices for crops if they are sold locally and prices for crops at markets in Nairobi. For Nairobi, the prices are stated during the harvesting season (first line), and during the off-season (second line). Mariah Ngutu Peter, an Anthropologist living in Nairobi, helped me estimating these prices. It has to be noted that middlemen collecting crops at the farm gates will not get the price at which crops are sold at markets in Nairobi. There might be several middlemen involved before the crops reach Nairobi and the seller in Nairobi also add their margin.
The table below shows prices for milk if sold to the Sirimon Chees Factory that processes locally produced milk. Sale of milk to the Sirimon Chees Factory can be compared with sale of crops to middlemen. Both collect products at the farm gate.

peasants because middlemen pay very low prices to peasants. At the other hand, peasants see middlemen often as the only possibility to sell their crops. If they only have harvested a small quantity, they cannot organise a transport and direct sale of their products. Middlemen collect their crops at their farm gate, also if the quantity is small. An estimate of prices for different crops at the peasants' farm gate and in urban areas can be found in figure 42.

A middleman with whom I had an interview also explained that margins of small middlemen with little money are rather low and the business is risky. This middleman has a store in Mwireri from where he operates. At the time of harvesting, he goes around in the area to purchase crops from peasants. Some peasants also bring the crops directly to his store. The middleman sells the crops to a *posho* mill in Nanyuki. This *posho* mill sells most products at a market for Masaai in Dol Dol. The middlemen cannot go to Dol Dol himself to sell the crops because he fears that his car does not make the travel there.

Peasants in the area know the middleman and also call him if they wanted to sell some crops. When he purchases crops, he negotiates the price with the peasant. Normally he does not have a great scope to negotiate the price because his margins are low. To measure the quantity, he carries a scale in his car. The middleman told me, he always measures the crops very carefully because peasants trust him. He generally pays peasants in cash, only few accepted a payment with M-*Pesa*. Normally, he brings the crops which he buys directly to the *posho* mill in Nanyuki because he needes to sell them immediately to get again cash to buy more crops. He does not have enough cash to buy a lot of crops at a time. This also prevents the storage of crops to wait for better prices to sell them. Nevertheless, from the earnings of this business he was able to buy a car to collect the harvest products. The middleman has a small farm in the area by himself. Before he worked as a middleman, he worked for a company. With the money he saved from this employment, he could start his business as middlemen.

Middlemen do not only buy products in Mwireri. Sometimes middlemen also come to Mwireri to sell products. Once, a middlemen came to Mwireri with a heavily loaded motor bike to sell cabbage. He had bought the cabbage in at a place some kilometers towards Mount Kenya because he knew the peasants there. In Mwireri, he sold the cabbages at a lower price than they were offered at this time at local shops. Shortly after arriving, a crowd surrounded his motorbike and within a short time he had sold all the cabbages. The next days, cabbages were sold at almost every shop in Mwireri at prices greatly above the price to which the middlemen sold the cabbages.

Milk that cannot be sold to neighbours or local shops and restaurants is generally sold to the Sirimon Chees Factory, a processing company close to Mwireri. The Sirimon Chees Factory pays a smaller price for the milk than local customers (30 KSH/l instead of 30-45 KSH/l) but they take as much milk as one wants to sell and they come to pick up the milk at the farm. Because cows do not produce the same amount of milk every day, peasants try to sell a certain quantity of milk of which they are sure to get

it every day to local customers and the excess production is sold to the Sirimon Chees Factory. Before selling the milk to the Sirimon Chees Factory peasants sold the milk to other milk processing companies. However, these companies started to reduce the price for the milk and most peasants started to sell their milk to other customers, such as the Sirimon Chees Factory. One peasant told me that the company to which he sells his milk, started to drop the price for the milk. He got angry and did not want to sell his milk to them anymore. Because he could not keep the milk for later sale and did not want to throw it away, he bestowed the milk to his neighbours until he started to sell to the Sirimon Chees Factory.

Middlemen and processing companies pay low prices for farm products, especially during the harvesting season. If peasants can sell their products directly to neighbours, local shops or even shops in Nanyuki, they can earn more money from selling their crops. However, local customers only purchase limited quantities and organising the sale of products in Nanyuki and the transport to bring products there is only worthwhile if peasants produce larger quantities. Therefore, middlemen and processing companies that collect products directly at the farm gate are often the only possibility for peasants to sell their products, even if they pay low prices.

14.6 Product Marketing Organisations

To sell products at higher prices, peasants try to circumvent middlemen by selling products directly to customers in Nanyuki or elsewhere in Kenya. If peasants do not produce large quantities, they have to organise the direct sale of their products collectively through so-called product marketing organisations. If they sell their products together, they can negotiate higher prices with customers because they can circumvent the long chain of middlemen that each has his margin and they can organise the transport of products more economically.

Peasants told me that they once had a group to coordinate the sale of tomatoes. At this time, prices for tomatoes were much higher in Mombasa than in the study area (for price differences between the farm gate and Nairobi see figure 42 in chapter 14.5) However, organising the transport to the 700 km distant Mombasa and sale of tomatoes there was too complicated and expensive for individual producers. As a group of peasants they could hire a lorry and one of the group travelled with all the tomatoes to Mombasa. Even though they made some high profits by collectively selling the tomatoes in Mombasa, it was also risky to do so. Sometimes, the market for tomatoes in Mombasa was flooded with tomatoes from Tanzania, as one peasant explained. If this occurred, they could not sell their tomatoes and they made a complete loss.

Another product marketing organisation is the Mwireri Commercial Village Group. They were active at the time of my research. This group is organised as a self-help group with written by-laws and a formal

organisational structure. These by-laws are drafted by the members of the group themselves (in more or less participatory ways) and can be amended if the majority of the group members wants to do so. The by-laws describe the aim of the group and how it is organised. They also describe sanctions for trespassing of the rules. However, sanctions are generally discussed by the members and adapted to the specific context of the trespassing. The management of the group is elected every two years. The management organises the collective purchase of agro-chemical inputs as well as the collective sale of crops. If they purchase input products collectively, prices are lower than if every peasant would buy the product individually. With the collective sale of products, they can negotiate higher prices with customers because they can sell larger and more stable quantities and they can enquire where prices are highest for sale. The foundation of such product marketing organisations is supported by several organisations, such as Syngenta Foundation, SNV, KENDAT and the Agricultural Department of Laikipia. The Mwireri Commercial Village Group is supported by SNV and this group is also the target group for the SNV trainings (see chapter 12). At the time of my research they had organised a collective sale of onions to some customers in Nanyuki.

At the time of my research, some peasants also founded a self-help group to jointly sell milk to a customer in Meru. This self-help group is organised similar to the product marketing organisation described above. The group collects the milk every day and brings it to Meru. To collect the milk, the self-help group employed somebody. To pay the collection and transporting of milk to Meru, for every litre sold through the self-help group, a certain amount is deduced from the sale price. However, the sale price in Meru is so high that peasants still earned more money if they sell the milk through this group compared to selling the milk to the Sirimon Chees Factory (35 KSH/l instead of 30 KSH/l). Peasants can decide every day how much milk they want to sell to the self-help group. When they had the idea of founding the milk self-help group, they asked the Governor of Laikipia if he would support their group. To ask the governor, they approached him with the help of an Agricultural Extension Officer of the Agricultural Department of Laikipia. Because the 2017 elections were not far anymore and the Governor felt that he could need some additional votes from this area, he promised that the Agricultural Department of Laikipia would support the group with the provision of a milk cooler that allows the group to store the milk for some days in order to transport higher quantities to Meru.

Another group that is organised similarly sold milk to Kenya Co-operative Creameries. Because they reduced the prices for milk, many peasants left the self-group that organised the sale of milk to this customer. This self-help group does not only organise the sale of milk, they also organise an insurance for cows for those peasants who wanted to insure their cows. This insurance, offered by a private insurance company, is rather expensive and covers death or theft of cows. Moreover, the insurance includes the provision of vaccination for the cows and some feed supplements. However, according to one peasant, the inputs provided by the insurance do not really fit with what they need for their cows.

The costs for the insurance are deduced from the money paid for the milk. Peasants who do not sell their milk to the Kenya Co-operative Creameries can pay for the insurance by themselves but peasants were not sure in interviews if this insurance really is beneficial for them. Selling milk seems to be easier than selling agricultural crops. Income is more equally distributed over the year. Purchase seems to be securer than selling crops and risks for production failures are lower.

14.7 Out-grower Schemes

As mentioned in chapter 7.2, another possibility to sell crops is through so-called out-grower schemes. In out-grower schemes, peasants produce a specific crop for sale to an exporting company. The production for such companies has to comply with specific standards for export-production (e.g. the EUREP-GAP) set by European retailers. To ensure that peasants comply with the required standards, some exporting company sell the required and allowed inputs for production directly to the peasant. However, if products do not comply with the standards they are rejected by the exporting company. According to Jaffee (1994) compliance with the standards is generally higher in theory than in practice. Nevertheless, as shown below, peasants struggle to comply with the standards and many cannot participate in such out-grower schemes. However, if peasants are able to comply with the standards, it is assumed by most authors that peasants can benefit from relative good prices for their products (Mati 2004, Ulrich 2014, Teuscher 2017, Ngutu Peter et al. (n.d.)).

Balthasar Teuscher (2017) analysed economic implications of peasants' participation in out-grower schemes for his master thesis that is part of the research project "Towards Food Sustainability". As shown in his thesis, some kilometres westwards of Mwireri some peasants engage in out-grower schemes. To participate in an out-grower scheme they have to be member of a peasant self-help group and they have to be able to irrigate their farm. Only economically better off peasants can participate in such out-grower schemes because only these peasants meet the requirements for participation. The export company for which they produce provides the inputs for them and an agronomist advises them in using the inputs in order to comply with the high standards required for export production. Participating peasants earn most of the cash-needs of their household from selling their crops. Compared to other peasants who do not participate in this out-grower scheme, they are economically better off and their food security is higher.

Some peasants in the vicinity of Mwireri accounted that they participated in our-grower schemes since the late 1990s. In 2011, Syngenta Foundation shifted its focus from supporting peasants in production to supporting peasants in accessing markets. They provided agro-chemical inputs for the production that met the standard required for export production. Moreover, they linked the peasants with financial institutes that provided the capital to purchase the inputs required for export-oriented

production. Last but not least, they linked the peasants with exporting or processing companies in Kenya to link the peasants with the market. Thereby, they helped the peasants to negotiate beneficial contracts with the exporting or processing companies. However, this programme had a difficult start because almost the entire first harvest was destroyed by frost. Other organisations, such as the FAO, SNV or the Agricultural Department of Laikipia also have programmes to link peasants with processing or exporting companies in Kenya.

The peasant who had been provided the greenhouse by SNV told me that in 2012 they tried to establish an out-grower scheme. With the support of Syngenta Foundation, a self-help group of peasants approached an export-oriented horticultural production and exporting company (Kenya Horticultural Exporters (KHE)), to negotiate conditions for an out-grower scheme. It was arranged that KHE provided the seeds and agro-chemical inputs for tomato production. To pay these inputs, every peasant got a loan from Equity Bank, a Kenyan bank. Once the tomatoes were delivered to KHE, the company paid the money to Equity Bank. Equity Bank deducted the loan and interests from this payment and cashed out the remaining money to the peasant. The loan from Equity Bank included a clause that if peasants experienced a crop failure and therefore could not sell any tomatoes to KHE, they could cover the loan for the inputs with the payment for the next season if they took again a loan to purchase inputs for a next production season. However, with EU GAP new standards for export crops were implemented in 2013. Most peasants did not know how to produce to comply with these new standards and when they delivered their tomatoes to KHE, the tomatoes were rejected because chemical residuals on the fruits were too high. At this moment, the peasant who told me about this our-grower scheme left the scheme and started to sell his tomatoes to customers in Nanyuki and at a shop in Mwireri as described above. He told me that other peasants learned how to produce in order to comply with the new standard and continued in the out-grower scheme. However, sometimes their products are still rejected. The peasants suspected KHE to reject their products during off-seasons when they have to pay more to the peasant than they could get from selling the tomatoes. In order to reject tomatoes KHE argued that the tomatoes have too much chemical residuals. Peasants cannot afford an independent chemical analysis of their products to prove that KHE only uses this wrong allegation to reject tomatoes which they cannot sell profitably during the off-season. As such, the peasants participating in this out-grower scheme depends at the mercy of the company to buy the tomatoes. As the peasant concluded trenchantly:

> “Out-growing is very good if they are buying. But if they are not buying, it is a huge loss”

The difficulties for peasants to comply with the production standards to participate in such out-grower schemes are also mentioned in the paper of Ngutu Peter et al. ((n.d.)). According to their analysis, many peasants are not able to comply with the production standards and are excluded from out-

grower schemes. These standards are beneficial for consumers of these products but the peasants that grow these products have to bear the costs of complying to the standards.

Compared to other forms of selling products as described before, selling products to out-growers requires a specific way of producing crops. This production is different from production for self-consumption or sale through other channels. Even though participation in such out-grower schemes can earn a lot of money, the costs for production and all the risks are transferred to the producing peasants. Lack of money or access to loans to start the participation in an out-grower scheme, lack of appropriate infrastructure and the risk of crop failures or a rejection of the crops by the out-grower keep most peasants around Mwireri from participating in such out-grower schemes. At the moment of my research, almost no peasant living around Mwireri participated in out-grower schemes.

14.8 Conclusion

Several peasants stated that they do not earn much money from selling agricultural products, crops or milk and eggs. In various programmes that support peasant production and access to markets, peasants are required to keep farm records. In these farm records peasants should note all the tasks and expenditures for agricultural production and livestock keeping and all the earnings from selling their products. These farm records should give the peasants a basis to economise their production. However, several peasants told me that they do not keep farm records because “it would be very disappointing to see how much you invest in farming, compared to the yields, especially if you have a crop loss. If you keep records you have to explain [the bad economic performance] to your family. Thus, for the sake of the family, I do not keep farm records”. Despite the difficulties to earn money from farming, some peasants hoped to make good profits from farming and keeping livestock if the weather conditions are good or if they improve their farming practices.

15. Money

Several elder peasants recounted in interviews that during the time they were younger, money was not as important in their daily life as it is today. Peasants used to form groups to work jointly at the *shamba* of each peasant of the group (see chapter 13.2) and products were exchanged through bartering and other forms of exchange. Today, many things that are important for peasant production and generally in peasants' live have to be bought. Peasants bought the land on which they live and carry out peasant agricultural production, they buy seeds and agro-chemical input products, workers and services for agricultural production are remunerated, peasants purchase food, medicine, they pay school fees or they donate money to their church. As such, money is involved in and important for a majority of peasants' activities. However, even today non-monetary and generalized reciprocity still exist within families or among friends and neighbours. Because money has become important for peasant livelihoods and economic activities, I analysed at one hand, for what peasants need money and at the other hand how they get money.

15.1 Household Expenditures

First, I tried to analyse household expenditures by asking several peasants to note their daily household expenditures. Peasants struggled to note these expenditures because different people from the household purchased food and household items. One peasant almost exclusively noted petrol for his care as household expenditures. Another peasant mainly noted remunerations for people who worked at his farm. After some days, peasants lost interest in keeping precise records and I could not motivate them to keep exact records over a longer period (they would have noted something in the booklet I gave them to not disappoint me, but this would not have been the actual expenditures of their household). Therefore, the few notes of the household expenditures were not meaningful for a direct analysis. Nevertheless, I could use them as basis for interviews about household expenditures. When I discussed their notes, the peasants explained that the notes would not represent their "real" expenditures and we could start to discuss what expenditures could be more realistic.

In the household survey, peasants named and listed expenditures of their household according their importance, by how they perceived it.[112] A great majority of peasants listed costs to purchase food as

[112] In the household survey peasants were asked to first name the most important expenditures of their household. They were free to name as many items as they perceived of being important. Secondly, they were asked to rate these items according to their importance. This listing does not give an exact overview about the expenditures of households because, as peasants mentioned themselves, they did simply not know how much

most or second most important expenditure of their household. Other important categories of household expenditures were school fees, agricultural inputs and employment of agricultural workers, costs for healthcare and money to buy water (see figure 43). In interviews, peasants mentioned similar expenditures as being important for their household budget.

As mentioned in chapter 14, approximately two-third of the food produced by peasants is used for self-consumption. Most peasants think that producing food for self-consumption is cheaper and better than purchasing food. However, peasants did not only consume food that they produced at their farm, they also purchased food. I could not estimate how much food is sourced from own production and

	1st	2nd	3rd	4th
Purchase of food	59,6%	29,8%	3,5%	0,0%
School fees	14,0%	15,8%	8,8%	3,5%
Agricultural inputs and agricultural work	7,0%	14,0%	3,5%	1,8%
Healthcare	7.0%	5,3%	3,5%	0,0%
Access to water	5,3%	14,0%	10,5%	0,0%
Transport	1,8%	5,3%	0,0%	0,0%
other	5,3%	8,8%	28,1%	1,8%

Figure 43: Table of Household Expenditures According to their Importance
The table shows the percentage of peasants who named and listed the stated category of household expenditure as most important, second most important, third most important or fourth most important.

how much food is purchased. Despite using approximately two-third of the food of their own production, generally peasants felt that costs to purchase food stress their household budget the most (see table in figure 43). Peasants purchase food from neighbours, at small shops in Mwireri, at markets on the main road to Nanyuki or in Nanyuki. Food that is sold in local shops, at markets or in Nanyuki is mainly produced within Kenya.

Next to food, school fees are perceived as a high household expenditure, especially if children go to a high school or university outside the study area. One peasant said in an interview that he does not have enough money to cultivate his entire *shamba* because he has to spend a lot of money for the education of his daughter. Furthermore, he mentioned that he had to sell parts of his livestock to afford the school fees of his daughter. However, he said "when my daughter has completed her education, I will not have any problem. She is graduating in December. I have now already paid everything. Now we are free and I will have more money for farming".[113] In other interviews, peasants mentioned that already costs for the primary school of their children stress their household budgets.

money they spend for the different items. Nevertheless, it provides an overview of how peasants perceive the importance of different household expenditures.

[113] It has to be mentioned that not all households could afford to subordinate agricultural production to the education of their children. Some children also had to work at their farm instead of going to school (see chapter 13.1).

These statements substantiate the perception of peasants that school fees put a great burden on their household budget.

Further important expenditures of peasant households that were mentioned in the household survey are costs for agricultural production, healthcare, access to water, and transport. The costs for agricultural production are further discussed in the next sub-chapter. Costs for healthcare depend greatly on the health condition of the members of the peasant household. Locally organised self-help groups and larger health insurances to buffer costs for healthcare are further discussed in chapter 15.4. As described in chapter 8.5, fees for the participation in water projects can be high, especially if peasants joined the project not from the beginning. Most peasants who stated to spend a great share of their household budget on water have to buy water per cherry can at the borehole or from other peasants or organisations because they cannot afford the initial fee for a membership in a water project.

Another element of expenditure that I observed during my research were donation to the church. At the time of my research, they renovated the local Catholic Church. On large posters at the church's wall every member of the church was listed with an amount of money promised to be donated. Peasants did not donate this money at one go but several smaller shares. In a second column the amount already donated was added up. Everybody could see who donated already how much to the church and after messes people discussed about who spend how much and who fell behind with their payment and why they did so.

Generally, it can be summarised that money is important for many things in peasants' daily life. Even though peasants do not know exactly how much money they spend on different items it can be concluded that generally the purchase of food is the greatest household expenditure, followed by school fees and costs for peasant agricultural production. With the focus of my research on agricultural production of peasants I analyse costs of peasant production more in detail in the next chapter.

15.2 Costs for Peasant Agricultural Production

As described in the last chapter, peasant agricultural production depends on money in many areas. Agricultural production depends on access to land. As shown in chapter ten, accessing land for agricultural production is a difficult and expensive endeavour. Even though initially prices for land were lower, high interest rates in governmental settlement schemes made also the purchase of this land expensive. With the steep rise of land-prices, purchasing land became even more difficult over time. Many who were not able to find the required money to buy land left the area. As described in chapter 11.4, peasant agricultural production also depended on external material inputs, such as certified hybrid seeds, synthetic fertilizer and agro-chemicals. These inputs are expensive and some peasants

cannot apply all the inputs of which they think to be necessary for their production because they are too expensive. As described in chapter 13, some peasants also employed other peasants to work for them or they deployed agricultural services. Both is cost-intensive.

The costs for land, agricultural inputs and work force or agricultural services make peasant agricultural production an expensive endeavour. One peasant summarised this aspect trenchantly by saying:

"You know, you must start with money, without money, no farming."

Another peasant further explained: "Farm work is not simple. You use a lot of money before it yields anything. You need to break the soil with the tractor, you need seeds, you need to plant. If you do not plant by your own, you need to engage other people to do the work for you. So, you must have money, you cannot do farming without money […]. The problem for the farmers is capital. For every work you do, you need capital. Farming is also a business and in every business, you need capital to start the business. If you do not have money, you cannot make money from the soil." This shows that local peasant production depends greatly on money.

However, the use of money for these different aspects of agricultural production does not imply that all these aspects follow pure economic rationales as described in chapter 4.1. As described in chapter ten, access to land does not only depend on money. Good social relationships were also important to be allocated a plot or to purchase a plot from other peasants. Moreover, material inputs from the global capitalist market can only be accessed through intermediaries that act as a buffer between the global capitalist market and local peasants. Last but not least, the employment of other peasants to work on the *shamba* or agricultural services from local service providers is managed by local institutions that prevent an absolute exploitation in these wage-work arrangements (see chapter 13).

To cover all these expenditures, peasant households have to earn additional money. Different peasant household have different strategies to earn additional money to cover household needs and the costs of peasant agricultural production.

15.3 Monetary Income of Peasant Households

Peasants use different sources to earn money to cover their household needs. One possibility to earn money is to sell agricultural products. In addition, most peasants depend other sources of income, such as working for an export oriented flori- or horticultural farm, working for the government, working for a non-governmental organization (e.g. as trainer of peasants), working in the construction sector, working on other peasants' *shamba*, having an own small shop or other petty business, trading agricultural products, receiving a pension, etc. Some of these sources are explained more in detail in the following passages.

Sale of Agricultural Products

As shown in chapter 14, most peasants sell parts of their harvest and dairy products to earn money. However, most farm products are used for self-consumption and those peasants selling products stated that they do not earn much money therewith. Nevertheless, the sale of farm products provides an opportunity to earn cash. If weather conditions are good or peasants can improve their farming practices they hope to earn more money with peasant agricultural production. As described in chapter 14, peasants sell farm products to neighbours or local shops in Mwireri. Middlemen buy their products to sell them in urban markets. To achieve higher prices peasants also organise the sale of their products through product marketing organisations to sell products together. For immediate cash needs, peasants also sell parts of their livestock to local butchers. The participation in out-grower schemes is not common in the vicinity of Mwireri. Peasants fear to participate in these out-grower schemes because they experienced high rates of rejection of their products or crop failures if they produced for export markets through out-grower schemes.

Despite selling some farm products, peasants cannot earn enough money to cover their household needs and costs for peasant agricultural production. Since peasants also spend most money for the purchase of food, it can be concluded that the current form of peasant production does not allow to cover the subsistence needs of peasant households. It does not provide enough food to sustain the household, additional food has to be bought, and it does not allow to cover the cash need of peasant households. Moreover, it does not provide enough money to cover the costs of peasant agricultural production.

Working at Other Peasants' *Shamba*

Some peasants work at other peasants' *shamba* to earn additional money. For some peasants, especially peasants with few other income opportunities, this is an important source of their household income. As described in chapter 13.3, salaries for peasants working at other peasants' *shamba* are fix and generally not negotiated in the vicinity of Mwieri. However, peasants working at other peasants' *shamba* are only employed on a daily basis if there is need for workforce. Therefore, working on other peasants' *shamba* does not provide a stable income. In interviews, peasant mentioned that they prefer to work for export oriented agricultural production companies, for example, because there the employment is more stable, even for casual workers.

Working for Export Oriented Horti- and Floricultural Companies

An important source of income for local peasant households are employments by the export oriented agricultural sector on the horti- and floricultural companies. According to the household survey, approximately 11% of the adult people living in the vicinity of Mwireri worked for an export oriented flori- or horticultural company in 2016. Several horti- and floricultural companies are located in the vicinity of Mwireri but companies also use buses to source workers living at some distance to the

production sites. A horticultural production company that is located approximately 12 km north-west of Mwireri, for example, uses buses to transport workers from Mwireri and other places to their farm. As described by Ngutu Peter (2018) and Ngutu Peter et al. (n.d.), the employment by these companies provides a well appreciated source of income, especially for unskilled labourers and women. Peasants in Mwireri explained that the arrival of these companies brought desperately needed employment opportunities to this region. According to one peasant, these new employment opportunities helped to reduce unemployment and criminality "because now, after the work young men are too tired to do stupid things" as he said. Some even felt that the demand for labourers by these companies competes with the demand for workers to carry out peasant agricultural production. Several peasants stated that it became more difficult to find people to work at the *shamba* since these companies have arrived. Moreover, some people working for these companies even do not farm at their own *shamba* anymore. Some people just moved to this area because they are permanently employment as skilled labourer by one of these companies.

The companies offer different types of employment. Skilled labourers who drive machines, manage the fertilisation of plots, etc. are generally employed on a permanent contract. After a probation phase of some months they get a permanent contract that includes notification period for dismissal and some social contributions to the healthcare of the family. Unskilled labourers for the many manual tasks for the production of flowers or vegetables are generally employed on a casual or temporary basis. This enables the companies to employ a flexible workforce, depending on the company's need. If production is scaled down (for example because the company does not have enough water for irrigation or marked demand decreases) workers are laid off in great numbers (see Ngutu Peter 2017, 2018). According to the Kenyan law, workers cannot be employed on a casual/temporary basis for a long time (more than three months). To maintain the flexibility and low social contributions of casual and temporary workers, unskilled workers are often only employed for some months before they are laid off again with the chance to re-apply for a job after some time (Ngutu Peter 2017, 2018). For some peasants, this is not a big issue because their family also relies on other sources of income. However, for peasants with a tight household budget, regular dismissals on short notice can be difficult to handle. As shown by Ngutu Peter (2018) and Ngutu Peter et al. ((n.d.)) employment by these companies is seen by most peasants as a temporary income opportunity that is not very reliable. Only if peasants can draw on other sources to sustain themselves after they are dismissed from the work, peasants can cope with the working conditions offered by these companies. If peasants are dismissed from the work, they have to draw on peasant production or informal economic activities.

However, some peasants told me that they started other business with the money they earned from working for these companies. One peasant worked for this company until he had enough money to buy a motorbike and work as motorbike-taxi driver. As such, some people benefit from the

employment, even though working conditions were not favourable. As shown in chapter 12.2, some peasants also benefit from working for these companies because they learn new agricultural technologies which they try to apply on their own farm.

In addition to the unsteady employment, some workers complained about bad working conditions. In an interview, a worker complained that the company where he works does not has a functioning structure for complaints. If he has a problem with a supervisor, he cannot go anywhere to complain about the behaviour of him. This makes that “the supervisor is like the king”. As shown by Ngutu Peter (2017, 2018), workers also complain about the quality of the food they are provided for workers’ meals and the fact that products that are rejected for export but would still be suitable for human consumption are fed to baboons instead of the workers who would appreciate better food. Moreover, workers and people living in Mwireri associate some jobs at these farms with health risks. Spraying agro-chemicals at these farms is seen as one of the most dangerous jobs. I have been told that despite protective gears some sprayers became sick. Doctors explained them that they might had become sick because of their job as sprayers. To reduce health risks of sprayers and to avoid that the company is held responsible for adverse health impacts, sprayers are generally only employed for some months.

With approximately 11% of the adult people living in the vicinity working for an agro-industrial company, these companies are an important employer. However, generally the working conditions, as described here, remind one of the exploitation of workers described by Marx (1962 [1867]) and the subsidise of workers through peasant production described by Meillassoux (1975, see chapter 4.2 and 4.5). But peasant production in the vicinity of Mwireri is not as independent as described by Meillassoux. He describes the rural subsistence sector (i.e. the peasant production) in the Ivory Coast as independent production that is exploited by capitalist production. In the case of this study, the peasant production of people working for export oriented horti- and floricultural companies also depends on money earned in the capitalist production (e.g. to invest salaries in the purchase of land, agricultural inputs or to employ workers by the peasants themselves). Therefore, one can also say that, as much as the capitalist production depends on an exploitation of cheap labourers and subsidise through the peasant production, the peasant production depends on money earned in the capitalist production. This dependence is the result of land right transformations and the need to purchase land after independence of Kenya (see chapter ten). This dependence increases the vulnerability of peasants to exploitation because they are not only exploited if they work for the agro-industrial sector, but they need to work for the agro-industrial sector to maintain the peasant production for subsistence and sale.

Working for the Government and as Trainer of Peasants

Some people in Mwirei also work or worked for the government, as teacher, Police Officer, Agricultural Extension Officer etc. Such jobs provide a small but rather stable source of income. Some elder peasants told me that they receive a small pension because they had worked for the government before they had retired. These pension are not enough to make a living but substantially and regularly contributed to the monetary income of their household.

As mentioned in chapter 12, some local peasants also work as trainers of peasants for organisations which promote new agricultural technologies. Agricultural Extension Officers select peasants as trainers whom they know and of whom they expect to be capable to teach other peasants in new agricultural technologies. Peasants who work as trainers of peasants have to collect signatures that proved the attendance of sufficient peasants to be paid for the trainings. Some trainers feared to lose their remuneration if they cannot provide a full list of peasants participating in their trainings. Therefore, they were more concerned about collecting sufficient signatures than teaching lessons in agricultural production. Some trainers told me that they are paid their remuneration late because of organisational constraints. Remunerations for such trainings can only add up to a household income but do not cover its full monetary needs. Nevertheless, the remuneration for trainers is a welcomed additional income for the trainers.

Working for the British Army

Some young men explained that they work as statist for the British Army from time to time. The British Army recruits people to play civilians in battle simulations. To recruit statists, they send somebody to approach youth groups. Leaders of youth groups select and send the required number of statists. Working as a statist is perceived interesting by the men who did this job. One can meet soldiers from different commonwealth countries and in addition to an easy earned salary, the army provides food during the work at the military base.

Working in the Informal Economy

A further important possibility to earn money are small shops, petty trade or small services. Several peasants have small shops were they sell food and household items. They buy food and other items from local peasants or retailers. Much money cannot be earned with these shops, especially if the owner has a small budget to stock up the shop. One peasant for example has a small shop in Mwireri at which he sells small instant coffee in portion bags, small portions of sugar, single cigarettes, small bottles of water, cooking oil, credit for the mobile phone, cookies, some plastic items and torches. The whole shop is not larger than 4 square meters. With his motorbike, the owner of the shop goes to Nanyuki from time to time to buy new articles for his shop. With money from a former job in a water project and with a credit from the bank, he purchased the first products for sale at his shop. But as he admitted himself, he cannot make a living from this shop. Nevertheless, the shop complements to his

small income from farming. At the other hand, an owner with a larger shop that is combined with the local *posho* mill can make more profit from his shop. Other peasants cook food in a small restaurant or have a small bar. Two butchers earn some money from buying animals from local peasants and Maasais, bringing them to a slaughterhouse and selling the meet (see chapter 14.2). Two peasants make some money by selling agro-chemical products in Mwireri (see chapter 11.3). Peasants working at so-called *jua kali* metal workshops earn money from repairing and producing doors, gates, tools for local agricultural production and simple machines. Some machines that are locally produced are even sold to a neighbouring country as people working there told me proudly (see chapter 8). One peasant sells fuel. Another peasant repairs and sells old clothes. One peasant repairs shoes. Others have a hairdresser atelier or operate a small computer café. Some peasants also work regularly at other people's small shops in Mwireri. Depending on the performance of the shop, they are paid a small remuneration. As described in chapter 14, some peasants engage in trade of farm products and some young men work as bike driver. Others seek employment in the construction sector in Nanyuki and a peasant even told me that her daughter went to work in Dubai.

Possibilities to earn money
Selling agricultural crops - Sale to neighbours or at local shops - Sale to middlemen - Sale through product marketing organisations - Sale to exporting companies
Formal Employment - Working for horti- and floricultural companies (permanent or casual/temporary contracts) - Working for the government - Working as trainer of peasants in one of the various training programmes - Working for the British Army
Informal Economy - Working on other peasant's *shamba* or offering agricultural services to other peasants - Own business (small shop, small butchery, small *posho* mill, small restaurant, selling agro-chemicals, selling medicaments, *jua kali* workshop, repairing and selling old clothes or shoes, hairdresser atelier, small computer café, etc.) - Trading farm products
Labour Migration - Working on construction sites in nearby cities - Working abroad

Figure 44: Table of possibilities to earn money

The table in figure 44 shows that peasants find many ways of earning cash in this specific local context. However, most of these income opportunities do not provide much income nor a stable income. Most peasants rely on a combination of different sources of income. Thereby, they combine agricultural production, wage employment in the agricultural sector and in other economic sectors, public employment, jobs in the public sector and petty trade. The diversification of income strategies can be compared with mini-max strategies as described by Lipton (1982 [1968]) as elaborated in chapter 4.1. Instead of mixing different crops to ensure the minimum yield required for survival, peasants mix different sources of income (of which one is an agricultural production that resembles the one described by Lipton) to ensure a minimum income required for survival. However, peasants also mix different sources of income because even under good conditions one source is barely enough to make a living and despite different sources of income some peasants struggle to make a living when luck is not at their side.

With regard to food systems, engaging in peasant production or the production of export-oriented horti- and floricultural companies both contributes to but does not provide for a living in this context. Peasant production does not allow peasants to earn sufficient money cover the costs for peasant production and peasants' livelihoods and working for export-oriented horti- and floricultural companies does not provide a sufficient nor a reliable income to fully depend on it. Therewith, the different food systems in this region alone or in combination do not provide for a living for most peasants living in the vicinity of Mwireri. Peasants have to develop further strategies to cope with this difficulty. A possibility to cope with unstable income are credit groups. In the next sub-chapter, I describe how peasants organised such credit groups.

15.4 Credit Groups

Credit groups or table-banking groups, are self-help group with well-defined and selected members and clearly defined institutions for the management of such groups (in the case of such groups, they are written down as by-laws). Basically, the members of such a group met every month. Every member brings the same amount of money and puts it on a table. At the meeting, members who are in need of money can request a so-called advance. The group discuss to whom they issue an advance if the total amount of requested money exceeds the amount of money on the table. When they meet the next month, the members who took an advance have to pay back the advanced money plus an interests. Generally, interests are 10% of the money advanced. The interests are shared among all the group members. If one cannot or can only partially pay back an advance and interest within one month, he

or she has to take another advance to cover the owed money. If one does not have the money to repay an advance and interests, debts grow quickly.[114]

Some of these groups emerged out of groups for trainings in agricultural practices or vice versa (see chapter 12). Some training-organisations (e.g. the Syngenta Foundation or KENDAT) also promoted and supported the foundation of credit self-help groups.

Over time, credit groups were further developed (sometimes with the support of training-organisations). The money is no longer brought in cash to the meeting but paid to the bank account of the group. These payments can be made at the bank branches in Mwireri. With the payslip every member proves his or her monthly contribution to the group. Also advances can be issued and paid back through the bank account.

In some groups every member has to pay the same amount of money. In other groups, members can set the amount they want to pay to the group annually. Depending on how much money the group has accumulated at the bank, they can issue high advances to their members. Some peasants who are member of several groups spent a considerable share of their household budget on monthly contributions to such credit systems.

By the end of the year, members are paid out their share of the interests the group gained from issuing advances. Depending on how much money one paid to the group, the member receive a larger or smaller share of the profit made with the interests.

Some groups also started to issue loans that have to be paid back within one year. Interests for loans are also 10%. Thereby, the 10% interest have to be paid independently on when the debtor pays back the loan. Loans are only issued for larger amounts of money. Issuing loans reduces the profit of a group because the interests for loans are lower than interests for advances.[115]

Over the years, groups can accumulate capital. This allows them to issue higher advances and loans that provided more interests and as such higher benefits for the members. Some groups also started to invest in other ventures, such as buying a tent for festivities. These tents are rented out if somebody organises a festivity. The rent for the tent provides a further source of income for the group. However, the rent is not the only reason for such ventures. Such groups also aim to develop the community, as members of these groups said. By offering a tent for rent, they provide an appreciated service to

[114] E.g.: One is issued an advance of 1'000 KSH. After one month, this person has to pay back 1,100 KSH. If this person has no money, this person has to take a new loan of 1,100 KSH. By the end of the second month this person has to pay back already 1,210 KSH. After one year, one has to pay back 3,138 KSH.

[115] Advances for one month can be issued anew every month and earn 10% interests every month. For example, 1,000 KSH that are issued every month as a loan can earn up to 1,200 KSH per year. Loans at the other hand can only be issued once per year and only earn 10% interests per year. 1,000 KSH only earn 100 KSH of interests.

members and non-members of the group. Larger groups also invest in real estates to earn money from leasing land or renting out houses.

If such groups become bigger, they can be registered as a *sacco*, an officially registered co-operative. *Saccos* were legal entities that can take loans from a bank. However, the registration as a *sacco* is rather expensive and most credit groups in Mwireri remain self-help groups.

Figure 45: Pictures of Meetings of Credit Self-help Groups

all pictures taken by the author

The operation of a credit self-help group is regulated by so-called by-laws. By-laws are written regulations of the group. The by-laws of the group clearly define who is a member of such a group, when and where the group meets, how much one has to pay if he or she arrives late, who manages the meeting, how the collection of money and the handing out of advances is organised, when advances have to be paid back (normally after one month) and how much interests one has to pay for an advance (generally 10%). By-laws are crafted by the group members themselves when the group is founded. Most groups elect a committee to draft the by-laws. After drafting the by-laws, they are discussed and amended by the group members in a general assembly. In group meetings, these regulations can be adapted or their implementation can be discussed. Sometimes, the by-laws are not implemented strictly. This enables the group to react flexible to the needs of their members. If a

member of the group can, for example, not pay back an advance, the other members can decide to extend the repayment period, to waive interests or to help this person in another way. At the other hand they can also insist on a strict adherence to the by-laws and heavy punishment. Discussions on how to act in such a situation can lead to fierce negotiations during meetings or secretly arranged collusions prior to a group meeting. One peasant who was a leader of several groups explained that it would be important to stick to the by-laws because if people are treated too nicely, the groups do not function anymore and then people cannot benefit from the service provided by the group. However, sometimes humanity requires that some people are helped.

Representatives of such a group are regularly elected by all members, depending on the duration stated in the by-laws. Most groups' representatives consist of a manager, a treasurer and a secretary. The manager leads the group meetings. The treasurer handles the money and the secretary notes all transactions of the credit group in a record book. It is of uttermost importance that the secretary of the group is able to keep proper records. Discrepancies in record books can result in a loss of confidence. If members do not trust a group to operate sound, they might withdraw from the group and claim back their monthly contributions. Theoretically, a group can be dissolved and the members of the group get back all the money they have paid to the group. However, if records are not kept exactly, some might not have paid back advances or interests, or some might even have had their hands in the group's treasury.

Welfare Groups and *Harambee*

Some of these credit groups are also linked with so-called welfare groups. Welfare groups act like a basic insurance. Members of a welfare group oblige themselves to pay money to other members and to comfort them in the case of an adversary (if somebody has to go to the hospital, if a close relative dies or if the house of a member burns down). written by-laws of such group clearly define which adversaries are covered by the group and how much money every member has to pay in the case of an adversary. Some welfare groups have a compulsory membership for people living in a specific area. Compulsory membership should create cohesion among the peasants living in a specific neighbourhood, as a leader of such a group explained. However, these groups are also the ones that were most often ranked as badly functioning by participating members (see below).

Both, the credit and the welfare groups can help peasants to get money to cope with crisis. But both groups also come at a cost. Members have to pay money to the credit group and advances and loans have to be paid back by the debtor including an interest. Welfare groups depend on the support of other members if a member experiences an adversary. For some members of welfare groups with little money, it was difficult to pay the required amount to help another group member with an adversary.

They even had to take advances in credit groups to support other members who experienced an adversary.

Corinne Wacker (1996), a Swiss Anthropologist already analysed peasant self-help groups in Laikipia in the 1990s. She emphasised the importance of the local residence-based social organisation through self-help groups. The self-help groups she analysed were intended as "mutual assistance and welfare, regularised rotating credit and labour associations, cultural activities and income generating projects" whereby the activities of the self-help groups were set by the members themselves (1996: 28). According to Wacker, self-help group existed in Laikipia already in the colonial time as so-called "clubs". According to the census presented in Wacker's analysis, between the 1970s and 1990s, the number of registered self-help groups increased nearly by the factor 10. Most of these self-help groups were founded in rural areas. The majority was formed by women of peasants, housewives of large-scale farm labourers or women who were married to squatters. Gender-mixed groups and men's group were only formed since the late 1970s and constitute a minority of self-help groups. Moreover, "the better off, richer farmers, business people, the very poor and landless people, governmental employees and converts living in the small-scale farming areas" were seldom members of self-help groups (Wacker 1996: 28-38).

At the time of my research, most groups were gender mixed. Better off peasants were also members of self-help groups, often in leading positions. As shown in figure 46, slightly more than one-fifth (22%) of peasants stated in the household survey not to be member in any self-help group. Peasants who stated not be member in any self-help group were heterogeneous. In 2016 more than half (51%) of the peasants were members of one self-help group, roughly one-eight were members of two self-help groups and only few peasants were members of three or more self-help groups. Almost half of the peasants were member of a credit self-help group, two-fifth were member of a welfare group.

Some groups are exclusively for a small number of better-off peasants. Some larger groups in which everybody can participate are not operated well. Therefore, peasants who cannot become member of well-functioning groups cannot benefit from such self-help groups much. Only 6% of the members who participated in credit groups stated in the household survey that a credit group in which they participated do not function well. They explained that the group do not function well because members do not pay their monthly contribution regularly, not all members are treated equally, and the management is poor. 12% of the members of welfare groups stated that a welfare group in which they participated do not function well. They accuse consistently that bad management accounted for the bad performance of the group. However, it has to be noted that other members of the same group perceived the same group to function well or very well. This shows that the perception whether a group functions well or not is also a subjective perception. A good function of a group is described with

capable leaders that manage the group in a manner that enables the group to provide its services. According to some peasants, a strong leader who does not allow too much participation of the group members in the administration of the group is good if the leader is well minded and accountable to the group members.

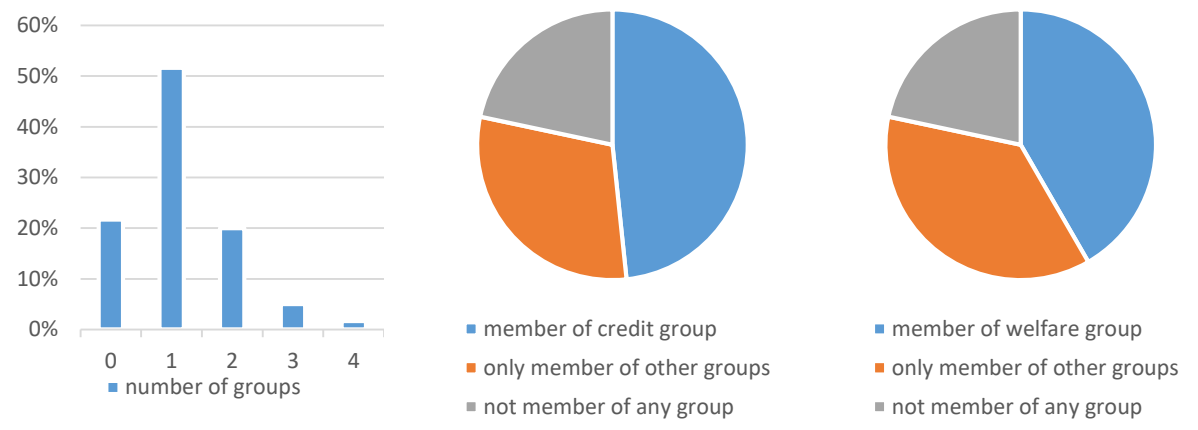


Figure 46: Graphs of Self-help Group Membership
The graph to the left shows the number of groups peasants are member of according to their statement in the household survey. The table in the middle shows the proportion of peasants who are member in a credit group and the table to the right shows the proportion of peasants who are member in a welfare group according to the household survey.

With regard to collective action, it seems, that smaller groups are easier to manage successfully and for a good management participation in the crafting of by-laws seems important. However, too much participation in the administration of the group does not necessarily lead to a good management of such groups. Under certain circumstances strong leadership with high accountability towards the group members might provide better results than thorough participation in every management detail.

Other forms of collective action, such as collective purchase of land (see chapter 10.2), the provision of piped water (see chapter 8.5), or the collective sale of agricultural products (see chapter 15.3) are organised similar to self-help groups. During my research I also learned that most export oriented horti- and floricultural companies supported credit, welfare or other self-help groups for labourers. The work of Wacker (1996) shows that this form of collective action and mutual support already existed for a long time. The organisation of collective actions has changed over time but remained important up to the present day.

Credit and welfare groups are a good example of collective action. As shown in the table in figure 47, the management of credit and welfare groups complies with the eight design principles for robust common pool resources management as described by Ostrom (1990). Only, in the case of these groups, the resource is not a pasture, a path or a corral, but an informal credit institute or an informal

insurance. There are clear rules about how the members have to contribute to the availability of this resource and how they can use it. Similar to the design principles for robust common pool resources management, it is clear who is a member and is obliged to contribute and allowed to benefit from the credit system. The rules are well adapted to the local context and can be modified by the members of the group. Openly discussing the handing out of credits or the support of somebody in need and record keeping in large books makes monitoring accountable to all members. Rule violations are discussed within the group. Conflicts between the monitorers, those keeping records, and the group members can be discussed in the monthly meetings. Credit groups and welfare groups are recognized by external governmental authorise and the rules of such groups are nested into the national legislation.

(1) Groups that are appointed to use a CPR as well as the CPR itself have to be clearly defined with clearly defined boundaries.	Membership in such groups is clearly defined with a list of all members. The total amount of credits to be issued or the support of people in need is clearly defined.
(2) Rules for access to and use of the CPR have to be appropriate to the local context.	Rules (by-laws) are made by local actors to be appropriate in the local context
(3) The rules that manage access and use of the CPR have to be open to modification through the affected users to be adapted to changes and new contexts.	In regular meetings, rules can be adapted by the users. However, too much participation of the group members in the administration of the group is perceived by many members as hampering a good management of a group.
(4) The users must be monitored in a way that is accountable to the users themselves.	Openly discussing the handing out of credits or the support of somebody in need and record keeping in books makes monitoring accountable to all members
(5) Rule violation must be sanctioned gradually.	There are clear rules for sanctions violations but they can be adapted to specific contexts.
(6) There have to be mechanisms that allow conflict-resolution among users and between users and monitorers.	Conflicts can be discussed in the regular meetings. However, in practice not all members of the group have the same abilities to raise an issue to be discussed in the meeting.
(7) The institutions must be recognized by external governmental authorities.	Self-help groups are supported by external governmental authorities, companies and organisations that support peasants
(8) The rules have to be nested into larger systems, thus in tune with institutions on a larger scale.	Self-help groups are acknowledged in the legislation
(Ostrom 1990: 91-102)	

Figure 47: Table of Design Principles for Robust Management of Self-help Groups

With the joint drafting of by-laws and the participation by all group members in the negotiation of how the by-laws are implemented in practice, these groups seem to allow for a rather balanced participation. However, in practice some group members have more experience in drafting by-laws, they are adroit in influencing common decisions and therewith can mainly determine the fate of such a group. Group members with more power to shape and select institutions for the management of such self-help groups can influence the negotiation process of institutions to define a management

that is mostly in their favour and enables them to benefit most from such groups. This affects the management of such groups and can result in a consolidation of power imbalances within such a group (see analysis of Ensminger's (1992) model of institutional transformation in chapter 5.2).

Generally, better-off peasants could participate in more efficient groups, not all peasants could participate in all groups, and some groups did not provide their services equally to all members (e.g. water projects, see chapter 8.5). To ensure that all peasants, especially weaker peasants, can benefit equally from the services offered by these groups, it would be important that the crafting and the implementation of by-laws of such groups considers also the needs of weaker peasants. This could be achieved if conditions for an active participation of all involved actors, as described in the constitutionality approach by Haller et al. (2015), would be considered (see chapter 3).

A further opportunity to be supported by others is to organise a *harambee*[116]. A *harambee* is an event to raise money from the community. People are expected to donate some money if they are invited for a *harambee*. One can organise a *harmabee* to raise a larger amount of money, for a community project or for an individual purpose (such as raising money to pay school fees or a surgery). During my research, I observed a *harambee* after a mass at the church to raise money for a surgery of a poor person. Other *harambee* can be entire events with invitations, a meal and an announcement of whom donates how much money. Depending on how much money one has, people are expected to donate more or less money at a *harambee*. Donating money at a *harambee* is associated with prestige and politicians who want to rise can do so by spending lots of money at *harambee*. This form of mutual support is managed by various informal local institutions. These institutions are deeply embedded in the local culture of the people living in the vicinity of Mwireri. *Harambee* can be seen as a cultural feature that leads to a redistribution of wealth among a peasant community, similarly to the cargo system described by Wolf (1957) in chapter 4.4. However, similarly to Cancian's (1989) observation cargo systems, *harambee* might result in some redistribution of wealth but they do not result in a levelling of a society.

[116] *Harambee* is Swahili for "all pull together". The term *harambee* for pulling together became popular through Jomo Kenyatta who promoted local collective action to develop Kenya as a nation. The term *harambee* also decorates the coat of arms of Kenya. As such, *harambee* is known all over Kenya but its implementation varies from region to region.

16 Discussion

To discuss how food systems influence economic activities and generally livelihoods of peasants in the vicinity of Mwireri, and how peasants influence food systems with regard to food sustainability through their activities and strategies, I start by describing peasants' economic activities (i.e. peasant agricultural production). Thereafter, I discuss how peasant agricultural production is linked with different food and non-food systems that operate at various scales from local to global. To understand why peasant agricultural production is linked with different food and non-food systems as it is today, I further discuss how peasant agricultural production developed as it is today and which implications this has on the sustainability of food systems that are linked to peasant production.

In the vicinity of Mwireri, peasants grow crops and keep livestock on small plots with a size of generally 1 to 7 acres. Some peasants have smaller, others have larger plots. Their production is greatly affected by the small size of their plots, unreliable and unpredictable rainfall, poor soil quality, plant disease as well as insect infestations and fungi pests (see chapter 9). To access land, peasants bought land from colonial land-owners through settlement schemes (governmental or private), or they purchased and leased land from other peasants. Therewith, accessing land is very expensive and raising a sufficient amount of money to pay for the land is difficult in this context. Knowing somebody who is in charge at the respective offices of the government facilitates land purchasing processes substantially (see chapter 10).

Peasant agricultural production further depends on locally produced and purchased material inputs, such as seeds, manure, synthetic fertilizer, herbicides, pesticides, animal feed and veterinary products. Currently, peasant agricultural production would not work without purchased material inputs. Local agro-vet stores sell material inputs that are manufactured by companies located in Kenya and all over the world. The local agro-vet stores import these products through intermediaries from national and global companies. At the local and regional level, personal trust relationships are important to facilitate the flow of material inputs from intermediaries through local shops to the individual peasants (e.g. by providing advances on the basis of trust-relationships). Nevertheless, the use of such products makes peasant production cost-intensive and not all peasants can afford to purchase all inputs they perceive to be necessary for a successful production. Some of the products are known to have negative ecological and health impacts. Various governmental and non-governmental organisations, as well as the agro-chemical companies themselves advise peasants on how to use these input products (see chapter 11).

Local peasant knowledge and know-how was adapted and further developed after settling in this region. Moreover, peasants combine local knowledge and knowhow with new farming technologies

that are propagated by external organisations through sensitisation and training programmes. These new agricultural technologies foster a local production that depends on externally developed technologies and material inputs. In addition, these new agricultural technologies are designed to improve agricultural production of peasants that are comparatively rich and have better access to water for irrigation and to larger plots (see chapter 12).

The work force to carry out agricultural production is mainly sourced from the peasants' household. In the past, there was a system of mutual support between households to carry out agricultural production. Today this mutual support is mainly replaced by local wage work arrangements. Salaries to employ somebody are fixed by informal local regulations (see chapter 13). Despite the prevalence of local wage work arrangements, forms of mutual support persist (sharing of information, *harambee*, etc.).

Peasants use most of the food they produce for self-consumption, but the share of food used for self-consumption varies between different households and fluctuates over time. Using food for self-consumption reduces costs to buy food. Nevertheless, costs for purchasing food stress peasants' household-budget the most. In addition to self-consumption, peasants also exchange food with neighbours and sell it to neighbours, local shops or traders. Traders in turn sell food to urban centres. Some traders also process food (e.g. milling grains). Some peasants founded product marketing organisations to collectively sell their products directly to customers in urban centres (e.g. to shops or processing companies). This allows them to circumvent local traders that pay low prices for products purchased directly at the farm gate (see chapter 14 and 15).

Peasants need money for their livelihood (to buy food, to pay school fees, to cover healthcare costs, etc.) and peasant production (to access land, to buy material inputs and to pay workers and services). In order to earn money, peasants sell parts of their harvest. Peasants can sell farm products to neighbours, local shops, traders or through product marketing organisations. However, earning sufficient money with the sale of farm products in order to cover the costs for peasant agricultural production and to cover the subsistence needs of the household is difficult or almost impossible. To earn additional money, peasants engage in other economic activities, such as working on other peasants' *shamba,* working for export oriented horti- and floricultural companies, working for the government or non-governmental organisations, or engaging in an own small business (e.g. having a small shop, trading food, driving a motorbike taxi, etc.). Therefore, peasants are not only agricultural producers on their own *shamba*, but also engage in other economic activities.

Credit groups enabled participating peasants to access credits from other peasants to invest in peasant production, other economic activities or to cover unforeseen cash needs. *Harambee* is a further possibility to get money.

Many of these aspects link peasants and their local production with different food and non-food systems at various scales from local to global. These interlinks are further discussed in the next sub-chapter.

16.1 Interconnections of Food Systems

With the different origins of material inputs and knowledge for local peasant agricultural production, various influences on land allocations and the different uses of food produced by peasants, local peasant agricultural production is not only located at a local level, it reaches out and is affected by regional and even global levels and it is part of different food systems (see figure 48).

As elaborated in chapter 10 and 12, material inputs and knowledge for local peasant production is sourced from a household and local level (all inputs from the peasant household and the vicinity of Mwireri), from a regional level (all inputs from Kenya), and from a global level (all inputs from outside Kenya). Hence, peasant production in the vicinity of Mwireri and food systems depending on this production entail knowledge and material that is sourced from various levels from local to global.

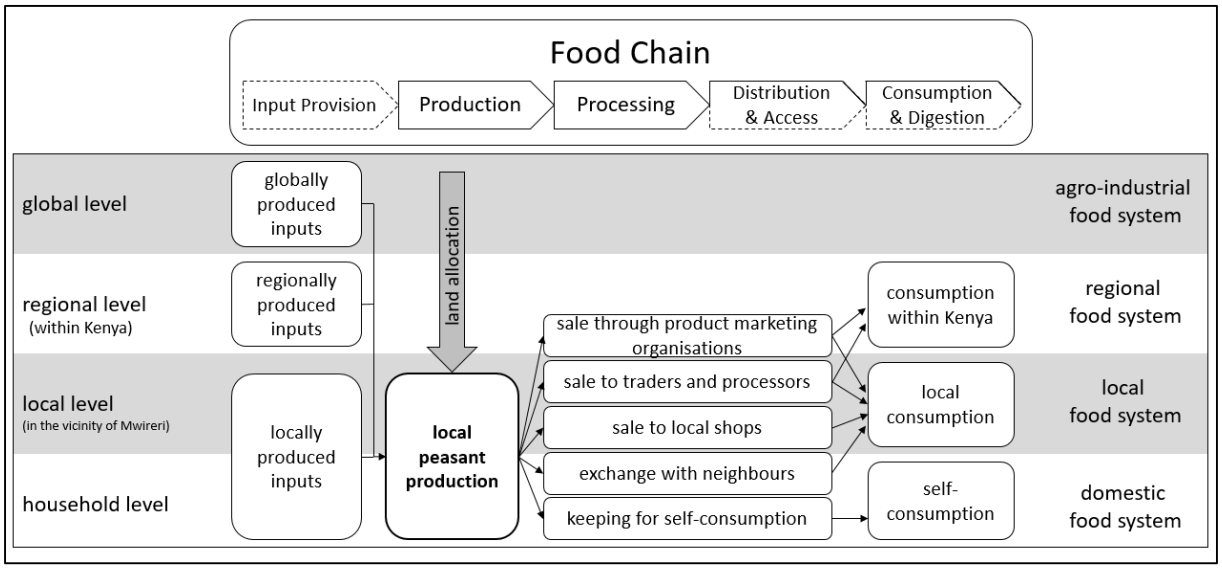


Figure 48: Schematic Figure of Food Chains of Local Peasant Agricultural Production

As outlined in chapter 13, peasant production depends mainly on workforce from the peasant household, but workforce can also be sourced from other people living in the vicinity of Mwireri (employing other people or services for the work on one's *shamba*). Therewith, peasant production is mainly located at the household and the local level. However, if it is also taken into account that land allocation for peasant production was to a large extent shaped by regional and global processes, it becomes evident that peasant production on this specifically allocated land is also affected by these

regional and global processes (see chapter 10). Which regional and global processes affected the land allocation and how the land allocation affects current local peasant production is further discussed in the next sub-chapter.

Farm products are kept for self-consumption, they are exchanged with neighbours or sold to neighbours, local shops or traders. Farm products that are kept for self-consumption remain at the household level. Farm products that are exchanged with neighbours or sold to local shops are consumed locally. Farm products that are sold to traders and processors or through product marketing organisations are either consumed locally or within Kenya and reach a local to regional level. According to the classification of food systems of Colonna et al. (2013), as described in chapter 2.3, food that is produced and kept for self-consumption is part of a domestic food system. Food that is exchanged with neighbours and sold to local shops for consumption in the vicinity of Mwireri is part of a local food system. Food that is sold to traders or through product marketing organisations that bring the products to urban centres of Kenya is part of a regional food system.[117] With the different uses of peasants' farm products, local peasant production is part of different food systems and reaches into different levels from the household level to a regional level. In addition, with input provision, peasant production even reaches into and is affected by processes at global levels.

However, global impacts do not directly translate into local effects. For example, globally produced agro-chemicals are not always applied as intended by the manufacturer (e.g. when herbicides are mixed with chicken fodder to kill millipedes). Also, the new agricultural technologies developed globally are not used as template for local peasant production. Peasants adapt these new technologies to the local socio-economic and ecological context and new food quality standards do not prevent all peasants from producing for export. Therefore, this local production in combination with global links is neither purely local, nor purely global. It can be seen as an amalgamation and new combination of local and global processes. Such a hybrid of local-global production can be meaningfully described with the new term, *glocal* production. The interdependence of local production with global input and knowledge provision is an essential element of domestic, local and regional food systems in the region north-west of Mount Kenya. With this local-global production of peasants in the vicinity of Mwireri, peasants can be described as an open peasant community, as described by Wolf (1955), with unique relationships with the larger world.

[117] The research project "Towards Food Sustainability" focuses on a regional food system that includes large-scale wheat farming, beef ranching and pastoralism, but not small-scale horticultural production (see, chapter 3.1). Therefore, the regional food system mentioned here is not the same as the regional food system described in the research project "Towards Food Sustainability". Some peasants also sell crops to exporting horticultural companies. Such food production is classified by Colonna et al. (2013) as part of an agro-industrial food system. However, in the vicinity of Mwireri such out-grower arrangements have been rare and were not subject of my research (for a detailed description of out-grower schemes, see chapter 14.7).

The food system classification of Colonna et al. (2013), as described in chapter 2, falls short in considering such amalgamating processes. A description of such interdependences as simple links between food systems and other systems would omit the importance of these vital interdependences.

Clearly, there is food production that is less globally affected or is hardly embedded locally. However, in the case of local food production in the north-western Mont Kenya Region for domestic, local and regional food systems, a clear differentiation between local and global is not meaningful to characterize the food systems. It is important to note that the production for domestic, local and regional food systems can have vital links with global manufacturing and markets. This has to be considered when developing strategies to improve the sustainability of such food systems.

This interplay between global and local processes has already been described by Peggy Bareltt (1977, see chapter 4.5).The economic activities of peasants have to be understood in the context of this interplay, and not only as persistence in underdevelopment, as an adaptation to the ecological, social or economic environment, as a cultural feature or as the result of an unfavourable position in the world market. It is rather the interplay of all these factors that makes peasants' economic activities *glocal*. In addition to Bareltt's description of heterogeneous adaptations of peasants to changing market demands, in the vicinity of Mwireri not only the different adaptations of peasants to changing market demands but already the local differences of the peasants (e.g. how much land they have) are affected by *glocal* processes.

Not all peasants engage equally in different food systems. Peasant production for these different uses is carried out on the same plot and until the products are consumed, exchanged or sold, the producing peasants themselves do not know for which use they produce them. As mentioned in the last sub-chapter, peasants use most food for self-consumption. However, how much products of a household enter one or another food system depends on the peasant household's needs and opportunities to sell products and is subject to great fluctuations. Therefore, peasants' engagement in the different food systems varies between different households and fluctuates over time.

Through wage-work arrangements with export-oriented commercial horti- and floricultural farms, peasants are also linked to agro-industrial food systems, even if they do not produce directly for these food systems as out-growers. Working for these companies provides an important access to additional income. As described in chapter 15, in the year 2016 more than 10% of the adult people living in the vicinity of Mwireri worked for an export-oriented commercial horti- or floricultural farm. These employments are an important source for income to cover costs for peasant agricultural production and generally peasants' livelihoods. Since it is difficult to earn money with the sale of peasants' farm products, and local peasant production and generally peasants' livelihoods are costly, local peasant production and peasants' livelihoods depend on salaries from horti- and floricultural production

companies. With regard to food systems, one can argue that domestic, local and regional food systems that depend on peasant production but do not provide the necessary money for peasant production depend on peasants' income earned from working for export-oriented commercial horti- and floricultural companies and as such on money form the agro-industrial food systems.

In addition to working for export-oriented commercial horti- and floricultural farms, peasants also work for the government, non-governmental organisations, construction companies, or in the informal economy (e.g. working on other peasant's *shamba*, having a small shop, selling agro-chemicals, selling medicaments, working at a *jua kali* workshop, trading farm products, etc.). With these economic activities peasants also engage in non-food systems or in other positions in local and regional food systems (selling agro-chemicals or processing and trading farm products).

Last but not least, as consumers, peasants eat food that they produce by themselves, that is produced by neighbours or by other actors within Kenya (see chapter 14.3). As such, peasants consume food that is part of domestic, local and regional food systems.

Combining peasants' engagement in food production and peasants' food consumption, it can be summarised that peasants in the vicinity of Mwireri engage in domestic, local, regional and agro-industrial food systems, and in non-food systems. They depend on the engagement in various food and non-food systems to make a living and to successfully engage in local peasant production. Peasants cannot make a living or engage in local peasant production by only engaging in one food or non-food system. Only the combination of engagements in different food systems enables peasants to make a living and to engage successfully in local peasant production. The diversification of income engagements in different food systems can be compared with mini-max strategies as described by Lipton (1982 [1968]). Instead of mixing different crops to ensure the minimum yield required for survival, peasants mix different engagements in food systems and non-food systems to ensure the minimum income required for survival and carrying out peasant agricultural production. However, peasants also mix different engagements in food systems because even under good conditions one engagement is not enough to make a living. Also, despite different engagements in food systems some peasants struggle to make a living and to engage in peasant production when luck is not on their side. With the dependence of peasants on engagement in different food and non-food systems for peasant production, also local peasant production in the vicinity of Mwireri is inextricably linked with domestic, local, regional and agro-industrial food systems, and several non-food systems.

However, this does not explain why peasant agricultural production is reliant on money without, however, enabling peasants to earn money in this sector. The next chapter will shed light on this dilemma and explain why peasants engage in this production, even if it seems irrational from a neo-classical microeconomic perspective.

16.2 Commodification of peasant production – an analysis of institutional transformations

In the vicinity of Mwireri, a possibility for peasant agricultural production emerged with the sale of colonial estates to peasants through governmental and private settlement schemes. As analysed in the last sub-chapter, this peasant agricultural production is part of three co-existing food systems. Local food production by peasants on small plots is part of domestic, local and regional food systems that reach into and are affected by processes at local, regional and global levels. In addition to peasant production on small plots, export-oriented flori- and horticultural production is part of an agro-industrial food system.

As a result of historical transformation and peasants' adaptation to these transformation processes, current peasant production in the vicinity of Mwireri depends on externally manufactured inputs and money. My research and analysis show which historic processes caused these dependencies, and how they did so. Furthermore, my research and analysis show how these dependencies currently affect the livelihoods of peasants and the sustainability of food systems.

Peasant agricultural production in the vicinity of Mwireri depends, like any other type of agricultural production, on natural resources and a physical place where it can be carried out on. In the vicinity of Mwireri, access to natural resources and a physical place is managed through access to land. Peasants had different possibilities to acquire land in the vicinity of Mwireri.

During the colonial time, colonial settlers were allotted land in what nowadays is the vicinity of Mwieri. In pre-colonial times, this land was used by Masai pastoralists and Okiek hunting and gathering groups. With the allocation of land to colonial settlers, pastoralists and hunting and gathering groups lost access to seasonal grazing areas and hunting and gathering territories. After the independence of Kenya, the leaving British administration and the new Kenyan government promised that colonial ranches and farms would be returned to native Kenyans. Colonial settlers were requested to sell their land to Kenyans. People already living in today's vicinity of Mwireri as squatters, people living in the so-called *shamba* system at the foot of Mount Kenya, and people coming from the densely populated land that remained under their control during the colonial time, acquired land in the vicinity of Mwireri.

Governmental and private settlement schemes enabled peasants to purchase land from former colonial land-owners. As described in chapter 10, governmental settlement schemes were organised by the Kenyan government and financed by European creditors. For the Kalalu Settlement Scheme, a governmental settlement scheme in the vicinity of Mwireri, the government purchased land from a colonial land-owner who was willing to sell land. Together with the land, the government also purchased irrigation infrastructure and livestock. Government representatives were supposed to

select peasants according to prescribed criteria for the land allocation in this settlement scheme. In practice these criteria were vague and gave space for a margin of discretion or in some cases abuse of power. Some peasants were given a plot in this settlement scheme as reward for their good work for a government representative, some were given a plot because they lived in the *shamba*-system at the foot of Mount Kenya, and others had to stubbornly insist on a favour by a government representative to be allocated a plot in the settlement scheme. Mismanagement of the irrigation infrastructure and theft of material led to a decay of the water supply system. Also, the livestock disappeared miraculously. Once the peasants managed to be allocated a plot, they generally did not have the necessary information on how the payment for the land was organised (e.g. that they actually had to pay for the land or that interests were so high). Moreover, the process of land allocation changed without the peasants' notice (e.g. that they were allocated more land). The institutions that regulated the land acquisitions from the colonial land-owners were mainly influenced by external actors (creditors, colonial land-owners and high-ranking politicians). Moreover, the institutions that organised the allocation of the land to peasants were mainly influenced by high-ranking politicians and governmental representatives. Through misuse of power, politicians and governmental representatives could even implement institutions that are generally perceived as illicit or illegal. In this context, peasants being allocated the land had only little bargaining power and as such little to no say in the crafting of the institutions that regulated the purchase of land from colonial settlers and the allocation of the land to peasants through governmental settlement schemes.[118] As a result, the allocation of land barely considered the needs of the peasants acquiring the land.

Private settlement schemes were founded by peasants with good reputation (elites). To purchase land through a private settlement scheme, over years, people deposited as much money as possible at the account of a settlement scheme. Once the private settlement scheme had sufficient money, they purchased a large tract of land from a colonial land-owner. Then, they distributed the land among the members of the group. Depending on how much money somebody deposited on the account, the size of the allocated plot varies. In private settlement schemes, peasants had more possibilities to participate in the negotiation of how the allocation of land shall be organised (e.g. through participation in annual meetings). However, in practice, mainly elites determined the institutions that regulated the land allocation. Vis a vis colonial land-owners and creditors that supported private settlement schemes, even these elites had a rather low bargaining power position. They did barely

[118] As described in chapter 5.2 macroeconomic and political changes (that are the result of colonialization and de-colonialization processes) resulted in a reduction of the bargaining power of peasants. Even tough peasants had little bargaining power to influence the negotiations for the crafting of institutions that regulated the allocation of land, peasants were not powerless. Peasants could improve their bargaining power, for example by forming organisations (see Ensminger 1992) or by applying weapons of the weak (see Scott 1985). As the example of the Gitugi Company shows, elites can be overthrown in private settlement schemes. However, it can be questioned if this results in a general better management of this settlement scheme in this case.

dare to ask the colonial land-owner if they could buy some land from them. This resulted in institutions that regulated land acquisitions from colonial land-owners and allocations of the land within the settlement scheme that only marginally considered the needs of most peasants acquiring land through such a settlement scheme.

In both cases, formal and informal (and even illicit) institutions that regulated the allocation of land were greatly influenced by creditors, politicians, former land-owners and governmental representatives or elites. The peasants acquiring the land had little to no say in the crafting of institutions that organised the allocation of land. Therefore, the allocation of land did barely consider their needs, institutions to organise the allocation of land could change without peasants' notice and peasants only had limited knowledge of how the land allocation was actually organised. As a result, institutions managed the allocation of land in a way that the government or private settlement schemes had to buy land for allocation from colonial land-owners (alternatively the Kenyan government could also had expropriated colonial land-owners for example). To buy land from colonial land-owners, the Kenyan government and private land buying companies had to get credits with high interest rates. Consequently, peasants had to spend a lot of money to acquire land (to pay colonial land-owners and creditors via the government or private settlement schemes) in a context in which it was difficult to earn money, especially through agricultural production. Moreover, peasants had to have good social relationships in order to cope with or benefit from the abuse of power by politicians and governmental representatives that allocated the land.

Similarly, buying or leasing land from peasants, who are willing or forced to sell or lease their land, requires a huge amount of money and good social relationships. The example of the peasant who purchased land from another peasant (see chapter 10.4) shows that having sufficient money is not enough for a successful land transaction. Good social relationships with people having information on who might sell land and government representatives accomplishing the land deal is important as well. As such, if a peasant bought land through a governmental settlement scheme independently, through a private settlement scheme, or from another peasant, buying land was expensive and good social relationships were important.

Because it was difficult (or even impossible) to earn sufficient money through agricultural activities to buy land, those peasants who were able to acquire land therefore earned the money through off-farm activities. Not all peasants were able to purchase a plot. Those who failed to do so could not move to a rural area or had to leave the area. As landless peasants they were often left with no other choice than moving to the proliferating slums surrounding the large cities of Kenya. Nevertheless, some peasants who managed to raise the necessary money and resist against all other odds could buy some land in the vicinity of Mwireri. However, they were only able to acquire small plots in an area that is

ecologically unsuitable for peasant agricultural production. As described in the chapters 7.1 and 8.1, the region around Mwireri is characterised by unpredictably varying rainfall and a rather poor soil quality at the time when the peasants arrived in this area.

In addition, peasants lost access to resources with the allocation of "free lands" to individually owned plots in the governmental settlement schemes (see chapter 10.1) and with the enclosure of the forest-like land on the compound of the Kongoni Farm (see chapter 8.4). These resources can be seen as common pool resources as described in chapter 5.1. These common pool resources helped peasants to cope with the precarious conditions induced by the small plot sizes and the unfavourable ecological conditions. Other common pool resources that could help to cope with the precarious conditions are difficult to access. Some narrow lines of grass along roads can be seen as nowadays overused remnants of formerly wider available commonly used pastures. Former irrigation systems decayed after the land was purchased from the colonial land-owners. As described in chapter 8.5 the management and distribution of river water through new water project is difficult and does not work properly. Some peasants have access to commonly piped river water and others do not have access. However, piped river water is only for domestic use and not for irrigation. The invasion on the large tract of land in the South of Mwireri (see chapter 8.4) can be seen as a desperate try to open new common pool resources in times of crisis.

To cope with the small plot sizes, unfavourable ecological conditions and lack of access to common pool resources, peasants started to improve agricultural production by applying purchased agro-chemical inputs and certified seeds. Such agro-chemical inputs include synthetic fertilizer, herbicides, insecticides, fungicides, but also veterinary products for livestock (see chapter 11). In various governmental and non-governmental programmes, peasants were advised and trained to use such externally produced inputs (see chapter 12). As described in chapter 11.2 these externally produced inputs are manufactured by different companies from Kenya and all over the world.[119] Peasants can access externally produced inputs through small local agro-vet stores that get the products from manufacturers in Kenya or larger agro-vet wholesale stores. The use of these externally produced inputs links peasants and their production with the capitalist economy at various scales from local to global (see previous sub-chapter). This makes their production dependent on money and the global capitalist economy. However, peasants are not directly linked to the global capitalist economy. Small local agro-vet stores and agro-vet wholesale stores act buffer-like between the peasants and the global capitalist economy. Owners of small local agro-vet stores that are themselves peasants ensure

[119] It has to be noted that peasants do not only depend on externally produced inputs. Some peasants keep and breed seeds, produce manure or apply locally produced inputs to fight fungi or insect pests on their *shamba*. However, almost all peasants depend to some extent on externally produced inputs to carry out agricultural production.

transport of externally manufactured input products to the rural area, they grant advances to local peasants that could not get advances on the open market (e.g. advances are granted on the basis of trust relationships and not solvency), and they explain peasants how to use these inputs in a way that is actually understood by the peasants. Agro-vet wholesale stores in turn grant advances to local agro-vet stores (on the basis of trust relationships) and they order products in sufficient quantity to be delivered by the producer. Only this buffer enables peasants to actually access externally manufactured input products. Nevertheless, the dependence on these input products makes peasant production cost intensive. At the same time, it is difficult to earn money solely with peasant agricultural production.

Parallel to the commodification of agricultural inputs, the organisation of agricultural work became increasingly commodified. At the time peasants moved to the area in the vicinity of Mwireri, most agricultural tasks were done by members of the peasant household. Today, this has not changed much. However, at the time of settlement, peasants could ask neighbours to help them carry out agricultural tasks. Various temporarily accepted informal local institutions that are embedded in the local culture regulated this kind of mutual support (see chapter 13.2). With a general pervasion of wage-work and increasing monetary needs for agricultural production and peasants' livelihoods, mutual support was gradually replaced by the employment of workers or specialised agricultural services to carry out agricultural tasks. Nevertheless, forms of mutual support persist up to the present day. However, the transformation of agricultural work from mutual support to wage-work further increased cost intensively of agricultural production.

The high amount of money to acquire land, the dependence on purchased externally manufactured agricultural input products and the transformation of the organisation of agricultural work from mutual support to wage-work make current peasant agricultural production highly cost intensive (see chapter 15.2). Moreover, not only peasant production is cost intensive. Peasant livelihoods are generally cost intensive. Even though peasants used most food from their production for self-consumption (see chapter 14.3), most peasants rated costs for purchasing additional food as greatest household expenditure. Another high household expenditure are school fees (see chapter 15.1). The high costs for agricultural production and peasants' subsistence needs have to be covered somehow.

Most peasants explained that they did not earn much money from selling agricultural products. Small plots, high costs for agricultural production, low productivity and low prices for harvest products makes it difficult to earn much money from selling agricultural products. As described above, small plots result from the allocation of land that only marginally considered the needs of most peasants acquiring land. High costs for agricultural production are caused by the high prices for land, the dependence on externally manufactured agro-chemicals, and the partial commodification of the organisation of

agricultural work and services. The productivity is reduced for example by adverse ecological conditions, adaptations to the ecological conditions (i.e. intercropping as mini-max strategy), or lack of money to buy agro-chemical input materials. If peasants could not sell harvest products directly to neighbours, local shops or other customers, they had to sell them to so-called middlemen or brokers. During harvesting times, brokers buy products directly at peasants' farm gate. There, prices are low and peasants only get little money for their products (see chapter 14.5 and 15.3). Selling farm products through out-grower schemes would provide a higher income. However, selling products through out-grower schemes to a global capitalist market is difficult. It is difficult and cost intensive to produce in compliance with the high standards set by the exporting companies and customers in Europe. In addition, the producing peasants have to bear the costs caused by losses originating from crop failures or a rejection of products by the exporting company (see chapter 14.7).

The above described transformations make current peasant agricultural production and generally peasants' livelihoods highly cost intensive. At the same time, it is difficult to earn money from selling agricultural products. The commodification of agricultural production is difficult to handle if at the same time a commodification of the use of agricultural products is difficult (most food is still consumed by the peasant household). As a result, peasant agricultural production and selling farm products does not generate sufficient money to cover the cash needs of peasant agricultural production and peasants' livelihoods. From a neoclassical micro-economic perspective (see chapter 4.1) it seems irrational to carry out peasant agricultural production under these conditions. Therefore, other reasons must account for peasant devotion towards peasant agricultural production.

To earn additional money, some peasants work for an agro-industrial company, some peasants work for the government, some peasants work as trainer of peasants, some peasants work on other peasants' *shamba*, some peasants have an own business (such as a small shop, a *jua kali* workshop, etc.), and some peasants engage in the trade of farm products (for a full list of income strategies see the table in figure 44). As described in chapter 15.3, in most of these off-farm activities peasants are exposed to exploitation.

Some peasants work on other peasants' *shamba* to earn some additional income.[120] As described in chapter 13.3 and 13.5, local institutions regulate the remuneration of employed workers on peasants' *shamba*. Therewith, the employment of workers does not follow pure economic rationales as described in chapter 4.1. This prevents that an increased availability of workers (i.e. a reserve army of labourers) leads to diminishing salaries – or a scarcity of workers would lead to an increase in salaries and therewith higher costs for agricultural production. However, working on other peasants' *shamba*

[120] Working on other peasants' *shamba* for a remuneration is a new development. Formerly, peasants worked on other peasants' *shamba* in a form generalised reciprocity organised as mutual support (see chapter 13.2).

is generally perceived as a bad way of earning money. The employment is unsteady, one is only employed if another peasant is in need for workforce and capable of paying it. Moreover, the work is tedious and salaries are rather low. Nobody could make a living from only working on other peasants' *shamba*. This shows that local institutions regulating the employment do not necessarily prevent exploitation. Peasants actually prefer to work for an export-oriented agro-industrial flori- or horticultural production company compared to working on other peasants' *shamba*.

More than 10% of the adult peasants living in the vicinity of Mwireri worked for an export-oriented agro-industrial flori- and horticultural production company. Therefore, these companies are an important employer in this region. However, the companies hire a great number of their staff on a casual and temporary basis. This enables the companies to employ a flexible workforce, depending on the company's need. Moreover, casual and temporary contracts end if the need of workforce reduces or latest after three months because casual and temporary employment is legally limited to three months. Casual and temporary employed workers do not have a health insurance or a payment for sick days. Some peasants can cope with these working conditions. For them, working for an agro-industrial flori- or horticultural company is a good opportunity to earn some additional cash. They work for such a company for some months to earn money to build up or improve an own business. For other peasants (e.g. a single mother) with a tight household budget or less opportunities to rely on other sources of income or subsistence agricultural productions, it can be difficult to cope with these precarious working conditions.

Working for the government provides a small but stable source of income and even a small pension after retirement. This kind of employment enables peasants to rely on a steadier source of off-farm income. Working as trainer of peasants for a training programme in turn is less steady but nevertheless a welcomed source of income to diversify the sources of income of a peasant household.

A further important possibility to earn money with off-farm activities are in the informal economy. Peasants have small local shops, they engage petty trade or they offer small services. As described in chapter 15.3, these off-farm activities in the informal economy enable peasants to earn additional cash. However, in order to participate in the capitalist economy, peasants have to offer the goods they produce and the services they offer at low. Therefore, earning money with these activities is difficult and often result in self-exploitation of peasants engaging in these activities. On the other hand, these informal economy activities provide cheap goods and services that are used for the local peasant agricultural production and for the formal capitalist production of agro-industrial companies. As such, these informal economy activities subsidise peasant agricultural production and the capitalist production of agro-industrial companies. The subsidise of the capitalist production of agro-industrial companies through the provision of cheap goods and services and the alimentation of people who do

no longer find an income in the formal capitalist economy result in an exploitation of these informal economy activates through the formal capitalist economy (see chapter 4.5). In addition to the subsidise of the formal capitalist economy through informal economy activities as described in chapter 4.5, it can be noted that informal economy activities also subsidise the peasant agricultural production.

To cope with the high cost intensity of peasant agricultural production that is caused by the above described processes of land acquisitions and allocations and the difficulties to earn money with agricultural production, peasants are forced to earn money in off-farm activities. In these off-farm activities peasants are often exposed to exploitation. To cope with these exploitations, peasants depend in turn on subsistence farming and other local buffer strategies. With this dependence on subsistence farming, peasants cannot allow a full integration of peasant agricultural production into capitalist modes of production. These findings sustain the Neo-Marxist theory of Meillassoux (1975) who argued that the expansion of the capitalist mode of production results in a dissolution of non-capitalist subsistence production because peasants who engage in the capitalist sector depend on subsistence production to cope with the exploitation in capitalist sector (see chapter 4.5).

In addition to a bare need to defend the peasant agricultural production from dissolution into capitalist modes of production, ideological reasons lead to resistance against a full integration of peasant agricultural production into capitalist modes of production. These ideological reasons are not necessarily expressed through an explicitly anticapitalistic framed discourse, such as the discourse of La Via Campesina for example (see chapter 2.2), but can also be expressed through practical activities or other less explicitly anticapitalistic framed discourses. The quote in the beginning of my Thesis on page i shows such an implicit discourse of a peasant who said that he chose to be a farmer to be free, to be his own boss. Also, the ideal of acquiring and managing land as a peasant to become a head of an *mbarî* can be seen as a strategy that is more ideologically than economically reasonable (see chapter 7.2). This shows that not only pure economic rationales, distaste for work or the reduction of risks (see chapter 4.1) are important for household strategies. Cultural features and activities that oppose a capitalist invasion into peasant agricultural production also affect household strategies of peasants in the vicinity of Mwireri. This sustains the theories of Wolf (1957), Foster (1965), Scott (1976), Cancian (1989) and Tria Kerkvliet (2009) that peasants oppose full capitalist integration under some circumstances as described in chapter 4.5.

16.3 Strategies to Cope with the Commodification of Peasant Farming

To cope with the high cost intensity of peasant agricultural production and the difficulties to earn money with agricultural production and the exploitation in off-farm activities, peasants depend on additional buffer strategies. Peasants support each other within the family or among friends. In

addition, peasants found self-help groups/companies/sacco to organise collective action more formally.[121] Such self-help groups provide access to land (private settlement schemes), piped river water (water projects), to markets (product marketing organisations), to credits (credit groups), and to insurance services (welfare groups). If these groups are managed well, they provide proposed services to the members of such a group. However, not all groups are managed well and not everybody can join every group. Some groups are exclusively for a small number of selected peasants. Peasants who are a member of several well-managed groups get access to a wide range of services. Peasants, who are excluded from well-managed groups or who are not provided a service by a group, lack access to the services provided by these groups.

How such groups and collective action are managed well depends on the institutional setting guiding them. Institutions are, as described in chapter five, formal and informal norms, rules and regulations that structure actions and interactions of actors. Institutions themselves are nothing naturally given. They are the product of negotiation between different actors. This negotiation process is influenced by power relations and endemic and external processes. Moreover, institutions can be conflictive and contradictory.

Private settlement schemes, as described in chapter 10.2 and analysed in the last sub-chapter, are an example of collective action in the study region. To buy land from colonial settlers, peasants founded such private settlement schemes. These settlement schemes collected money from peasants and once they had enough money to purchase a large tract of land from a colonial settler, the land was bought and distributed among the members of the settlement scheme. Depending on how much money a peasant paid to the scheme, the size of the allocated plot varied. Local elites mainly determined the institutions that regulated the collection of money to buy the land and the allocation of land to the individual peasants through such schemes. Moreover, vis a vis colonial land-owners and creditors that supported private settlement schemes, these schemes had a rather low bargaining power position. All this resulted in institutions that regulated the purchase and allocation of land in ways that only marginally considered the needs of most peasants acquiring land through such a settlement scheme.

The management of river water abstraction and provision through Water Resource User Associations (WRUA) and water projects is a further interesting form of collective action. As described in chapter 7.4, WRUA help to mitigate conflicts between different water users. WRUA enable a management of

[121] Other strategies to cope with the difficult situations are more illicit activities, such as acquiring land through a good social relationship with a politician (see chapter 10.3), invading other people's shamba to graze animals during droughts (see chapter 9.5), withdrawing more water from a water project on the expanse of others (see chapter 8.5), cheating in forms to receive payment for trainings of peasants (see chapter 12.1), stealing from other peasants or agro-industrial companies (see chapter 8.4), etc. Some of these strategies can be described as weapons of the weak, especially if they result in an advantage of peasants on the expanse of more powerful actors (see Scott 1985).

river water as common pool resource by the water users themselves in a way that largely complies with the eight design principles described by Ostrom (1990, see chapter 7.4). Especially their recognition by external governmental authorities and their embeddedness in institutions on a larger scale can be highlighted here. However, in the study region, river water remains scarce during dry seasons, some water projects were allegedly privileged over others due to bribery or affinity, and most projects admitted that they cheat to a certain extent in order to get more river water because everybody cheats (e.g. withdrawing more water than one is allowed by the WRUA). With these rule violations, the management functions of WRUA have to questioned. Nevertheless, even with existing rule violations, WRUA help to mitigate conflicts over access to river water and they prevent a completely unmanaged free access to river water as described by Hardin (1968) in his article on the Tragedy of the Commons.

In addition to the water user associations that manage the allocation of river water to the different water projects, water projects are another form of collective action at another level. For the distribution of water that is allocated to a water project by the WRUA, groups of peasants commonly built and maintain a water provision system. The internal distribution of water within water projects can be seen as a second level of water distribution on the basis of the design principles for robust common pool resources management. The management of river water only works well if both levels operate well. Some water projects seem to operate quite well while others do not work well. Some members of water projects complained that they are not provided water from the project in which they are a member while other members of the same project get water (see chapter 8.5). For the discussion on CPR management theories (see chapter 5.1), one could add that it is important to consider the management of a CPR at all levels and if it works well at one level, it does not ensure that it works well at all levels. Therefore, it is important to know which levels are important for a thorough management of a CPR and one has to look if the end-users are actually benefiting from a common management of a resource.

Another example of collective action are so-called Product Marketing Organisations, described in chapter 14.6. Through Product Marketing Organisations, peasants try to circumvent traders by selling products collectively to customers in Kenyan cities. Last but not least, credit and welfare groups are a good example of collective action. As shown in chapter 15.4, the management of credit and welfare groups complies largely with the eight design principles for robust common pool resources management as described by Ostrom (1990). In the case of these groups, the resource is not a pasture, a path or a corral, but an informal credit institute or an informal insurance. Moreover, with the joint drafting of by-laws and the participation by all group members in the negotiation of how the by-laws are implemented in practice, these groups seem to allow for a rather balanced participation.

By-laws, important institutions of such self-help groups, influence who can benefit in which way from the services provided by these different types of collective actions. All these types of collective action have similarities with the management of common pool resources as described by Ostrom (1990, see chapter 5.1), even though the resources provided by these types of collective action are not well preserved pastures or manmade paths, but collective purchase of land for individual land acquisitions, a beneficial access to markets, access to credits (or dividends for those investing in the group), or mutual support in adversary incidents (similarly to an insurance). This shows that the concept of robust common pool resources management can be enlarged to the collective actions by peasants in the vicinity of Mwireri.

In practice, often some group members have more experience in drafting by-laws, are adroit in influencing common decisions and therewith they can mainly determine the fate of group for collective action and they can ensure that the groups provide its service in a way that is most beneficial to them. Moreover, not all groups are operated well and not all groups are capable of providing the foreseen services. This indicates that, as described by Ensminger (1992), power-relations that are affected by endogenous (e.g. dignity of respect persons) and external changes (e.g. support of some peasants by training programmes) affect the negotiation of institutional settings that manage collective actions. Actors with power to shape and select institutions chose those institutions that are mostly in their favour. This again affects distributional effects in their favour and further enhances their bargaining power. As such, an institutional setting for the management of a collective action might not be in the best interest of all but in the interest of those with the most bargaining power.

16.4 Heterogeneity of Peasants in the Vicinity of Mwireri

Despite the general low bargaining power of peasants in the negotiation of institutions that managed the land acquisition and land allocation, the institutions in place privileged some peasants over others in the land allocation process. Those with more money, better relations to authorities or management positions in private settlement schemes could acquire more land than others (or others had to invest more efforts to achieve the same amount of land, for example the women who worked at the petrol station, see chapter 10.3). Similarly, somebody with little money and a reputation of not paying back advances might struggle to access the required agro-chemical inputs for the production. Moreover, such a person might not be accepted as a member in well-functioning credit or welfare self-help groups.

In addition, as shown in chapter 12.1, external organisations that support peasants rather support those peasants that are already better off (peasants with larger plots, access to water for irrigation, more money to invest in farming, etc.). Organisations that train peasants in new agricultural

technologies promote technologies that can only be implemented by peasants with enough land and money to purchase inputs. Moreover, their demonstration plots are implemented on plots of peasants that are knowledgeable, have enough land, good relations to the operators of the training programmes and, for some programmes, access to water for irrigation. This restricts the selection of peasants for demonstration plots to those that are already better off. These peasants are provided the seeds and other inputs for such demonstration plots, one even received a greenhouse. As such, the peasants that are already better off are further provided with inputs by these organisations and the programmes are adapted to their needs. Lack of material inputs and means prevent that poorer households can host demonstration plots or implement the new technologies taught in these programmes.

Moreover, subsidised synthetic fertilizer that is provided by the government can only be acquired by peasants who can afford to pay for fertilizer that might arrive late. Peasants with little money cannot afford to invest the little capital they have in fertilizer that might arrive late and have to purchase the more expensive fertilizer at the market (see chapter 11.3). Last but not least, under the name *Uwezo*, agro-chemical production companies sell products in small quantities to enable the poor peasants to buy the products without investing a lot of money. However, these products are more expensive per kilogram than the same product sold in large quantity. Therefore, peasants with a small budget have to pay more money for the same product than peasants with more money (see chapter 11.4).

In summary, peasants that are generally better off, such as the one who got the greenhouse from SNV, have more possibilities to operate in the local context. This allows them to cope better with the difficulties of peasant production in this region and to benefit from its possibilities. Peasants with less money or smaller plots struggled to cope with all the difficulties of local peasant production and they have fewer opportunities to benefit from. These peasants generally have less opportunities to engage in off-farm activities and they are more likely to be exploited in these activities. This incurs them with a double burden, the burden of earning money and the burden of engaging in peasant agricultural production. With the additional burden of house- and care work, many women are incurred with a triple burden. Moreover, depending on their abilities, peasants have different possibilities to shape institutions that affected food systems, their interlinks and possibilities to benefit from them.

The Theory of Access (Ribot and Peluso 2003), as described in chapter 5.3, can be used to describe this heterogeneity of peasants. The institutional settings that structure peasants' economic activities and interactions can be described as rights to benefit from something. However, different peasants have different abilities to do so. Depending on their access to various capitals, such as technology, money, markets, labour and labour opportunities, knowledge, authorities and social relations, they have different possibilities to benefit from local peasant production, to cope with its difficulties and to

change institutional settings to better benefit from local peasant production or to cope with its difficulties.

16.5 Conclusion: Improving the Sustainability of Food Systems

Today, a great number of people suffer from hunger and malnutrition. Moreover, producing, processing, distributing and consuming food causes severe ecological problems and has great social impacts. To address these food-related issues, various comprehensive concepts have been developed. The concept of food sustainability combines different aspects of these concepts. Thereby, food sustainability is a normative concept that strives for inter- and intergenerational equity. It addresses access to food, qualities of food, impacts of food provision on Human Rights and other livelihood objectives, the allocation of benefits among different actors involved in food systems, power imbalances, participation possibilities and ecological aspects of food provision and utilisation.

Food sustainability can be analysed through the concept of food systems. Food systems describe the production, processing, distribution and consumption of food as a food chain that is influenced by ecological systems, economic systems, cultural/spiritual/ethical/ideological systems, knowledge/ information systems, institutional systems and physiological systems (see figure 2 in chapter 2.3). Assessing the food sustainability with this food system concept requires a transdisciplinary research approach that is able to deal with such a complex topic that involves different academic fields and uncertainties and controversies. The research project “Towards Food Sustainability: Reshaping the Coexistence of Different Food Systems in South America and Africa” is such a transdisciplinary research approach. My PhD Thesis is part of this research project.

In a selected area in the region north-west of Mount Kenya, I used an inductive social anthropological approach in order to analyse the interplay between different food and non-food systems, actor-specific outcomes of food systems and their interplay, how actors deal with these outcomes, and how they affect food systems, their interplay and outcomes. Such an approach enabled me to include local actors’ perspectives, concerns and expectations with regard to food systems’ sustainability.

The analysis of food production, procurement and consumption by peasants in the selected region in the region north-west of Mount Kenya has shown that peasants are involved in various food and non-food systems reaching into this region, and that none of these systems provided a basis for a living on its own. Moreover, food production is greatly affected by global and local processes and the various food systems operating in this area are inextricably interlinked. Moreover, peasants engaging in food production are not a homogeneous entity. On a local level, great differences exist between different peasants.

To analyse the sustainability of food systems in this region, the historic transformation processes and interlinks of food systems with other food systems and non-food systems from local to global levels have to be considered. Historic transformation processes, such as the specific commodification of peasant production in this region, greatly influence current peasant production and its outcomes with regard to sustainability. Moreover, the interlinks of food systems that are also a product of historic transformation processes and peasants' adaptation strategies are a specific characteristic of the food systems in this region. Many interlinks of food systems are not obvious at first sight or might be contested. This makes it difficult to consider all these vital interlinks of food systems. With these complex and hidden interlinks, food systems have various social and economic outcomes in this local context. However, these outcomes do not affect peasants directly. Peasants have developed various strategies to cope with different outcomes of food systems that are difficult to handle (e.g. exploitation in wage-work arrangements). In addition, due to the heterogeneity of local peasants, the outcomes of food systems and their interlinks do not affect all peasants equally.

An analysis of food systems in this region that only looks at local and regional processes of food systems omit vital global interlinks. Moreover, an analysis that does not consider adaptation strategies of local peasants and their heterogeneity can result in the recommendation of strategies for improving the sustainability of food systems that do not fit with the complex local reality of these food systems.

Participative transdisciplinary approaches are a possibility to deal with the complexity, unpredictability and contentedness of food systems, their interconnections, outcomes and heterogeneous possibilities to deal with them. It is important that transdisciplinary approaches apply an inductive research approach that enables the researcher to follow social and other processes that mattered in the specific context, to where they reached and from where they were influenced. Moreover, it is vital that transdisciplinary approaches do not only call for participation but reflect on how to enable all involved actors to thoroughly participate. Facilitating the participation of all involved actors and actor groups requires a good knowledge of the specific context with all the aspects that might prevent the participation of actors or actor groups. Social Anthropology has a long history of developing and applying methods to study and understand such contexts with regard to these aspects.

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