CHAPTER 5: IMPACTS OF LARGE-SCALE FARMING ON HOUSEHOLD FOOD SECURITY

5.1 Introduction

Food security has become a global concern after the worldwide food crisis of the 1970s, and its conceptualization following the World Food Conference of 1974. In spite of this, the latest estimates of the United Nations Food and Agriculture Organization indicate that about 805 million people in the world are undernourished in 2012–2014, with 26.6% in SSA (FAO 2014). Although the number of people who are food insecure has declined by about 100 million over the last decade, and many countries are forecast to attain the Millennium Development Goal (MDG) of halving hunger by 2015, the magnitude of food insecurity is still huge by any standard. Many countries in SSA have an alarming Global Hunger Index (GHI), which is an aggregate index based on an equal weight of food security indicators such as undernourishment, child weight and child mortality (IFPRI *et al*. 2012). As a result, food security continues to be a concern for politicians, researchers, academics and civil society.

There are about 7.6 million to over 8 million people in Ethiopia who are chronically food insecure on an annual basis (World Food Programme 2012; Rahmato & Pankhurst 2013; World Bank 2013). These people receive resource transfers (cash, food or both) through the Productive Safety Net Programme (PSNP). The PNSP was started in 2005 and identified a total of 319 food insecure districts in a total of 7.6 million people. The number of people who are in need of emergency food aid is even higher if those who are experiencing transitory food insecurity are included in the statistics. The country has been a major food-aid recipient since the catastrophic famine of the 1980s that claimed the life of about 1 million people (Ofcansky & Berry 1991). Since 1996, the amount of emergency relief food aid received by the Ethiopian government per annum has reached 5.2 million metric tonnes (World Bank 2013). The GHI for Ethiopia in 2012 was estimated at 28.7%, which falls under the category of 'alarming' food insecurity, but has declined from an 'extreme alarming' score of 42.2% in 1990, 38.6% in 1996 and 34.5% in 2001 (IFPRI *et al.* 2012). As a country frequently affected by food insecurity challenges, achieving national food security is always on the agenda of Ethiopia's development planners. A national Food Security Strategy (FSS) was first developed in 1996 as part of the broader poverty reduction strategy of the country, which considered agriculture as an engine of growth and poverty reduction. The FSS focused on three basic interventions: increasing domestic availability of food supply, improving access to food for food insecure households, and enhancing the emergency

response capacity of the country. The FSS, according to Woldemichael (2013), was expanded in 2003 – *the New Coalition for Food Security* – to ensure food security for chronically food insecure people. The new package has four components: the Productive Safety Net Programme (PSNP), the Household Asset Building Programme (HABP), the Complementary Community Investment programme (CCI), and the resettlement programme (started in 2003).

The Agricultural Development Led Industrialization (ADLI) strategy of the country is entrusted to increase the domestic availability of food, and this was considered one of the pillars for achieving national food security. ADLI envisaged increasing smallholder productivity in the highlands, and expanding large-scale commercial farming in the lowlands. A World Bank study identified the western lowlands of Ethiopia, bordering the Sudan, as a potential agricultural frontier with millions of hectares of arable land for both rain-fed and irrigated agriculture. The study recommended that the country tap into and develop land and water resources in the lowlands in a bid to accelerate the industrialization process (World Bank 2004). Ethiopia's strategy of using agriculture as an engine of economic growth and transformation, and to reduce the plight of poverty and food insecurity in the country, coincided with the rush for Africa's farmlands in 2007–2008. This has resulted in the transfer of large swathes of farmland to foreign and domestic capital in different parts of the country, including in the highlands, but notably in the lowlands. Increasing domestic availability of food supplies and creation of employment opportunities through the promotion of large-scale agriculture were, and still are, the transmitting mechanisms considered by the Ethiopian government to reduce poverty and food insecurity. This chapter analyses the food security contributions of large-scale farming in Ethiopia by using empirical data collected from households living in the vicinities of the large-scale farms selected as cases studies.

5.2 Concepts of Food Security

The concept of food security has evolved over more than four decades. Several definitions and indicators are used by researchers, and in some cases this has created ambiguities in terms of identifying what is being discussed (Jones *et al*. 2013). Maxwell and Smith (1991), for instance, counted more than 180 definitions used by researchers in the study of food security. The diversity in the conceptualization and operationalization of the concept comes not only due to the complexity and elusive-nature of the concept, but also the difficulty of measuring it. This compelled researchers to resort to adopting easily measurable indicators.

In the beginning, the definition of food security was dominated by supply-side issues (United Nations 1975), and goals were geared towards ensuring stable and adequate supplies of food at national and international levels, without diligent attention to improved access to food at individual and household levels (Maxwell & Smith 1991). Thus, several countries adopted a green revolution strategy for boosting agricultural production and increasing national food supplies. However, failure of the direct translation of increased food availability by the successful green revolution to improve the food security situation of individual households necessitated the consideration of the demand-side of food security.

Amartya Sen's 1981 thesis *Poverty and Famine: An Essay on Entitlement and Deprivation* showed the widespread famine and starvation among individuals in countries that were successful in achieving sufficient food supplies at national levels. Thus, Sen's thesis adequately demonstrated the importance of ensuring access to food when nations deal with issues of food security (Sen 1981). He further argued that the poor may lack adequate access to food due to declining wage rates and high food prices regardless of sufficient food availability. As a result, the concept of food security was re-defined in 1983 to include 'entitlements to food' through secured physical and economic access to available foods by vulnerable groups of people (cf. FAO 1983).

Three years later, in its report *Poverty and Hunger*, the World Bank (1986) came up with the notion of chronic food insecurity, which is caused by structural factors (lack of assets, education, etc.) and transitory food insecurity caused by temporary factors (volatility of commodity prices, war, natural calamities, etc.). Transitory food insecurity is further qualified as cyclical and temporary food insecurity, with the former indicating recurrence. Such distinctions had a significant impact on a country's long-term economic development policy measures regarding the reduction of poverty and short-term strategies for addressing short-term factors of food insecurity. In this respect, Ethiopia is globally known for cyclical food insecurity problems that affect millions of its population due to irregular patterns of rainfall. As this thesis is being written, several parts of Ethiopia are hit by El Nino,[55] which has resulted in failed and poor rainfall conditions in the *belg* and *meher* seasons,[56] respectively, and the number of people

[55] El Niño is a water-warming weather phenomenon in the Pacific Ocean with mixed/diverse effects of both reduced rainfall levels and flooding in East Africa (*The Irish Times* 2015).
[56] Ethiopia has a bimodal rainy season in several parts of the country. The *belg* season (usually between February and April) is short while the *meher* or main rainy season (May to September) is long. In the *belg* rainy season, early

needing emergency food aid had escalated to close to 8.2 million in October 2015 (*The Irish Times* 2015) from 4.5 million in August 2015 (GIEWS 2015; UNOCHA 2015) and is forecast to reach 15 million in 2016 (BBC Africa 2015).

In the 1990s, the concept of food security further evolved to address the concerns of access to healthy and nutritious food to ensure an active and healthy life for individual members of a household. Such re-definition came after concerns over inequitable access to nutritious food stuffs among men and women within a household were raised (Quisumbing & Maluccio 1999), which necessitated looking into the food acquisition behaviour of households (Jones *et al*. 2013). This evolution brought a third important component – utilization of food – into the food security conceptualization, which shifted the focus of food security studies to consider issues of dietary quality (Jonsson 2010). The inclusion of the food utilization dimension in the definition of food security implied that simple physical and economic access to food are necessary but not sufficient to achieve food security (Jones *et al*. 2013). The delegates of the World Food Summit in 1996 thus considered the importance of food utilization in attaining food security within the household and came up with a re-definition of food security to reflect issues of dietary quality and intra-household food access. The first definition was adopted in the 1996 World Food Summit and states "food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life" (FAO 1996). FAO provided an alternative definition in 2001. In the second version, social access to sufficient, safe and nutritious food was added in addition to ensuring physical and economic access to food so as to reflect the importance of consumption of food stuffs that are culturally acceptable to society (FAO 2001).

In the 1996 and 2001 conceptualizations of food security, the phrase *at all times* is included to emphasize the importance of *stability of food security* across time. This has further strengthened the 1986 World Bank's notion of chronic and transitory food security. Due to the use of cross-sectional research designs, food security researchers seldom addressed stability of food security despite the fact that individuals and households move in and out of food security situations due to temporary as well as permanent shocks (Carter & Barrett 2006). Though these definitions are comprehensive and cited several times by researchers, indicators used to measure the different

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maturing crops are usually produced and fill up food balance gaps of the population, in addition to supplying green pasture and water for livestock.

dimensions stated in the definitions show variation, again reflecting the practical challenges of food security metrics.

5.3 Indicators and Measurement of Food Security

The literature on food security is massive and diverse. Researchers use food security indicators that measure any one or combinations of the four dimensions (availability, access, utilization and stability) of food security at national, regional, household and/or individual level. The diversity of food security indicators used in the literature brings a "dizzy array of options" to the measurement of food security (Jones *et al*. 2013, p. 484). This section tries to present a summary of the widely used food security metrics at various levels/scales so as to provide a conceptual map of the selection of food security indicators for this study.

Depending on the scale of analysis – national, regional, household or individual – and the dimension of food security – availability, access, utilization or stability – a variety of food security indicators are used to estimate the magnitude of food security. At national/regional level, the availability and access dimensions of food security are commonly addressed by several studies (Jayne & Molla 1995; Asefa & Zegeye 2003; Van der Veen & Tagel 2011). Indicators such as Food Balance Sheet (FBS),[57] Global Food Security Index (GFSI), Famine Early Warning System Network (FEWSN), Comprehensive Food Security and Vulnerability Analysis (CFSVA), etc., are some of the indicators used in this respect. The Global Hunger Index uses an aggregate index of three equally weighted indicators – undernourishment, child mortality and child under weight – as an indicator of food security status (IFPRI *et al*. 2012). While food security metrics that capture the availability dimension of food security provide information about food surplus or deficiency at national level (FAO 2001) allow comparisons among countries based on food supply to their citizens (Jones *et al*. 2013), and enable the setting of targets for agricultural production (FAO 2001), these hide the many facets of food insecurity at household and individual level (FAO 2012d).

At household and individual level, the focus of several studies is on the access and utilization dimensions of food security, and indicators such as Household Consumption and Expenditure Survey (HCES), Coping Strategy Index (CSI), Household Dietary Diversity Score (HDDS), Household Food Insecurity Access Scale (HFIAS), Food Energy Intake (FEI), and

[57] Food balance sheet is calculated using national aggregate data on food supply (domestic food production and total food imports) and food utilization (FAO 2001).

anthropometric measure of weight and height are commonly used (Hoddinott & Yohannes 2002; Maxwell *et al*. 2003; Schmidt & Dorosh 2009; Shete 2010; Gebreyesus *et al*. 2015). The stability dimension of food security is less commonly researched since it requires a cohort of observations for repeated measurement. The food consumption expenditure adjusted for family size, age and sex composition is widely used as an indicator of the *access* dimensions of household food security status. This requires establishing a food basket that represents the food preferences of the poor so as to address the basic concept of 'food preferences' embodied in definition of food security. Dietary diversity is an indicator of food security used to capture the nutritional quality of a household's food basket.

In this study, three different indicators of food security such as the Food Consumption Expenditure, the Coping Strategy Index and the Food Energy Intake are used to measure levels of food security using the conceptualization of food security on the basis of access and utilization dimension. Combining different types of indicators helps to see the robustness of the food security metrics as well as to complement the deficiency of anyone of the indicator. In two of the case studies (Oromia and Benshanguel Gumuz), the same cohort of respondents was studied for two different time periods using these indicators. This helps to rule out food insecurity arising from factors not related to the intervention.

The basket of food items developed for highlands of Ethiopia (see Annex 5.1), which ensures an individual 2,200 Kcal per adult equivalent per day (Dercon & Tadesse 1999, p. 89), was one of the indicators used in this study. The basket of food items was valued at the local market prices for each study area and prices were collected concurrently with the household surveys. This served as a food poverty line for that particular area. Household consumption data from different sources were collected for the week prior to the survey to reduce problems of recall. This was valued using the local market prices in the same way as the basket of food items, and it was later converted into a monthly consumption expenditure after it was adjusted for adult equivalent units (see Annex 5.2).[58] Household consumption expenditure per adult equivalent was then compared to the basket of food items that provides 2,200 Kcal per adult equivalent per day in order to identify a family's food security status. Households with daily consumption expenditure below 2,200 Kcal per adult equivalent per day are food insecure.

[58] Consumption difference between households due to differences in age and sex of family members were normalized using adult equivalent units developed for Ethiopia by Dercon and Krishnan (1998, p. 40).

A second food security indicator used in this study is the Coping Strategy Index (CSI). This method takes into account the coping strategies that households follow when they neither have enough food at their disposal, nor enough money to buy food from the market. It measures the coping behaviour of households adopted as a short-term fall-back mechanism in response to an immediate and temporary decline in access to food. The coping behaviours are reversible compared to adaptation strategies adopted for persistent deprivation to food. For each study area, the coping strategies adopted by food insecure households were identified during the exploratory phase of the research conducted in each region. The frequency of use of the coping strategies was recorded for the past seven days in the follow-up household surveys conducted in each region. With the help of five Focus Group Discussions (FGDs) organized in each study area, household coping strategies were weighted for their severity levels as least severe, moderate severe, severe, and most severe. A weighted average severity score was then calculated for each coping strategy by multiplying the frequency of use of the coping strategy by each food insecure household with the severity score. This gives a score for the Coping Strategy Index.[59]

A third food security indicator used in this study is the Food Energy Intake per adult equivalent per day. The Ethiopian Health and Nutrition Research Institute (EHNRI) and the Food and Agriculture Organization of the United Nations developed food composition tables for different traditional foods consumed in Ethiopia (EHNRI 1997; EHNRI & FAO 1998). Using these food composition tables, the consumption data collected from households were calculated for energy content. Allowance was given for the loss of food during preparation. The daily household energy intake was then rescaled into an adult equivalent unit using adult equivalent conversion factors. Households that fulfil a daily energy intake of 2,200 Kcal and above per adult equivalent are food secure. The basket of food items developed for highlands of Ethiopia with cereal-based farming cannot be a representative food basket for lowland areas of the country, which have a different food culture and preferences. Therefore, this indicator was not used for Gambella and Benshanguel Gumuz Regional States. For these two regions, only the CSI and the daily Food Energy Intake indicators of food security were used, but for Oromia Regional State all the three indicators were applied.

[59] For details of the procedures to calculate the CSI score see Maxwell & Caldwell (2008).

5.4 Results and Discussion

5.4.1 Evidence from Oromia Regional State: the case of Karuturi Farm in Bako

As discussed in the methodology section of Chapter 1, the impact of Karuturi's intervention on household food security status is estimated using two different methodological approaches – the PSM and the double difference technique (DiD) – of estimating impacts of interventions. It is important to remind readers again about the data sources of this study used for the two impact estimation techniques. The data set used for the estimation based on the PSM technique came from 300 households (142 affected and 158 non-affected households) that were surveyed in 2012. On the other hand, the data set used for the estimation based on the DiD technique came from the 158 households who were surveyed in 2012 representing the non-affected households. Hence, the 2012 survey on 158 households served as a baseline survey for the DiD estimation. In 2014, these households were surveyed again for the second time. During this time, 75 out of the 158 households had lost access to land due to Karuturi's intervention and hence they were surveyed representing the affected stratum. On the other hand, 83 out of the 158 households still had access to the land owned through the *de facto* customary property regime, and hence they were surveyed representing the non-affected households. This means that the data set for the two impact estimation techniques has some overlap, which will yield comparable but not necessarily the same estimates. The following section presents the results from the two approaches.

5.4.1.1 Estimation of magnitude and impact of Karuturi's intervention on household food security using the 2012 cross-sectional household survey data

1) Magnitude of food security in Bako Tibe District using cross-sectional data (n=300)

The quantities of food commodities accessed and consumed by each households from different sources were recorded for the week prior to the survey period. This was later converted into consumption expenditure and re-scaled using adult equivalent units to account for differences in the age and sex of household members. This allowed comparison between different households. To identify the difference in food-security status between affected and non-affected households, household consumption expenditure data in both categories was compared to a basket of food items that provides 2,200 Kcal per adult equivalent per day. The estimate indicates that expenditure on food in order to be food secure in the district was ETB 1,925 (US$ 106) per year in 2012, which is a little less than the national estimate of ETB 1,985 (US$ 109) per year. The mean monthly consumption expenditure for households affected by Karuturi was estimated at ETB 256 for the same year, which is 27% lower than the mean monthly consumption expenditure

of non-affected households (ETB 351). Using this indicator, the level of food insecurity in Bako Tibe District was 32% for affected and 12% for non-affected households (Table 5.1).

Table 5.1: Magnitude of food security in Bako Tibe District for affected and non-affected households

Food security indicator	Affected households (n=142)						Non-affected households (n=158)					
	Food insecure		Food secure		Total		Food insecure		Food secure		Total	
	F	*%*	*f*	*%*	*F*	*%*	*f*	*%*	*F*	*%*	*F*	*%*
Consumption expenditure	46	32.4	96	67.6	142	100	19	12	139	88	158	100
Coping strategy index	51	35.9	91	64.1	142	100	21	13.3	137	86.7	158	100
Food energy intake	47	33.1	95	66.9	142	100	21	13.3	137	86.7	158	100

Source: Survey data, 2012; Note: f= Frequency

The Coping Strategy Index was the other food security indicator for Bako. Households that faced food shortages and had no income at their disposal to buy food in the market employed different coping mechanisms. A relatively high coping strategy score shows a high degree of food insecurity. Those who faced severe food insecurity employed more precarious coping mechanisms than those who had less serious food security problems. Households in the affected stratum were found to use more challenging coping mechanisms. These included not eating for a whole day, borrowing food from neighbours (which is considered as a loss of dignity in the community) and consuming seed stock that has been set aside for cultivation in the following season. On the other hand, households in the non-affected stratum adopted less severe coping mechanisms, such as buying and consuming less preferred and cheaper foods and reducing the size and frequency of their meals. By definition, a zero CSI score means that a household is food secure and a CSI score above zero means that some level of food insecurity exists. The results of the survey showed that while households in the non-affected stratum had an average CSI score of 0.17, those in the affected stratum had an average CSI score of 1.7 (see Annex 5.3 and 5.4 for the coping strategies adopted in Bako area).

The households in both affected and non-affected categories that adopted some level of coping mechanisms were identified and the percentage of households that were food insecure was calculated. The results indicated that 36% of the households in the affected stratum had a CSI score above zero, and were thus food insecure, compared to 13% of those in the non-affected stratum (Table 5.1). This result is comparable to what was found using consumption expenditure

per adult equivalent as an indicator of food security and justifies the robustness of the study's findings.

The third food security indictor used in Bako was the Food Energy Intake (FEI) measured in kilocalories. As discussed in the previous section, the food composition table developed by FAO and ENHRI for use in Ethiopia was used in the calculation of the food energy contents of the different food commodities consumed by households in Bako. The mean energy consumed per adult equivalent per day by those households in the affected stratum was 2,232 Kcal, which is 12.5% less than the energy intake (2,510 Kcal) consumed by those in the non-affected stratum. Based on this indicator, 33.1% of the affected households were found to be food insecure, which is a little less than the estimated magnitude of food insecurity based on the CSI indicator but closer to the magnitude of food security estimated based on the Food Consumption Expenditure. On the other hand, the level of food insecurity of the non-affected households (13%) estimated using the FEI as indicator was consistent with the estimated magnitude of food insecurity based on the CSI indicator. All the three food security indicators provided estimates of the magnitude of food insecurity in the area with only marginal differences demonstrating the stability of the results.

By any standard, the magnitude of food insecurity of the households estimated using all the three indicators (32–36%) in the affected stratum is comparatively higher than those in the non-affected stratum (12–13%). Several factors could contribute to the level of food insecurity in the affected and non-affected strata and cannot be entirely attributed to Karuturi's intervention. It is therefore necessary to decompose the food insecurity that occurred due to the intervention by Karuturi. The next section, therefore, discusses the impact of Karuturi's intervention on the food security status of households using the technique of PSM.

2) Impact of Karuturi's intervention on households' food security in Bako Tibe District using cross-sectional data (n=300)

To determine the degree of food insecurity that was attributed to the transfer of land to Karuturi, the Propensity Score Matching (PSM) techniques was estimated. The PSM results presented in Table 5.2 indicate that the affected households, on average, spent food consumption expenditure which was 20–26% lower than the non-affected households. In other words, on average, they spent ETB 69–92 less money on food items compared to the food expenses of the non-affected households. Based on the CSI indicator, the scores of coping strategies adopted by households in

the affected stratum were nine times higher than those of non-affected households. The difference between the scores indicates the severity of the coping mechanisms adopted, which is related to the high degree of food insecurity experienced by the affected households. Similarly, due to the intervention of Karuturi, the affected households consumed food energy that was 12–13% (i.e. a decline of 268.95–294.75 Kcal per adult equivalent per day) lower than the food energy consumed by the non-affected households. The results were significant at either $p<0.01$, $p<0.05$ or $p<0.1$ (Table 5.2)

Table 5.2: Impact of Karuturi's investment on households' food security in Bako Tibe District

Food security indicators	Matching algorithms [a]	Matched samples		Impact (ATT)	Std. error[b]	t-statistics
		Affected	Non-affected	Kcal/ ETB/CSI (%)		
Consumption expenditure (ETB)	NN	142	66	-91.9 (-26.2)	49.1	-1.87*
	Radius	36	39	-77.3	80.1	-0.97
	Kernel	142	142	-69.3 (-19.7)	30.9	-2.24**
	SS	142	142	-70.4 (-20)	33.9	-2.07**
Coping Strategy Index (CSI)	NN	142	66	1.5 (8.8 times)	0.5	2.96***
	Radius	36	39	0.8	1.5	0.52
	Kernel	142	142	1.6 (9.4 times)	0.5	2.99***
	SS	142	142	1.6 (9.4 times)	0.5	3.29***
Food energy intake (Kcal)	NN	142	66	-268.95 (-12.3)	91.3	-2.95**
	Radius	36	39	-276.97 (-12.4)	55.3	-5.0***
	Kernel	142	142	-294.75 (-13.3)	66.37	-4.44***
	SS	142	142	-275.86 (-12.3)	70.95	-3.89***

[a] Radius matching was done with a calliper of 0.001 [b]Bootstrap standard error is calculated based on 100 replications *** $p< 0.01$; ** $p< 0.05$; and * $p< 0.1$

Source: Survey data, 2012

To identify the degree of food insecurity due to the intervention by Karuturi, the food insecurity level of the affected households in the district before and after the intervention for all the three food security indicators was decomposed. To do this, the average loss of monthly consumption expenditure (ETB 69–92) was accounted for in relation to each household's monthly consumption expenditure. The result indicated that about 26–30% of the affected households became food insecure after the intervention due to the transfer of land to the company. On the other hand, the food insecurity level of the affected households before the intervention, which was the result of factors other than the intervention by Karuturi was 3–6%. This confirms that large-scale land acquisition in Bako Tibe District exacerbated communities' food insecurity

levels, assuming that there is no selection bias due to unobservable farm and non-farm co-variates (Table 5.3).

Table 5.3: Decomposition of affected households' food insecurity after accounting for the estimated loss of consumption expenditure, n=142

Matching technique	Frequency / (%) of food-insecure households		Frequency / (%) of total food-insecure households
	Before the intervention	After the intervention	
NN	4 / (2.8)	42 / (29.6)	46 / (32.4)
Kernel	9 / (6.3)	37 / (26.1)	46 / (32.4)
Stratification	8 / (5.6)	38 / (26.8)	46 / (32.4)

Source: Survey data, 2012

The same procedure was followed for the CSI food security indicator in order to decompose the level of affected households' food insecurity before and after the intervention. Based on the CSI score, 36% of the affected households were food insecure. Results of the Propensity Score Matching indicated that the affected households adopted food security coping strategies with scores that go up to 1.6 (Table 5.2). When the mean increase in CSI score due to the loss of the land is subtracted from the individual household's CSI score, the level of food insecurity after the intervention by Karuturi is 30%. This means that only 6% of the households were food insecure in Bako District before Karuturi started farming in the villages. This result is again comparable with the estimation based on the consumption expenditure indicator and confirms the robustness of the findings (Table 5.4).

Table 5.4: Decomposition of affected household's food insecurity after accounting for the estimated increase in CSI score, n=142

Matching technique	Frequency / (%) of food-insecure households		Frequency / (%) of total food-insecure households
	Before the intervention	After the intervention	
NN	8 / (5.6)	43 / (30.2)	51 / (35.9)
Kernel	8 / (5.6)	43/ (30.2)	51/ (35.9)
Stratification	8 / (5.6)	43/ (30.2)	51/ (35.9)

Source: Survey data, 2012

Likewise, a similar procedure was followed to decompose the proportion of affected households who were food insecure before and after the intervention of Karuturi by accounting for the average food energy consumption, which declined due to the loss of land and impacted each household's daily food energy consumption. The estimated result using the PSM technique yielded that, on average, the affected households consumed 269–295 Kcal less food energy per adult equivalent per day (Table 5.2). The estimated declines in food energy consumption were added to each affected household's daily food energy consumption to examine the changes in their status of food security. The result revealed that 27.5–28.2% of the affected households became food insecure after they lost access to farm and grazing lands due to the transfer of land to Karuturi. Prior to the land transfer to Karuturi, only a small proportion of the households (5–6%) were food insecure based on the food energy intake indicator of food security (Table 5.5).

Table 5.5: Decomposition of affected households' food insecurity after accounting for the estimated loss of food energy consumed per adult equivalent per day (Kcal), n=142

Matching technique	Frequency / (%) of food-insecure households		Frequency / (%) of total food-insecure households
	Before the intervention	After the intervention	
NN	8 / (6.3)	39 / (27.5)	47 / (33.1)
Radius	7 / (4.9)	40 / (28.2)	47 / (33.1)
Kernel	7 / (4.9)	40 / (28.2)	47 / (33.1)
Stratification	7 / (4.9)	40 / (28.2)	47 / (33.1)

Source: Survey data, 2012

In sum, the results presented so far were from a data set generated from 300 households in 2012 (142 affected and 158 non-affected) through a cross-section research design in which the affected households were compared to the non-affected ones using the PSM technique. With this approach, the study estimated that 26–30% of the affected households were food insecure based on the indicator of food consumption expenditure, 30% of them were food insecure based on the CSI indicator, and 27–28% of them were food insecure based on the indicator of food energy intake. All three food security indicators provided a comparable estimation results for the magnitude of impact of transferring the farm and grazing land owned through the *de facto* customary property regime on the food security status of local people. Local people used to produce food crops such as *teff* and Niger seed in the relatively well-drained parts of the valley

bottom and graze animals in the water-logged parts of the valley, which are now given over to large-scale farming by Karuturi. The transfer of these lands to Karuturi worsened the food insecurity status of the local population in Bako Tibe District to an alarming rate, from 3–6% of food insecurity before the intervention to 32–36% after the intervention.

5.4.1.2 Estimation of magnitude and impact of Karuturi's intervention on household food security using the 2012 and 2014 household survey data

As mentioned previously, a second impact estimation approach, i.e. the double-difference (DiD) technique, was implemented to estimate the magnitude of impact of Karuturi's intervention on the food security status of the local population in Bako Tibe District. This was done in an effort to see whether the attribution of changes in the food security status of the local population is consistent between the two approaches. The discussions presented below are therefore based on the analysis of a data set generated from 158 households interviewed both in 2012 and in 2014 using the approach of the double-difference technique for impact estimation.

1) Magnitude of household food security status in Bako Tibe District using panel data (n=158)

During the baseline period (i.e. in 2012), the mean monthly consumption expenditures for households in affected (n=75) and non-affected (n=83) strata were about ETB 352 and ETB 351, respectively. In 2014, the mean consumption expenditure for affected households had declined to ETB 248 from the 2012 estimate, which was ETB 352. Proportionally, the affected households experienced a decline in their consumption expenditure in 2014 by about 29.5%. On the other hand, those households in the non-affected group, on average, experienced only a 0.008% decline in their food consumption expenditure (Table 5.6).

Based on the coping strategies adopted, both the affected and non-affected households had similar CSI scores in 2012, which was 0.16–0.17. After the affected households experienced the negative effects of Karuturi's intervention, they adopted coping strategies with relatively high severity scores, and as a result, their CSI score increased by 91.2% (i.e. CSI score=1.81), while the CSI score for the non-affected households had only increased marginally by 5.5% (i.e. CSI score=0.18). Similarly, based on the caloric intake, both the affected and non-affected households had a similar average caloric consumption in 2012, which was 2509 Kcal for the affected and 2512 Kcal for the non-affected ones. In 2014, however, the affected households experienced a decline in caloric consumption by 12.3%, while the caloric consumption of the non-affected households declined marginally by 0.3% (Table 5.6).

Table 5.6: Difference-in-difference estimation of the impact of large-scale farming on household food security in Bako District, Oromia Regional State

Food security indicator	Affected (n=75)	Non-affected (n=83)	DiD
Mean consumption expenditure (ETB) in 2012 (a)	351.5	350.5	1 (t=0.04; NS)
Mean consumption expenditure (ETB) in 2014 (b)	247.9	350.2	-80.7 (t=-3)***
Mean difference (b-a)	**-82.1**	**-0.3**	**-81.7 (Impact)**
SE (t statistics)	11.4 (-7.2)***	2.4 (-0.14)	11.7 (t= -7.3)***
Mean CSI score in 2012 (a)	0.16	0.17	-0.01 (t=-0.1)
Mean CSI score in 2014 (b)	1.81	0.18	1.63 (t=5.14)***
Mean difference (b-a)	**1.65**	**0.01**	**1.64 (Impact)**
SE (t statistics)	0.31 (t=5.4)***	0.06 (t=0.2)	0.3 (t=3.0)***
Mean calorie intake in 2012 (a)	2509.2	2511.6	-2.4 (t=-0.03)
Mean calorie intake in 2014 (b)	2235.2	2504.2	-269.1 (t=-3.7)***
Mean difference (b-a)	**-274**	**-7.3**	**-266.7 (Impact)**
SE (t statistics)	37.3 (t=-7.3)***	32.8 (t=-0.22)	49.5 (t=-5.4)***

Source: Survey data, 2012 and 2014; *** $p<0.001$

The basket of food items that provides 2200 Kcal per adult equivalent per day is valued using the food prices collected in Bako local market in 2014. The amount of food consumption expenditure that enables an adult to be food secure per month in Bako was ETB 175. The food expenditure needed by an adult per month to be food secure in 2014 is 9% higher than the food consumption needed by an adult per month in 2012 (i.e. ETB 160.42). The estimation of the magnitude of food security using the data set for two periods indicates that the household food security status deteriorated between the two periods. Magnitude of food insecurity for affected households in 2012 was about 5%, and for the same group of households, the magnitude of food insecurity has worsened in 2014 and reached 33–36%. For the non-affected households, the magnitude of food insecurity in 2012 was 5–6% and remained relatively unchanged at 6% in 2014 (Table 5.7). The magnitude of food insecurity for the affected households estimated using cross-sectional survey data of 2012 for the three food security indicators ranges between 32–36%, which is closer to the magnitude estimated using panel data (2012 and 2014), which was 33–36% (Tables 5.1 and 5.7).

Table 5.7: Magnitude of food security before (2012) and after Karuturi's intervention (2014) in Bako Tibe District, Oromia Regional State

Food security status based on different indicators	Affected (n=75)		Non-affected (n=83)	
	Before (2012)	After (2014)	Before (2012)	After (2014)
1. Consumption expenditure				
Frequency / (%) food secure	71 / (95)	50 / (67)	79 / (95)	78 / (94)
Frequency / (%) food insecure	4 / (5)	25 / (33)	4 / (5)	5 / (6)
2. Coping strategy index				
Frequency / (%) food secure	70 / (95)	48 / (64)	78 / (94)	78 / (94)
Frequency / (%) food insecure	4 / (5)	27 / (36)	5 / (6)	5 / (6)
3. Food energy intake				
Frequency / (%) food secure	71 / (95)	50 / (67)	78 / (94)	78 / (94)
Frequency / (%) food insecure	4 / (5)	25 / (33)	5 / (6)	5 / (6)

Source: Survey data, 2012 and 2014

2) Impact of Karuturi's intervention on household food security status in Bako Tibe District using panel data (n=158)

This section deals with the impact of Karuturi's intervention on the food security status of households and compares the result with the impact estimated based on the cross-sectional data set presented in section 5.5.1.1.

The double difference impact estimation result presented in Table 5.7 indicates that the transfer of land that was used by the local population in Bako Tibe District through the *de facto* customary property regime had significantly undermined household food security status for all the three food security indicators. Using the double difference approach and the food consumption expenditure indicator, those households who had lost access to farm and grazing lands due to Karuturi's intervention, on average, spent ETB 82 less per month for an adult in 2014 compared to their expenditure in 2012. Using the PSM approach, those households who are affected by Karuturi spent, on average, ETB 69–92 less per month compared to those households who are not affected by Karuturi's intervention. The decline in average consumption expenditure, estimated through the DiD technique for affected households, is within the range of the consumption expenditure values estimated through the PSM method, demonstrating the comparability of the two impact estimation approaches.

Decomposition analysis was carried, accounting for the average loss in consumption expenditure (i.e. ETB 82) to each household's monthly consumption expenditure data, and then compared to the base line that makes an individual food secure. The result revealed that 28% of the households became food insecure after they lost access to lands due to the intervention of Karuturi (Table 5.8). The decomposition result calculated based on the double-difference impact estimation approach is comparable to the decomposition outcome done using the PSM technique presented in Table 5.3.

Table 5.8: Decomposition of the food insecurity level of affected households after accounting for the impact of the intervention

Food security indicators	Frequency (%) food insecure households (n=75)		Frequency (%) total food insecure households
	Others factors	Due to intervention	
1. Consumption expenditure	4 (5.3%)	21 (28.0%)	25 (33.3%)
2. Coping strategy index	5 (6.7%)	22 (29.3%)	27 (36.0%)
3. Food energy intake	4 (5.3%)	21 (28.0%)	25 (33.3%)

Source: Survey data, 2012 and 2014

The same approach was followed for the Coping Strategy Index and the Food Energy Intake indicators of food security to estimate the impact of Karuturi's intervention on household food security status. Accordingly, after the local people lost access to land, on average, the affected households adopted a mean CSI score that has a severity score of 1.64 (Table 5.6). This score is comparable to the value estimated using the PSM approach, which was 1.5–1.6 (Table 5.2). Based on this indicator, the decomposition analysis revealed that 29.3% of the affected households became food insecure after they lost access to land following the transfer of the land to Karuturi (Table 5.8), and the magnitude of impact is comparable to the result estimated using the PSM approach, which is 30% (Table 5.4). Similarly, the average impact of losing land to Karuturi on the daily calories consumed per adult equivalent was 265 Kcal (Table 5.6), which is again close to the range of the impact estimated using the PSM approach (269–296 Kcal) presented in Table 5.2. The decomposition analysis after the double-difference analysis revealed that 28% of the affected households were estimated to be food insecure using the caloric intake food security indicator after they lost access to land due to Karuturi's intervention (Table 5.8).

This magnitude of impact is the same as the magnitude of impact attributed to Karuturi using the PSM approach, which was 28% (Table 5.5).

In sum, the magnitude of food insecurity estimated based on the two-year panel data and using the double-difference approach revealed that food insecurity among affected households worsened between 2012 and 2014, and the magnitude attributed to the loss of access to land due to Karuturi's intervention was 28–29%. Moreover, the PSM and the double-difference approaches of estimating impacts of development intervention consistently estimated the magnitude of impact of losing access to land on household food security status in Bako Tibe District.

Bako Tibe District has a good agricultural production potential and has only suffered a few incidences of food insecurity, unlike other parts of Ethiopia where it is prevalent. The magnitude of food insecurity attributed to Karuturi's intervention can be argued as very high for an area which used to experience a very low incidence of food insecurity (5–6%). A study by Fisseha (2011) also reported that the local people were food self-sufficient prior to 2008. The transfer of farmland to large-scale commercial farming has worsened the local food insecurity situation and resulted in a loss of income for the local community. Karuturi is currently supplying its products to the Addis Ababa market, which has little negative impacts in terms of dampening the local Bako price for smallholder farmers who are net sellers. Nor has it enhanced food security by increasing the availability of food for those who are net buyers.

While the development approach adopted by the Ethiopian government aims to enhance the food security and incomes of local people, this has not been achieved in the case of Bako Tibe District. The quantitative findings of this study agree with the claims made by the former UN Special Rapporteur on the Right to Food, Olivier De Schutter (2011, p. 250), that inward agricultural investment, no matter how well managed, has high opportunity costs and a low poverty-reducing effect for the local people. Findings from around the world also reported that the business model of plantation agriculture[60] undermined, rather than complemented local-level food security (cf. Oxfam 2014), reduced local food production by alienating land and exacerbated the pre-existing poverty of local people (Smalley 2013). The policy expectations of the Ethiopian

[60] "'Plantations grow one main cash crop; require capital investment; are larger than an average-sized holding although some land may be left uncultivated; rely on hired resident or non-resident labor, often including migrant labor; and are centrally managed. Ownership may be foreign or domestic, private or corporate" (Smalley 2013, 3).

(developmental) state that large-scale agricultural investment would play a complementary role in addressing local-level food security objectives have not been realized in the case of Bako. In this part of the region, promoting smallholder farming might be much more important than large-scale farming, given the evidence from this study that households were better off in terms of food-security status and income levels before land was transferred to the company.

5.4.2 Evidence from Gambella Regional State: The case of Basen Farm

The magnitude of food insecurity is relatively higher in Gambella Regional State compared to the situation in Oromia Regional State. On average, those households affected by Basen Farm in Abobo District of Gambella Regional State employed one or more coping strategies that had a mean CSI score of 4.2. Based on this indicator, 58% of the affected households were food insecure. On the other hand, those households that are selected to serve as counterfactuals adopted coping strategies that had a mean CSI score of 2.18. Proportionally, the magnitude of food insecurity among the non-affected households was lower than the affected households, which was estimated at 46.4% (Table 5.9).

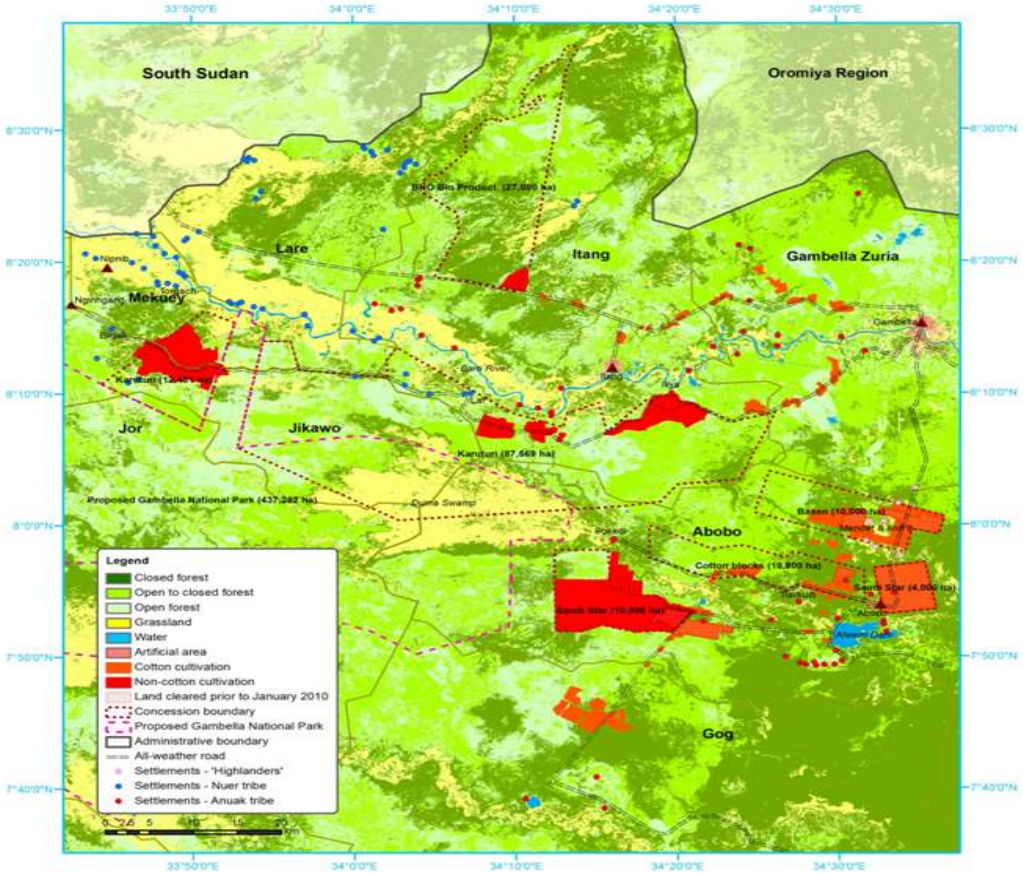
Table 5.9: Food security status of households affected by Basen Farm, Gambella Regional State

Indicator	Affected households (n=100)			Non-affected households (n=125)		
	Food insecure	Food secure	Total	Food insecure	Food secure	Total
Food energy intake (Kcal)	57(57%)	43 (43%)	100(100%)	61(48.8%)	58(46.4%)	125(100%)
Coping strategy index (CSI)	58 (58%)	42 (42%)	100(100%)	58(46.4%)	55(44%)	125(100%)

Source: Survey data, 2013

There are, generally, similarities between those households in the affected and non-affected strata in terms of employing food security coping strategies, albeit the difference is the frequency with which the strategies are employed. Coping strategies adopted include seeking emergency food aid, hunting and consuming bush meat, borrowing food from neighbours and/or relatives, decreasing portions and frequency of meals, consuming seeds put aside for next planting season and skipping meals. The households who are affected by Basen's intervention used precarious coping strategies, such as reducing both the frequency and portion of meals, and borrowing food from neighbours or relatives, which is considered shameful by society. Apart from the magnitude of food insecurity, the types of coping mechanism adopted by food insecure households serve as

a good proxy for the worsening food security situation among those households who lost access to additional cultivation plots due to the appropriation of farmlands by Basen Farm (Annex 5.5 and 5.6). According to an estimate by Schoneveld (2013), 383 immigrant settlers were enclosed by the concession of Basen Farm and they had lost 45% of their farmlands due to their inability to cultivate additional parcels after the inception of Basen's cotton farm (see Figure 5.1). The claim of the author corroborates with the findings of this study in that magnitude of food insecurity among households affected by Basen Farm had generally increased.



Source: Schoneveld (2013, p. 66)
Figure 5.1: Settlement pattern and large-scale farm development in Gambella Regional State

As is the case in Bako, the magnitude of food security in Abobo District was also estimated based on the food energy consumed per adult equivalent per day. Generally speaking, households in both strata failed to satisfy the minimum energy intake per adult equivalent per day required for a healthy life. The mean number of calories consumed per adult equivalent per day by those households affected by Basen Farm was 2,004 Kcal, which was lower than the amount of calorie

consumed by the households in the non-affected stratum (2093 Kcal). The food energy consumed by affected and non-affected households was 9.8% and 5.1% less than the recommended calories (2200 Kcal per adult per day), respectively, indicating that the immigrant settlers in the district are generally food insecure. Based on the FEI indicator of food security, 57% of the households in the affected stratum and 48.8% of the households in the non-affected stratum were food insecure. The estimated food insecurity using the CSI and FEI indicators are generally consistent, showing the robustness of the results (Table 5.9).

To factor in the magnitude of food insecurity to the intervention, the Propensity Score Matching was estimated in this study. Before proceeding to the estimation of the Average Treatment effect on the Treated (ATT), the balancing property for the affected and non-affected households was checked, and this was satisfied in a block of seven. The common support region that ensures the mean Propensity Score for the two groups of households was not different either. The average treatment effects on the treated (ATT) – in this case the average increase in the scores of coping strategies and the average decline in the amount of calories consumed – were estimated through nearest neighbourhood, radius, kernel and stratification matching techniques. The results confirmed that, on average, the coping strategies adopted by the households in the affected stratum were 1.9–2.2 higher than the non-affected stratum. Proportionally, due to the appropriation of farmlands by Basen Farm, the immigrant settlers adopted food security coping strategies that are 46–50% more severe. Similarly, the affected households, on average, consumed 78–93 Kcal per adult equivalent per day less than the amount consumed by their counterfactuals. Proportionally, the average decline in caloric consumption due to the loss of farmlands was 3.9–4.7%. The average increase in the scores of the Coping Strategy Index and the decline in the caloric consumption by those households due to the loss of land to Basen Farm was statistically significant for all the matching techniques (Table 5.10).

Cotton picking in Basen Farm is largely done through wage labour, and thus there is a huge demand for labour in this regard. Participation in wage employment could potentially offset the loss of land and minimize the negative impacts of farmland appropriation on household food security status. Nevertheless, the company imports labour from the Wolaita Sodo area in southern Ethiopia, and the settlers who are enclaved by Basen Farm did not receive any significant benefit from wage employment. In an interview conducted with the Human Resource Manager of Basen Farm on 28 January 2012 it was revealed that the company has reservations about recruiting labourers among the settlers because they not only lack the needed dexterity to pick the cotton

fibre from the pods efficiently, with little wastage, but they also perform slowly compared to those from southern Ethiopia. As a result, the company disfavour them in wage employment. Although farmland investments are promoted by the Ethiopian government, partly under the guise of employment creation for local people that would improve their food security situation, the position of Basen clearly illustrates that this was not the case.

Table 5.10: Impact of Basen Farm on household food security, Gambella Regional State

Food security indicators	Matching technique[a]	Matched samples		Impact (ATT)	Std. error[b]	t-value
		Affected	Non-affected	Kcal/CSI (%)		
Food energy intake (Kcal)	NN	100	54	-92.73	55.90	-1.66*
	Radius	67	111	-89.04	56.51	-1.58*
	Kernel	100	125	-78.54	40.00	-1.96*
	SS	91	134	-82.53	42.26	-1.95*
Coping Strategy Index (CSI)	NN	100	54	1.89	0.66	2.88**
	Radius	67	111	2.24	0.64	3.49***
	Kernel	100	125	1.93	0.59	3.29***
	SS	91	134	2.18	0.53	4.14***

[a] Radius matching was done with a calliper of 0.01 [b]Bootstrap standard error is calculated based on 100 replications; ***p<0.01; **p<0.05; *p<0.1
Source: Survey data, 2013

Further, in a bid to decompose the magnitude of food insecurity caused by Basen Farm and other factors, the average increase in CSI score was accounted for in respect of the food security Coping Strategy Index adopted by each affected household. Similarly, the average decline in Kcal is also accounted for with regard to the food energy consumed per adult equivalent per day by each affected household. For both the CSI and FEI indicators, the decomposition analysis revealed that food insecurity has increased among immigrant settlers by 8–10% due to their inability to access farmlands. Using the FEI indicator, all the matching techniques used in the analysis revealed that 8% of the households in the affected stratum became food insecure due to the loss of land to Basen Farm, while the causes for the food insecurity for the remaining 49% of the households were due to factors other than the loss of land. Similarly, using the CSI indicator, 10% of the households in the affected stratum became food insecure after they lost access to land

due to Basen Farm, while the causes for the food insecurity for the remaining 48% of the households were factors other than Basen's intervention.

Basen's concession enclaves a significant proportion of households who immigrated to and settled in Gambella in 1982 through the national re-settlement scheme implemented by the former military regime as a solution for food insecurity challenges in their area of origin. Originally, the settlers came from the southern and northern highlands of Ethiopia where food insecurity was rampant due to a shortage of cultivable land and frequent droughts. The scheme was reportedly unsuccessful and, as confirmed by this study too, the magnitude of food insecurity among the settlers who are non-affected by Basen Farm is very high, albeit it was meant to minimize the challenges of food insecurity prevalent in the area of origin of the settlers. The food insecurity level of the settlers worsened after they lost access to farmlands. The key informants of this study also explained that they are marginalized by the local administration. For example, when they request better access to farmlands, they are told that the land does not belong to them, but to the native Anuak (Key informant interview with two elderly highlanders conducted at Mender 8 of Abobo District on 28 January 2013). The 1982 settlers who have ethnic backgrounds other than the indigenous people of Gambella Regional State are largely viewed as intruders, not only by the local people, but also by the local administrators. This is much related to the ethnic federalism system that Ethiopia adopted since the downfall of the Derg regime, and the remnants of the settlers from outside Gambella Regional State are, therefore, systematically discriminated in all administrative matters in a form of protest against the political economy adopted by the former regime. The key informants further noted that conflicts over resources are common between the settlers and the Anuak, and on several occasions, the properties of the settlers have been looted with no meaningful administrative and political assistance given to them.

Apart from the loss of cultivable land, as will be discussed in Chapter 6, flooding is exacerbated due to the change in vegetation cover and the farming practices of large-scale farms operating in the vicinity. This has also contributed to the worsening of the welfare condition of the local people.

5.4.3 Evidence from Gambella Regional State: The case of Karuturi Farm

The second large-scale plantation studied in Gambella Regional State is Karuturi Agro Products PLC. In 2013, the company had developed close to 6,500 ha of land out of its 100,000 ha leasehold concession. The company opened farms in two different sites. One of its sites is located

in Ilia village with an estimated developed land size of 2,435 ha. This area is inhabited by the Anuak ethnic group. The second farm site is located in Makuey District (former Jikawo) and the estimated farm size developed so far is 4,000 ha. This area is inhabited by the Nuer ethnic group. Since the livelihood strategies of the Anuak and the Nuer are different, the study hypothesized that Karuturi's intervention will have different impact levels on the food security situation of the two ethnic groups. For this reason, surveys were conducted in both sites, and the findings are presented below.

Gambella Regional State is generally endowed with dense forests, woodlands, wetlands (e.g. the *Duma* wetland), extensive savanna grassland and water bodies (such as Baro, Gillo and Alwero rivers). According to Behailu *et al*. (2011), the Abobo-Gog, Mesengo and Godere areas are estimated to have 540,000 ha of forests, which are classified as national forest priority areas. These areas provide a variety of food sources, such as wild fruits and game meat, for the inhabitants of the region. Paradoxically, food insecurity is estimated to be very high in these parts of Gambella Regional State. Food deficit persists for 3–6 months in the regions, of which March to June are the most severe periods of the year. The results of this study revealed that 45–53% of the non-affected households and 52–63% of the households affected by Karuturi's intervention were food insecure. In terms of the food security situation, the Anuak were initially better off than the Nuer. This is confirmed by the magnitude of food insecurity among the non-affected households of both ethnic groups in which about 54–55% of the Anuak and 47–49% of the Nuer were food secure.

Although it is difficult to compare the mean scores of the food insecurity coping strategies adopted by the two ethnic groups due to differences in the types and severity weights of the strategies (see Annex 5.7–5.10), it is fair to compare them based on the mean calories consumed by the two groups. In this respect, the Anuak, who are not affected by Karuturi's intervention, on average, consumed food commodities that provided 2,143 Kcal per adult equivalent per day, which is lower than the daily caloric intake recommended (2,200 Kcal) for an individual by 2.7%. For the Nuer, this was 2,074 Kcal per adult equivalent per day, which is 6.1% lower than the recommended calorie intake, further revealing that food insecurity among the non-affected Nuer was higher than those among the Anuak (Table 5.11).

Table 5.11: Food security status of households affected by Karuturi Farm, Gambella

Case	Indicator	Affected households (n=100)			Non-affected households (n=125)		
		Food insecure	Food secure	Total	Food insecure	Food secure	Total
Anuak case	Food energy intake (Kcal)	63(63%)	37(37%)	100(100%)	56 (44.8%)	69(55.2%)	125(100%)
	Coping strategy index (CSI)	62(62%)	38(38%)	100(100%)	58 (46.4%)	67(53.6%)	125(100%)
Nuer case	Food energy intake (Kcal)	52(52%)	48(48%)	100(100%)	64 (51.2%)	61(48.8%)	125(100%)
	Coping strategy index (CSI)	53(53%)	47(47%)	100(100%)	66 (52.8%)	59(47.2%)	125(100%)

Source: survey data, 2013

Comparison of the food security situation within each ethnic group shows that the average caloric intake for the Anuak who are affected by Karuturi's intervention was 5.6% (2,030 Kcal/adult equivalent/day) lower than those who were not affected by the intervention (2,143 Kcal/adult equivalent/day). In terms of the average scores of coping strategies, the Anuak who are affected by Karuturi adopted coping strategies that had 48.8% higher mean score values (mean CSI=4.1) than those in the non-affected stratum (mean CSI=2.1). Based on the CSI and FEI indicators, 62–63% of the Anuak who are affected by Karuturi were food insecure. Comparatively, 45–46% of the non-affected Anuak were food insecure, which is 17% lower than the magnitude of food insecurity observed among the affected ones (Table 5.11).

Similarly, the Nuer who are affected by Karuturi's intervention, on average, consumed 2,059 Kcal per adult equivalent/day, which is only 0.73% less than the calories consumed by the non-affected ones (2,074 Kcal/adult equivalent/day). Based on the CSI indicator, the Nuer, who are affected by Karuturi's intervention, adopted coping strategies that had mean values of 2.33, compared to the non-affected ones who had CSI mean values of 2.12. Based on the FEI and CSI indicators, 51–53% of the Nuer who are affected by Karuturi were food insecure, which is 4% higher than the magnitude of food insecurity among the non-affected Nuer (47–49%) (Table 5.11). Comparisons of the average calories consumed and the mean scores of coping strategies adopted by the affected and non-affected households for the Nuer and the Anuak reveal that the differences are huge for the Anuak but not for the Nuer, probably demonstrating the different

magnitude of impact of the intervention between the two ethnic groups. For a more rigorous scientific analysis of the impacts of Karuturi's intervention on the food security situation of the Anuak and the Nuer, the Propensity Score Matching was estimated. The average treatment effects on the treated (ATT/impact) – in this case, the average increase in the scores of coping strategies and the average decline in the amount of calories consumed due to the intervention of Karuturi – were estimated using the nearest neighbourhood, radius, kernel and stratification matching techniques for both the Anuak and the Nuer ethnic groups. The results indicated that Karuturi's intervention had a significant impact on the food security situation of the Anuak, but not on that of the Nuer (Table 5.12).

Table 5.12: Impacts of Karuturi's intervention on the food security status of the Anuak and the Nuer, Gambella Regional State

Case	Food security indicators	Matching method[a]	Matched samples		Impact (ATT)	Std. error[b]	t-value
			Affected	Non-affected	Kcal/CSI		
Anuak Case	Food energy intake (Kcal)	NN	98	71	-94.87	51.84	-1.83*
		Radius	92	108	-105.46	48.76	-2.16**
		Kernel	98	120	-112.13	36.68	-3.06***
		SS	97	121	-115.96	31.47	-3.69***
	Coping Strategy Index (CSI)	NN	98	71	1.83	0.63	2.90**
		Radius	92	108	1.89	0.66	2.88**
		Kernel	98	120	2.03	0.53	3.8***
		SS	97	121	2.04	0.47	4.31***
Nuer case	Food energy intake (Kcal)	NN	100	42	-38.05	71.92	-0.53
		Radius	80	106	-26.35	47.77	-0.55
		Kernel	100	122	-33.80	51.32	-0.66
		SS	92	129	-23.64	43.62	-0.54
	Coping Strategy Index (CSI)	NN	100	42	0.55	0.53	1.05
		Radius	80	106	0.48	0.52	0.93
		Kernel	100	122	0.39	0.38	1.03
		SS	92	129	0.35	0.39	0.89

[a] Radius matching was done with a calliper of 0.01 [b]Bootstrap standard error is calculated based on 100 replications *** p< 0.01; ** p< 0.05; and * p< 0.1

Source: Survey data, 2013

In the following section, I aim to explain this observed varying outcome for the Anuak and the Nuer, respectively.

The Case of the Anuak

The Anuak produce food crops such as maize, sorghum, groundnut, etc. on a small scale using hand-hoe. Although they produce these food crops, they complement their food basket by hunting, gathering and fishing. Karuturi's farm operation at the Ilia site cleared forests that had significant economic and food value for the Anuak. Since they are largely dependent on forest-based livelihood resources, clearing of trees to open up new farms exacerbated the food insecurity situation of the local people. Indigenous trees such as *Vitellaria paradoxa* (also called shea nuts or shea tree), *Anogeissus leiocarpus*, *Combretum adenogonium* and *Grewia tenax* were predominan in the area, but deforested by the company. A focus group discussion held at Ilia village with five elderly women on 15 March 2013 revealed that collection of different fruits, seeds and roots from the forest – most importantly, shea tree (locally called *Wudo* in which both the fruit and the seeds are consumed), date tree (locally called *Wulemo*), *Dioscorea alata* (common name yam), *Cucurbita maxima*[61] (common name pumpkin) and an orange-like fruit locally called *Aulemo* – serve as important food and cash sources for the Anuak. It provides the needed food for the Anuak families and serves as an important consumption smoothening strategy during the months of deficits. The elderly women also mentioned that they used to collect forest honey, ground nuts and ginger in the forest area, which has now been bulldozed and cultivated for maize production. The oil palm nursery site and the plots under maize production by Karuturi at Ilia village are also reportedly used by local people for summer season production of food crops.

The loss of land that was used for production of summer season food crops and the clearing of forests that had important economic and food values worsened the food insecurity situation of the Anuak. The Anuaks, who are affected by Karuturi's farm operation, on average consumed 95–116 Kcal per adult equivalent per day less than those households who are not affected by the company. By the same token, the affected households adopted coping strategies that had a weighted mean values higher than those who were not affected by the company, further showing the increased intensity of food insecurity due to the large-scale plantation. The average loss in

[61] In the literature different scientific names such as *Cucurbita pepo*, *Cucurbita moschata*, and *Cucurbita maxima* are used for pumpkin.

caloric consumption and the increase in the frequency of coping strategies adopted by the affected households were both significant at either $p<0.01$, $p<0.05$ or $p<0.1$ (Table 5.12).

I accounted for the estimated impact of the intervention on the affected household's calorific consumption and Coping Strategy Index and examined their food security status without the intervention. Accordingly, based on the indicator of the Coping Strategy Index, 13% of the households became food insecure after they lost access to land and related natural resources due to the appropriation of the resources by Karuturi. Similarly, based on the Food Energy Intake indicator, 15% of the magnitude of food insecurity of the affected households is attributed to the appropriation of land-based resources to Karuturi. In other words, the magnitude of food insecurity among the Anuak who are affected by Karuturi would have been 48–49% without the large-scale plantation monoculture, showing that food insecurity has worsened to the present level of 62–63%. By national standards, even before the intervention, the magnitude of food insecurity among the Anuak is much higher than the magnitude estimated at national level, which calls for serious development planning.

Different coping mechanisms are used by the Anuak, such as seeking emergency food aid, migrating to neighbouring areas (e.g. towards the area where the Majenger ethnic group resides) to gather foods from the forest, reducing portions and frequency of meals, looking for social transfer from families/neighbours, skipping meals, etc. (Annex 5.7 and 5.8). The government also responded to the worsening food security situation of the Anuak by providing emergency food aid. However, the elderly women who participated in the focus group discussion criticized the amount of wheat grain supplied as food aid for being insufficient and inconsistent, while the damage suffered as a result of the appropriation of their lands was permanent. The frequency of use of coping strategies by those Anuak who are affected by Karuturi is somehow different from those who are not affected by the company, despite the similarity of coping behaviours between the two groups. For example, Anuak families who are affected by Karuturi frequently used coping strategies that have high severity scores, such as reducing the frequency and portion of meals, skipping meals altogether, migrating to nearby places to search for foods from the forest, etc. On the other hand, those Anuak families who continued to have access to land-based resources in the same way as before (i.e. the non-affected households) adopted food insecurity coping strategies that are less severe in their intensity. These include eating with or borrowing food from neighbours/families, reducing the portion size of meals, etc. (Annex 5.8). In the Anuak culture, when a household has no food to feed the family, borrowing food and eating with other

families/neighbours are accepted as normal practices, and thus have low severity scores. These types of coping behaviours are, however, considered as a loss of dignity and shame among households in the highland area, and thus have high severity scores (see the results from Bako and Abobo).

The Nuer case

The Nuer are generally agro-pastoralists and practise both crop production and extended livestock rearing. Owning livestock has both economic and social values among the Nuer ethnic groups. Cattle are sources of food and income for the Nuer families as well as a buffer against potential disasters such as droughts and diseases. On average, they own about 25 herds per household. A typical household owns up to 300 cattle. Savanna grassland and shrubs are the main sources of livestock feed for the Nuer. This makes grazing lands very important for the livelihood as well as social fabric of the Nuer. They also produce crops, dominantly maize, both in the rainy season and in the dry season. In the rainy season, they cultivate plots located away from the Baro River. In the dry season, when the floods of the Baro River recede, they move closer to the bank of the river and cultivate predominantly maize using the residual moisture on plots enriched with soil nutrients by the over-flooding.

This practice is often referred as 'flood recession farming' and common in several parts of Ethiopia such as Baro-Akobo in the southwest and Wabishebelle catchment in the southeast (cf. Mengistu 2005), Omo River valley in the south (cf. Woodroofe 1996), Lake Tana catchment in the northwest (cf. McCarthey *et al*. 2010), and Awash River in the northeast (Nederveen 2012). Food crop production from flood re-treat farming is an important source of food and feed for the Nuer since it bridges the long dry season. Abandoning this practice will pose a serious threat on their food security status. In terms of mobility, therefore, the Nuer temporarily move between dry and rainy season cultivation plots and, compared to the pastoralists elsewhere in Ethiopia (e.g. the pastoralists in the Afar and Somalia regions), they are relatively sedentary.

With the advent of large-scale plantations in the area, land availability for dry and wet season farming as well as for livestock grazing dwindled. The limited access to grazing land had some marginal impact on the milk productivity of cattle, but was found to be not statistically significant. The focus group discussion held in Bildak village on 26 March 2013 with six elderly women who are responsible for milking cows revealed that scarcity of animal feeds due to the conversion of parts of the grazing lands into maize farm by Karuturi has become a common

problem, in contrast to the situation before the transfer of the land to Karuturi. This had resulted in a decline in the productivity of milk and average length of lactation period. According to the elderly women, the average lactation period used to last for six months; this has now declined to five months due to shortage of feeds. In Gambella, extended livestock management is predominantly practised and, based on my own estimate, the average milk productivity is about 1.6 litres/day per lactating cow, which is lower than the national average (1.85 litres/day) estimated in 2011 (CSA 2011). The impact of Karuturi's intervention on household food security status was statistically insignificant for the Nuer ethnic group, who are predominantly agro-pastoralists despite its negative value (Table 5.12).

A couple of reasons can be mentioned for the insignificant impact of Karuturi's intervention. First, since the company has not cultivated its entire leasehold concession, the Nuer had access to savanna grassland in the areas not yet covered by Karuturi. Second, the Jikawo site of Karuturi was flooded for two consecutive years and the Nuer who live around the farm were invited to take the harvest for two years. The welfare loss due to losing land was compensated for by the maize grain collected from Karuturi's farm. The central issue here is would the free maize offered to the local people by Karuturi be sustainable? Before it went into bankruptcy in late 2014 and ceased its operations, Karuturi was planning to shift to the cultivation of upland rice, a crop that would be better suited to overcoming the water surplus. After Karuturi failed to perform to the expectations of the government, the AILAA planned to transfer the land that had been leased to Karuturi to another investor that can fully develop the entire concession. With a similar business model to that of Karuturi, i.e. plantation monoculture in which the local people are not well integrated, the impact of transferring the same land to another investor may bring a significant negative impact to the food security status of the Nuer families when the entire farmland is developed.

Another impact observed after the intervention of Karuturi is the increased intensity of conflicts due to resource scarcity. Within the Nuer ethnic group, there are different clans who compete and struggle for resources. The freedom to roam from one area to another, within the same ethnic group, in search of pasture, is not without problems. For example, in Makuey and Jikawo districts, there are four different clans, the *Ceichaany*, *Cienyajaam*, *Ciewaw*, and *Ciereng*, who compete for resources during times of scarcity. These conflicts existed long before Karuturi acquired farmlands in the area. To address the issue, the former Jikawo District is administratively divided into two districts as Makuey and Jikawo. The *Ceichaany*, who inhabit Makuey, cannot move further from Baro River as they face fierce conflict from *Cienyajaam*. The

Ceichaany in Makuey District cannot move towards the South Sudan border as they will they will be confronted by the Moorlie of South Sudan. The Moorlie live along the Ethio-South Sudan border and they are highly armed with modern guns. They frequently come to Makuey District to raid cattle as a strategy of cattle re-stocking. Conflicts between the different clans of the Nuer and between the Nuer and the Moorlie have exacerbated since Karuturi's arrival, which has created more scarcity of livestock feed.

5.4.4 Evidence from Benshanguel Gumuz Regional State: The case of S&P Farm

Agro-ecologically, Benshanguel Gumuz Regional State (BGRS) is suitable for the production of different types of food (e.g. sorghum, millet and maize) and cash crops (e.g. sesame, groundnut, cotton). It is endowed with various water sources – such as the Blue Nile, Dabus, Beles and Dedessa Rivers – that are suitable for irrigated agriculture and different minerals – such as gold, marble, limestone, copper, cobalt, zinc and lead – that provide a good potential for non-agriculture based development. While agriculture is one of the major livelihood activities of the indigenous population,[62] crop production is done traditionally through slash and burn, hand and hoe culture and through the system of shifting cultivation, with the exception of the *Shinasha* indigenous people who practise oxen-ploughing. Other activities such as gold mining, hunting and gathering, and livestock-rearing also contribute to the livelihood of the local people. Despite the huge potential of the region for agricultural and non-agricultural livelihood activities, it is one of the least developed regional states in Ethiopia, with a high prevalence of poverty and food insecurity (Benshanguel Gumuz Region, 2004). The period from May to September is generally one of food deficits for many of the districts in BGRS.

Given its huge agricultural potential, the Benshanguel Gumuz Regional State has received a significant proportion of large-scale plantation investments in the past few years. S&P is the large-scale agricultural investment selected as the case study for this dissertation. In 2010, the company leased 50,000 ha of land in Dangur and Guba districts of BGRS for the production of pongomia and other food crops. So far, the company has developed only a tiny portion of the land. Two rounds of household surveys were conducted in Dangur District in 2010 (before the company developed the land) and 2014 (after the company developed some portion of its concession) to examine the impacts of the large-scale plantation on the local food security situation in the area. In both rounds of household surveys, the same cohorts of households were

[62] The indigenous people include Berta (26.7%), Gumuz (23.4%), Shinasha (7%), Mao (0.6%) and Komo (0.2%). Significant proportion of Amhara (22.2%), Oromo (12.8%) and other (7.1%) make up the remaining proportion of the population of the region (CSA 2007).

interviewed to analyse the changes over the two periods. Similar to the process for Bako Tibe District, I systematically compared the food security situation of two different groups of households (affected and non-affected households) for two different time periods (2010 and 2014) using the FEI and CSI indicators.

In 2010, the mean calorific intake of the households in the affected village was 2,237 Kcal per adult equivalent per day. In 2014, after the company developed the land, it declined to 2,220 Kcal per adult equivalent per day. The average energy intake for both periods is slightly above the minimum calories (2,200 Kcal per adult equivalent per day) required to satisfy the needs of an adult, showing that, at village level, there was no problem of food insecurity in Dangur District for both periods (Table 5.13). The results confirm that while several districts (e.g. Sherkole, Kurmuk, Sirba Abay, Guba, and Menge) in BGRS are generally classified as food insecure by some studies (Oxfam-GB, 2000; Benshanguel Gumuz Region, 2004), at village level, Dangur District is immune from the problem of food insecurity. Dangur District is also not identified as chronically food insecure and thus not included in the lists of districts for the Productive Safety Net Programme (PSNP) (FAO 2011a).

Table 5.13: Difference-in-Difference estimation of the impact of S&P Farm on household food security in Dangur District, Benshanguel Gumuz Regional State

Outcome variables	Affected (n=96)	Non-affected (n=100)	DiD (n=196)
Mean CSI in 2010 (a)	2.02	1.98	0.03 (t=0.06)
Mean CSI in 2014 (b)	2.27	2.14	0.13 (t=0.83)
Difference (b–a)	**0.26**	**0.16**	**0.1 (Impact)**
SE (t-value)	0.29 (t=0.88)	0.23 (t=0.72)	0.37 (t=0.8)
Mean calories in 2010 (a)	2,237.2	2,237	0.19 (t=0.006)
Mean calories in 2014 (b)	2,220.0	2,235.3	-15.2 (t=-0.52)
Difference (b–a)	**-17.14**	**-1.75**	**-15.4 (Impact)**
SE (t-value)	11.8 (t=-1.5)	14.02 (t=-0.13)	18.3 (t=-0.4)

Source: Survey data, 2014

The double difference estimation results indicated that the impact of the S&P intervention on household food security status is insignificant both for the Food Energy Intake and the CSI

indicators (Table 5.13). However, it is important to note here that there is a general decline in the amount of food energy consumed per adult equivalent per day and a general increase in the scores of coping strategies adopted by the households as a result of the intervention of S&P Farm, despite the changes being insignificant. After the intervention of S&P Farm, those households in the affected village increased their coping strategy scores by 25% and they adopted coping mechanisms – such as skipping meals for a whole day, decreasing meal frequency and meal portions – that have high to moderate severity weights compared to those households in the non-affected village who adopted food security coping mechanisms – such as borrowing money to buy food and borrowing food from neighbours – that have less severe weights (Annex 5.9 and 5.10). As such, land is not a limiting factor for production. The Gumuz living in the vicinity of the S&P Farm are not fully and solely dependent on farming as a source of food and income (see Annex 5.11), contrary to the households in the highland parts of the country who depend predominantly on crop-livestock mixed farming (e.g. Bako Tibe District).

The households in the affected village have about 10 ha of land, which they use in an extensive cultivation system. Commonly, they cultivate sorghum on 0.5–2 ha of land and lease out the remaining parcels that they own. In the situation before the land was transferred to S&P Company, they had unlimited access to land (more than 10 ha), and they could develop and lease out farmlands for highlanders (especially for those who come from Gojjam) at a common lease rate of ETB 1,000–1,500 or for a 100 kg of sesame for each hectare of land leased out. The Gumuz prefer to take the 'in kind' lease arrangement, since one kg of sesame sells at a price higher than ETB 1. This trend has now declined due to the land transfer to S&P, although it has not been completely abandoned since families have access to parcels that are not yet developed by the company.

In addition, the Gumuz depend on collection of honey from the forest for their food and incomes. In 2010, the Gumuz in Dangur District managed to collect 80–90 kg of honey from the forest, which has declined to 10 kg of honey in 2014 for the households in the affected village (a 700–800% decline). Due to the clearing of indigenous trees, the productivity of wild honey bees declined also for the households in the non-affected village. In 2014, the households in the non-affected stratum, on average, managed to collect 24 kg of honey from the forest (a decline by 233–275%). It is generally true that environmental effects are not limited to those who are close to the changes made by the S&P Farm, but also to those households who are far from it and did not lose land directly. For this reason, those households in the non-affected stratum have also

experienced a slight decline in the average calorific intake and have adopted coping strategies with frequency scores higher than their scores in 2010. Both the changes in the mean calorific intake and the CSI are insignificant for the non-affected households too.

At household level, however, 28% of the households in 2010 and 30% of the households in 2014 were food insecure and consumed food commodities that provide less than the required calorie per adult equivalent per day (Table 5.14). In 2014, a general decline in the mean calorific intake (by about 12 Kcal per adult equivalent per day) is observed in those households who experienced the negative effects of losing land due to the intervention of S&P Farm despite being not statistically significant.

Table 5.14: Levels of food security before and after the intervention of S&P Company in Dangur District, Benshanguel Gumuz Regional State

Food security status based on different indicators	Affected (n=96)		Non-affected (n=100)	
	Before (2010)	After (2014)	Before (2010)	After (2014)
1. Food Energy Intake (Kcal)				
Frequency (%) food secure	69 (71.9%)	67 (69.8%)	72 (72%)	71 (71%)
Frequency (%) food insecure	27 (28.1%)	29 (30.2%)	28 (28%)	29 (29%)
2. CSI score				
Frequency (%) food secure	72 (75%)	70 (72.9%)	75 (75%)	74 (74%)
Frequency (%) food insecure	24 (25%)	26 (27%)	25 (25%)	26 (26%)

Source: Survey data, 2014

Using the Coping Strategy Index as an indicator of food security, households in the affected village adopted a weighted mean CSI score of 2.72 and 3.05 before (2010) and after (2014) the intervention of S&P Farm, respectively. Based on this indicator, 25% of the households in 2010 and 27% of the households in 2014 adopted one or more types of coping mechanisms to address the problem of household food insecurity. Coping strategies adopted by food insecure households include borrowing money to buy food, eating with neighbours or borrowing food grains, consuming seed stock reserved for next cropping season, decreasing meal frequency and meal portions and skip eating for the whole day. The strategies have different severity scores. The FGD rating of the various food security coping mechanisms shows that missing meals for a

whole day has a high severity score while reducing meal frequency and limiting meal portions have moderate severity scores. Borrowing money to buy food when families perceive that they can repay back loans and eating with relatives/neighbours who have food or borrowing food from neighbours are coping strategies that have less severe scores. It is interesting to note here that eating with neighbours/families and borrowing food from neighbours are coping strategies that are considered normal in the case of Dangur District, as in the case of Gambella (Annex 5.11 and 5.12). On the other hand, consuming food by collecting wild foods from the forest (i.e. hunting and gathering) is considered as food security coping strategy in some countries (cf. Nangulu 2009 for Kenya; Sneyd 2013 for Cameroon; Unger & Chagomoka 2014 for Ghana). However, in the case of Dangur District, consumption by hunting and gathering is common practice and not considered as a coping strategy. Those who have no food security problems also complement their consumption through these strategies. In Dangur District, households gather different root crops (locally called *echa, cisi, boya*), vegetables (e.g. pumpkin) and collect honey from wild honeybees. Though illegal, they hunt and consume different types of bush meat as sources of animal protein. These are important sources of food and income sources for the communities in the study area.

For both periods, the level of food insecurity measured using the CSI as indicator of food security (25–27%) is a little less than the magnitude measured using the Food Energy Intake (28–30%). This shows that as long as families manage to eat something at their disposal, they do not feel that they are food insecure. In reality, however, their diet may not be nutritious and provide the needed calories.

Though generally worsening, the changes in the level of household food security after the intervention of S&P are insignificant for two plausible reasons. First, the company developed only a small proportion of the 50,000 ha land, despite operating for about five years, and the Gumuz families still have access to the portion of land not yet developed. Second, land scarcity is not such a constraint in the area. Moreover, the regional state, through its regional re-settlement scheme, allocated, depending on the size of the family, up to 10 ha of land per household. This land size is huge compared to the mean land size available in other regions. Third, agriculture is not the only source of livelihood for the Gumuz (Annex 5.13), and the loss of land may not have a huge impact as long as other sources of livelihoods function well.

5.5 Summary

The results presented so far, based on the analysis of data generated from different case studies in the three regional states, show mixed pictures. Intuitively, but also logically, differences in the magnitude of impacts of large-scale agricultural investments on household food security are highly anticipated. The hypotheses presented in Chapter 1 were formulated based on the logical reasoning that impacts of large-scale plantations on household food security status depend on contexts and crop commodities produced by the large-scale farms. The results from the case studies confirmed the hypotheses that the magnitude of impacts of large-scale plantations is different across different contexts. Despite the insignificant impact of interventions on household food security in some cases (e.g. Karuturi in Gambella Regional State for the Nuer case and S&P in BGRS), the direction of impact for all the large-scale plantations was negative. All the large-scale plantations adopted the same type of business model in which the local people around the farms are simple providers of natural resources, mostly land and water and, in some limited cases, they are also sources of wage labour. The negative impact of land transfer on local people's food security status was not compensated for by the employment generated by large-scale farms due to very limited engagement of the local population in wage employment.