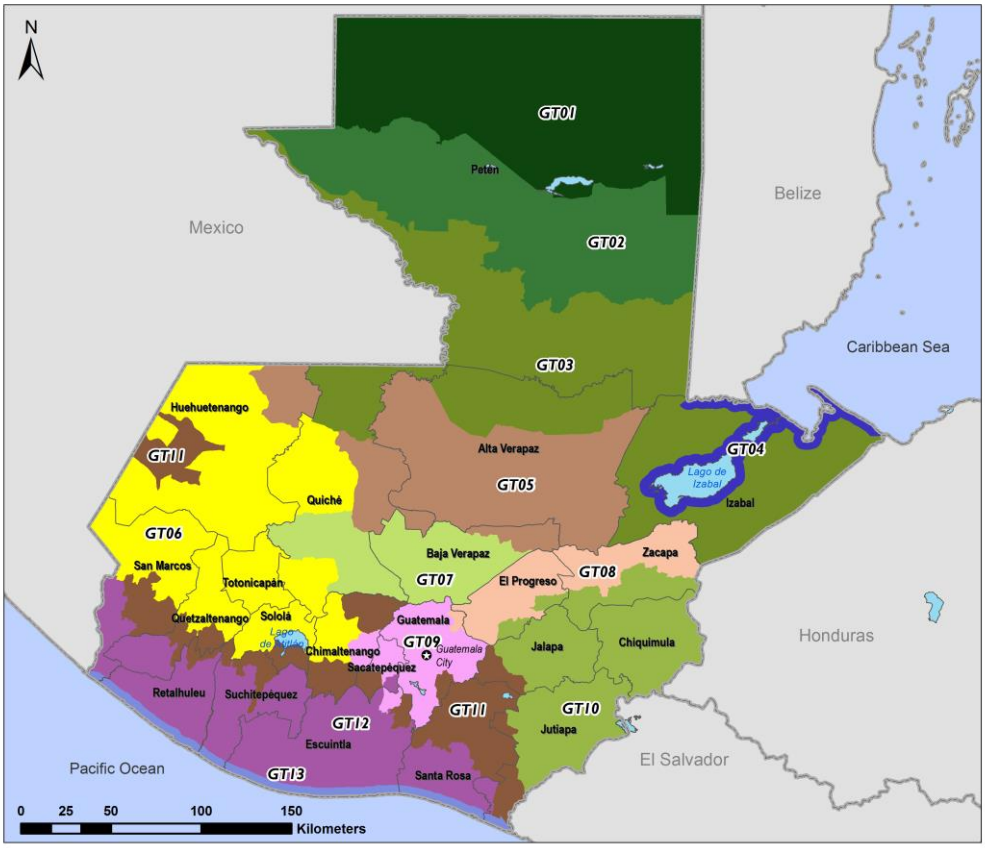
GUATEMALA
Livelihood zones and descriptions

November 2016

NATIONAL LIVELIHOOD ZONE MAP FOR GUATEMALA



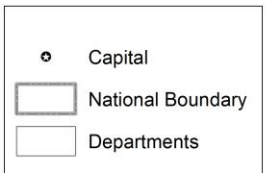


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Table of contents

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ADIMAN
ADIPAZ
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Amigos de Santa Cruz Panajachel Santa Cruz
AMSA
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APUS
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Ministerio de Salud Pública y Asistencia Social (MSPAS)
Ministerio de Trabajo (MINTRAB)
MOSCAMED
Municipalidad de Acatenango
Municipalidad de Acotenango
Municipalidad de Chiquimula
Municipalidad de Ixcán
Municipalidad de Mixco
Municipalidad de Ocós
Municipalidad de Pajapita
Municipalidad de Pasaco
Municipalidad de Puerto San José
Municipalidad de Purulhá, Baja Verapaz
Municipalidad de Salama
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Acronyms

ACF	*Accion Contre la Faim* (Action Against Hunger)
COOPI	*Cooperazione Internazionale*
FAO	Food and Agriculture Organization of the United Nations
FEG	Food Economy Group
FEWS NET	Famine Early Warning Systems Network
GT01	Guatemala livelihood zone 01 (zoning code)
GTQ	Guatemalan Quetzal
ha	hectares
HEA	Household Economy Analysis
km	kilometer
km^2	square kilometer
NGO	Non-governmental organization
NTS	Northern Transversal Strip (*Franja Transversal del Norte*)
masl	meters above sea level
mm	millimeters
mz	*manzanas* (unit of measure equal to 0.7 ha)
SESAN	Food and Nutritional Security Secretariat
USAID	United States Agency for International Development
WFP	United Nations World Food Program

Preface

This Livelihood Profiles document aims to describe how rural populations live in different areas of Guatemala. A livelihood refers to the ways people obtain access to the things they need to survive and prosper, with a particular focus on food, income and basic goods and service. The options available to households living in different regions vary. Understanding of how people usually make ends meet is essential for assessing how livelihoods will be affected by acute or medium term economic or ecological change and for planning interventions that will support, rather than undermine, their existing survival strategies.

Two main outputs are presented in this report in an effort to increase our understanding of rural livelihoods across the country: i) the **national livelihood zones map for Guatemala**, which shows a number of defined areas within which people share broadly the same patterns of livelihood and serves as livelihoods-based sampling frame for further fieldwork and analysis, and ii) the **livelihood zone profiles,** which describe the main characteristics of each zone, including a brief differentiation of the food security status of different socioeconomic groups.

In 2007, the Food and Early Warning Systems Network (FEWS NET), in partnership with the Food and Nutritional Security Secretariat (SESAN) and the United Nations Food and Agriculture Organization (FAO) produced the second national zoning and livelihood zone profiles report for Guatemala, published in 2009. The original document dates from 2004. Since then, these tools have been widely used by the different partners and have become basic reference material for development and humanitarian agencies working in the country.

After close to 10 years, the need for updating of the zoning exercise and the livelihood profiles has arisen. Continuous changes in the makeup of the national economy have, indeed, warranted the updating of the livelihoods-based tools. Among these new trends the following stand out: an increased urbanization, an important expansion of the areas devoted to permanent cash crops (cardamom, African palm, rubber, and sugar cane) mostly at the cost of basic grain production, the recent coffee crisis linked to coffee rust and the persistent dry weather in the southern regions. The recurrent dry weather has, in fact, resulted in rural population not wanting to risk crop losses and reducing the amount of land cultivated, and, as a result, increasing their dependency on labor sales and petty trade, especially among poorer households.

The updating of the national livelihood zones map and livelihood profiles was carried out jointly by the SESAN, FAO, ACF, COOPI, WFP and FEWS NET, and jointly funded by the United States Agency for International Development (USAID) and the aforementioned partners. Key personnel from these institutions acted as facilitators during national workshops and field meetings, charged with collecting and analyzing the information which provided the basis for the livelihood profiles. In addition, the participation of a wide spectrum of local organizations - who are the real connoisseurs of the regions - provided the necessary inputs for the redefinition of the zoning map, according to their experience and knowledge. The workshop was held in Guatemala City in February 2016 and was followed by field verification between July and August of the same year[1].

The main objective driving the updating of the livelihoods-based tools is to continue supporting food security monitoring efforts, early warning and emergency diagnosis. The workshops and meetings held during the validation process have been in themselves valuable exercises for different local actors to define and catalogue the characteristics of the areas where they work and especially the realities of local households, the interaction of different socioeconomic groups and their interdependence. These tools are expected to be equally useful for the development community at large.

The document is divided into three main sections:

[1] Annex 1 presents the list of workshop participants, as well as the programme followed during the field verification phase. Annex 2 presents the main changes included in the zoning update.

1. Introduction

    1.1 Brief overview of HEA (Household Economy Analysis) and FEWS NET's Livelihood Zoning and Profiling, which describes the methods used to develop the map and profiles and the key concepts that are used in livelihoods-based analyses;

    1.2 Application of Livelihood Zone Maps for food security analysis, which describes three essential ways the profiles can be used;

    1.3 Livelihood Zone Profile outline, which describes the layout and content of each profile.

2. National overview

    2.1 Summary of the country's characteristics and how they define local livelihoods;

    2.2. National zoning map;

    2.3 Summary of each livelihood zone, highlighting the main characteristics of the zone;

    2.4. Brief overview of the general patterns of access to food and income across zones and socioeconomic groups.

3. Livelihood profiles for each of the 13 livelihood zones identified

1. INTRODUCTION

1.1 Brief overview of HEA and FEWS NET's Livelihood Zoning and Profiling[2]

The Household Economy Analysis (HEA) is an analytical framework used to examine household operations – how households across the wealth spectrum, source food and income, their expenditure patterns, social relationships and how they cope with hazards.

The full analytical process involves six steps, beginning with a general disaggregating or zoning of geographic areas according to similar livelihood patterns and access to markets. Step two involves classifying households into common wealth groups using local determinants and quantifying asset ownership. Once the wealth groups are determined, detailed focus group interviews are conducted with each in step three, to determine and quantify the common food and income sources and the household's main expenditures.

Once the full story of household economies is understood, the next three steps are to operationalize the data for early warning and food security purposes (this processed is called "HEA Outcome Analysis). The fourth step in HEA involves analyzing the initial impact of shocks on household livelihoods for different wealth groups in a livelihood zone. Next, an analysis of households coping capacity is incorporated into the problem (shock) equation. Once the problem or problems have been defined, and the ability of households to cope on their own has been analyzed, the final picture is projected. This last and crucial step in the analytical framework translates the shock into terms that allow decision makers to take appropriate action.

In 2000, FEWS NET adopted the HEA livelihoods analytical framework as a lens through which to view early warning information. Because the task of completing national level HEA baselines in all FEWS NET countries was too large to meet the immediate needs, a two stage approach was developed with an aim to provide the minimum amount of livelihoods information in the immediate term while building the necessary foundation for future HEA baseline development. Stage one is development of the Livelihood Zone Map and stage two is the development of the Livelihood Zone Profiles.

Stage 1: Livelihood Zone Map – divides the country into homogenous zones within which the majority of people share broadly the same pattern of livelihood. It provides geographical orientation of livelihood systems and a sampling frame for future livelihood zone profiling and livelihood baseline development.

[2] Sections 1.1, 1.2 and 1.3 are taken and adapted from FEWS NET's "Application of the Livelihood Zone Maps and Profiles for Food Security Analysis and Early Warning: Guidance for Famine Early Warning Systems Network (FEWS NET) Representatives and Partners" published in 2009.

Stage 2: Livelihood Zone Profile – provides a snapshot of livelihood options (food and cash sources) of households in each zone, including a brief economic differentiation between groups (wealth groups). The Livelihood Zone Profiles provide information on the relative importance of different sources of food and income by wealth group. This information provides a basis to begin understanding vulnerability to particular events – i.e., which stresses will impact which populations and how (but not how much). This allows us to identify where potential risk of food insecurity exists and further investigation is required.

Unlike full HEA baselines[3], the Livelihood Zone Profiles do not offer *quantified* detail about household budgets and expandability/coping (i.e., *actual* amount of income earned, expenditures, etc.); therefore, they cannot be used to determine the *degree* to which households are vulnerable to different stresses nor to calculate food deficits and thus quantify households at ‐ risk of food and/or livelihood insecurity (as can be done with full HEA baselines).

However, by providing *qualitative* information on the *relative* importance of different sources of food and income, the Livelihood Zone Profiles offer a means for understanding which stresses will impact which populations and how, thereby identifying where potential risk exists and further investigation is required. The Livelihood Zone Profiles also provide a wealth of contextual information on which to develop seasonally specific monitoring systems and identify trends in monitoring information.

Livelihood zoning involves more than just the drawing of maps, however. A Livelihood Zone Map is of little use unless it is accompanied by a basic description of the patterns of livelihood in each zone, and ideally by an analysis of the underlying reasons for differences between zones. This means assessing in some detail the production and trade/exchange options in each of the zones, and the influence that the underlying geography has on each of these. We can think of these three factors as linked to consumption as follows: geography affects both the options for production (climate, soil, topography, etc.) and for marketing/trade (roads, proximity to urban centers, etc.), which, in turn, affect consumption by the household. Household production (of food and other items) may either be directly consumed or may be traded/exchanged for other items in the market.

*A livelihood zone is an area within which **the majority of people** share broadly the same pattern of livelihood, including options for obtaining food and income and market opportunities.*

A livelihood zoning is essential for the following reasons:

1. *It provides geographic orientation of livelihood systems to inform food security analysis and assistance targeting*
2. *It provides the basis for identifying geographically relevant food security monitoring indicators*
3. *It provides a sampling frame for on-the-ground assessments*

The essential resources necessary for livelihood zoning are people with substantial knowledge of geographic conditions and local livelihoods who can offer and compare their own knowledge and reason together to map out national livelihoods. It must be noted that available statistical data on a country's resources usually offer a limited repertoire of variables and they are almost never at a level of disaggregation to allow a statistical calculation of livelihood zones. A major problem with national data is that they are based on administrative units rather than according to economic geography; thus, analyses based on this information often merge two (or more) ecological or agro-economic zones greatly diluting the disaggregated view of livelihoods.

[3] For more information on HEA livelihood baselines, please see "The Practitioner's Guide to HEA", which can be downloaded from the FEG website at www.foodeconomy.com/resources.

Administrative divisions such as districts, while important for political and governance purposes, are not as useful for food security analysis. Homogenous ecological and economic zones often cross political boundaries. At the same time, within a single administrative unit in, say, a mountainous area, there may well be two or more different ecologies at different altitudes. Similarly a single district may stretch from agro- pastoral to agricultural areas, with two different economies. In the case of nomadic populations, the livelihood zone may actually be a group of people contrasted with another group in the same general ecology. Nevertheless, because resource allocation and service provision decisions are made on the basis of administrative zones, not homogenous livelihood zones, the administrative map is always superimposed on the Livelihood Zone Map.

1.2 Livelihood zone profile outline

The Livelihood Zone Profiles are a "light" product of the Household Economy Analysis. In compiling the profiles, a balance has been struck between accessibility and level of detail. The aim has been to present sufficient information to allow a rounded and balanced view of livelihoods nationally. They provide a rapid introduction to livelihoods in the country; they do not offer localized in depth detail.

The different elements included in a Livelihood Zone Profile are as follows:

A. *General livelihood zone description*: offers a general description of local livelihood patterns (crop production, livestock rearing, off-farm income generation etc.). This first section also provides information on geographic boundaries, topography, vegetation cover, climate and population density.

B. *Markets*: contains basic information on the marketing of local production, labor markets and on any imports of staple food into the zone. It provides information that is useful in developing monitoring systems.

C. *Perception of historical food access*: ranks the last five years according to the population's own perception of the level of food security and general livelihood security and describes any major events which have had a negative impact on livelihoods in the zone.

D. *Seasonal calendar*: visually presents the timing of important key activities during the year, allowing correlations to be made. This is useful in a variety of ways, for example to judge the likely impact of a hazard according to its timing during the year; to assess whether a particular activity is being undertaken at the normal time in the current year; to help interpret trends in and analyze monitoring information; and to develop seasonally appropriate interventions.

E. *Wealth breakdown:* describes the main wealth groups[4] (for example, 'poor', 'middle-income' and 'better-off'), explaining the differences between these groups and how this affects potential access to food and cash income. Just as the same external shock will have a different effect on two separate food economy zones, it will also have a varied impact on households in different wealth groups. Thus even within one livelihood zone, analysts must make distinctions about the ways in which households live. Households with different levels of assets tend to do different things to get food. In an agricultural zone, for example, different people will own different amounts of land, and may obtain different yields, often because they can afford improved seeds, fertilizer, pesticides and herbicides, while others cannot. Poor households with little land may work for richer households to get money to buy food; rich households may use profits from agriculture as capital to engage in trade. In the event of a crisis, poor

[4] It is important to bear in mind for this analysis that we are thinking of wealth in relative (and local) terms. Statistical data may indicate that 80% or even 90% of the population in a particular area lives below the national poverty line, but this is measuring poverty on a national, absolute scale. In a livelihoods analysis we are interested in understanding some of the differences between different groups within the community and the reasons for these – in which case it is not particularly useful to lump 80% or 90% of the population together into one group.

and rich households will be affected differently and therefore warrant separate examination. The elucidation of differences between households and the links between households is central to building up appropriate 'vulnerability' information.

F. *Sources of food and income*: examines patterns of food and cash income at each level of wealth, relating these to the characteristics of each group. The information in this section identifies which sources are most important to which wealth group, and therefore which groups will be impacted by which shocks. For example, a household that depends on purchase to meet a large percentage of food needs will be impacted by a rise in staple food prices (all else remaining equal), particularly during their peak buying period. The information helps identify which indicators should be monitored in different livelihood zones and for which wealth groups.

G. *Calendar of major sources of food and income for poor households:* focuses on the 'poor' wealth group and the timing of their sources of food and income throughout the year.

H. *Hazards and household response*: provides information on the different types of hazard that commonly affect the zone as well as on the various strategies available to different types of households in the zone to respond to these shocks. This information helps us analyze whether or not households may be able to withstand a particular shock, though it does not tell us absolutely whether these coping strategies will be enough to avoid food insecurity. Response strategies are also something to look for during the course of a season, as evidence of these may signal that a crisis is occurring.

I. *Indicators of crisis*: provides information on the key crisis indicators and their likely timing by zone, based upon an understanding of local livelihoods and local patterns of response to food shortage. Early warning involves identifying and interpreting key events that indicate that a severe food shortage or famine may be developing.

1.3 Application of livelihood zone maps and profiles for food security analysis

The main function of a Livelihood Zone Map and Livelihood Zone Profiles is to provide detailed geographic disaggregation for food security monitoring, analysis and decision support.

Monitoring

For early warning purposes, these two tools offer a first resort to identify relevant monitoring indicators. They tell us what is produced in each zone, which hazards the zone is prone to, how food and income is accessed and which markets populations depend on (both inside and outside the zone). This tells us which production - related and hazard - related indicators to monitor as well as which producer and retail prices are relevant to livelihood and food security in the zone. For example, if the cash crops in a livelihood zone are coffee and rubber, the producer prices of coffee and rubber are much more significant to monitor than say, bananas. Likewise, if the majority of the population depends on livestock sales for most of their cash, livestock producer prices are important to monitor.

Analysis

Livelihood Profiles provide essential geographic orientation for food security and early warning analysis. When a shock occurs or is forecast to occur, the Livelihood Zone Map tells us whether or not that shock is likely to have a direct or indirect impact on populations in particular livelihood zones.

For example, let's say there is a shock that negatively affects coffee production across two livelihood zones, Zone A and Zone B, that are primarily dependent on coffee sales for income. At the same time, laborers from Livelihood Zone C, where only grains and beans are grown in small quantities, depend on the income they earn through seasonal migration to Zones A and B, during the coffee harvest. Clearly, the livelihood and food security of certain people in Zones A and B may be compromised as a

direct result of the shock. The production and producer prices for coffee should be monitored over the next few months to track the situation. Likewise, the livelihood and food security of migratory laborers from Zone C may also be threatened by a shock to coffee production. If possible, the demand for and wages paid to laborers should also be monitored to better understand the livelihood and food security impacts on laborers in Livelihood Zone C.

The Livelihood Zone Map can also be used as a sample frame for food and livelihood security assessments. This includes additional livelihood profiling or baseline work, rapid needs assessments, nutrition surveys, market assessments, etc. The map provides an initial understanding of livelihood systems in each area of the country as a starting point for further investigation or verification of food security outcomes.

Decision Support

In the same way that Livelihood Zone Maps and Profiles provide orientation for conducting analysis, they also orient decision makers and others by making it possible to clearly indicate where food insecurity is likely to occur and why. In food security and early warning reporting, Livelihood Zone Maps should be used to geographically disaggregate potential food security outcomes. They should be used to more accurately state where a food security situation is likely to deteriorate (or improve) and the factors driving the situation in that area. For example, livestock/cereal terms of trade may be declining in pastoral livelihood zones, where livestock sales are the most important source of income and cereal purchases the most important source of food. In another livelihood zone, a key market for the sale of cash crops may be located in a neighboring district (or livelihood zone) that has become inaccessible due to conflict or infrastructure damage, resulting in significant income loss and purchasing power.

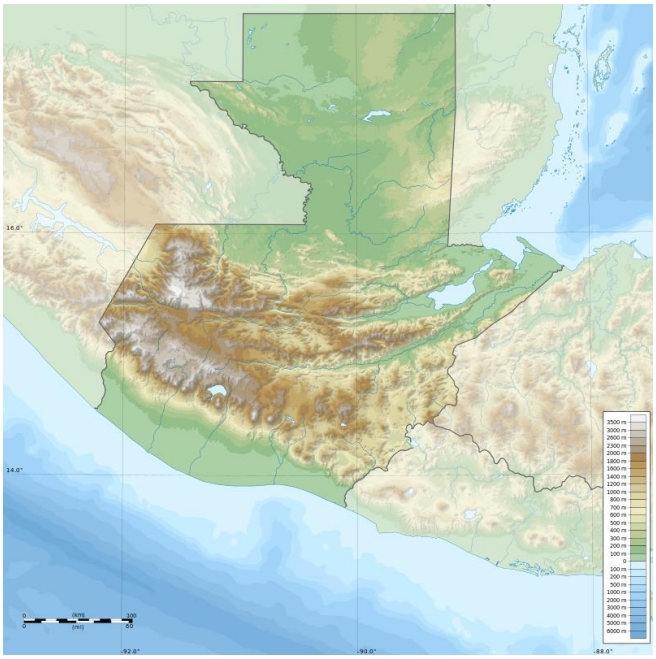
Livelihood Zone Maps can also be overlaid with other map layers, such as market flow maps, water systems/aquifer maps, hazard maps, assessment results, outlook maps, etc., to help analyze and illustrate multiple factors associated with a food security situation. For example, during scenario analysis, an overlay of the FEWS NET production and market flow maps with the Livelihood Zone Map illustrates the movement of goods between zones and helps analysts project how market‐related shocks/stresses and responses may or may not evolve in a particular livelihood zone. Various elements of the livelihood zone descriptions, such as the main sources of food or income by zone, can also be mapped to provide additional information and context for food security briefings and reports.

2. NATIONAL OVERVIEW

2.1 National summary

Approximately two thirds of the national territory are mountainous terrain, many of volcanic origin. The two main mountain ranges that traverse the country, running almost in parallel from the northwest to the southeast, are the Sierra de los Cuchumatanes and Sierra Madre del Sur. The highest peaks are located in Totonicapán, in the Sierra de los Cuchumatanes. The central highland plateau is located between these two mountain ranges. The highland plateau has a mild climate (1600 mm/year average rainfall levels), which becomes wetter and colder as the altitude increases (3500-4000 mm/year), especially along the volcanic range and in Alta Verapaz. On the contrary, the northern region of Petén follows a gentle slope and is characterized by a mixture of rangelands and tropical rainforests, many of them classed and protected by the National System of Protected Areas[6] (SIGAP), and is sparsely populated. The coastal areas of the Pacific are also flat, yet very hot and humid, and very fertile. Most major cities are located in the southern part of the country; these are the capital Guatemala City, Quetzaltenango and Escuintla. The shorter, low-lying Atlantic coast is wetter than the Pacific coast. The geographic location of the country makes it prone to frequent and high-intensity geological and weather-related shocks such as earthquakes, volcanic eruptions, droughts, tropical storms and hurricanes.

Map 1: Topography of Guatemala



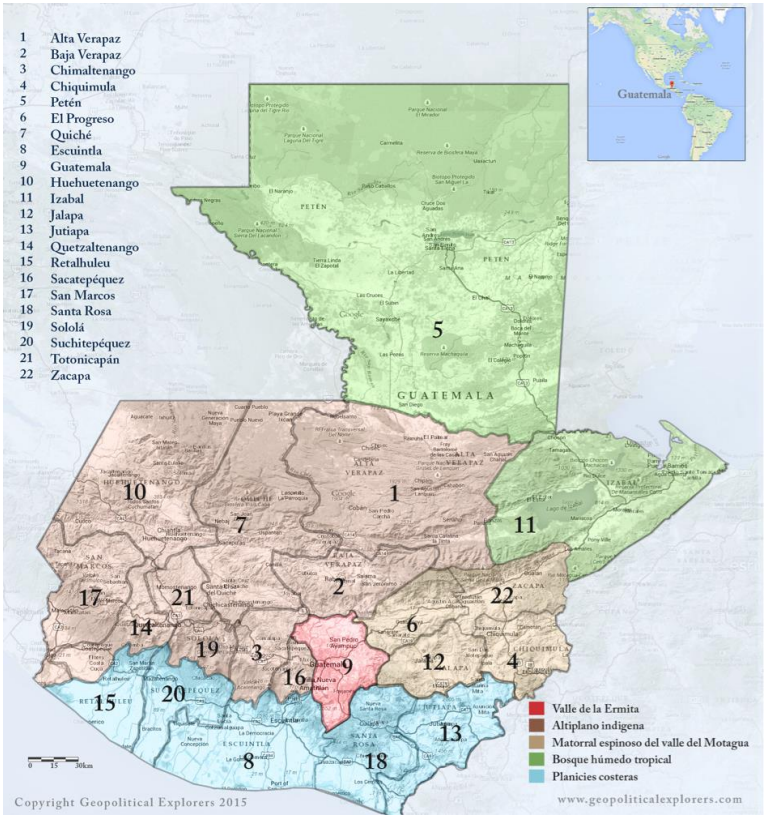
Source: Ikonact[5]

As illustrated in Map 2 below, the country can initially be divided into a small number of major ecological zones. The northern tropical rainforest areas where timber extraction but also staple grain production and cattle ranging are dominant. The country's breadbasket is located in southern Petén and the Franja Transversal del Norte (the Northern Transversal Strip). The central highlands and mountainous areas are where coffee, bananas, cardamom and other cash crops are grown. Formal and informal trade with Mexico is also important along the western border of the central highlands. The department of Guatemala, influenced by the capital city, hosts the main central wholesale market and a large industrial complex. The arid Montagua valley provides opportunities for mineral extraction as well as coffee and fruit production. And the southern coastal plains which are fed by a large number of short rivers nascent in the nearby Sierra Madre, which have provided the necessary irrigation for the proliferation of sugarcane plantations and tropical fruits, attracting laborers from the central regions. Additionally, both coastal zones support local fishing and tourism sectors.

[5] https://es.wikipedia.org/wiki/Guatemala#/media/File:Guatemala-geographic_map-blank.svg (last accessed 27 September 2016)

[6] In fact, over a third of the national territory is classed under the regime of protected areas with a total of 243 national, municipal and private protected areas, which occupy an area of close to 3.5 million hectares. The National System of Protected Areas (SIGAP) was created in 1989 to preserve, restore and protec the country's biodiversity and natural resources.

Map 2: Departments and eco-regions of Guatemala



Source: Geopolitical Explorers[7]

Guatemala's largest economic sector is agriculture, especially the production of cash crops for global markets. Coffee is its first product in terms of export market share. Coffee is cultivated mainly by small-scale farmers, most predominantly in Alta Verapaz, Huehuetenango and along the southern volcanic chain, but also in eastern Guatemala. Coffee production is closely followed by sugarcane production, which, on the contrary, is solely the domain of large industrial growers, as it is a more labor and input intensive crop. This sector has seen an important expansion, but is also an increasing source of environmental concern. Both of these crops generate an important flow of seasonal migration during the peak of the harvest period (from September to February for coffee and November to February for sugarcane). Additional cash crops include bananas, African palm, cardamom, rubber, fruits and vegetables, which are replacing coffee production in certain zones, and implemented through irrigation systems in others. Large-scale agriculture is an important source of casual agricultural labor and business opportunities in rural areas.

Guatemala has a population of over 16 million people (INE projections for 2015). As of 2014, only 51% of Guatemalans lived in cities, a rate which was well below rates in other countries in Central America and below the average for the Latin America and the Caribbean region (79.6%) (UN 2014[8]). However, the pace of urbanization is picking up and the gap between Guatemala City and its suburbs and the rest of the country already substantial.

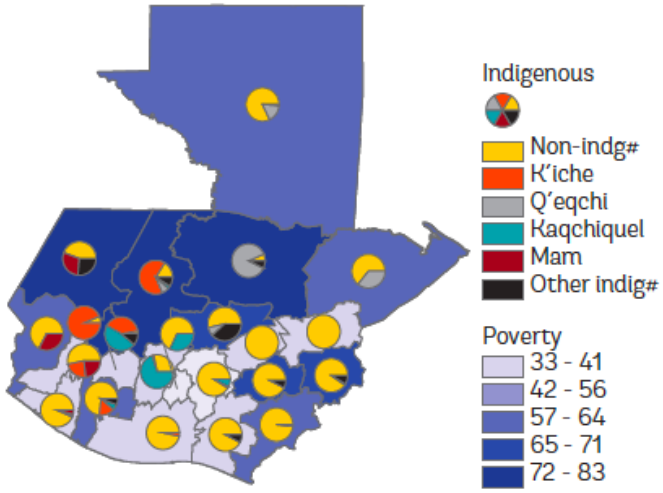
Ethnic-cultural diversity makes Guatemala distinct, with close to half the population belonging to an indigenous group, the highest share in the Latin America region. The three largest ethnic groups are the Mayan, the Xinca, and the Garifuna. Poverty and ethnicity are closely related, (see Map 3). One of the reasons for this correlation is the skewed land distribution pattern between indigenous peoples and the rest of the population.

[7] http://geopoliticalexplorers.com/blog/ecoregiones-como-subregiones-geopoliticas-2/ (last accessed 28 September 2016)

[8] UN 2014, "World Urbanization Prospects: highlights" https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf (last accessed 30 September 2016)

Food security and household's income security is largely dependent on the demand for unskilled labor, mostly agricultural labor, both locally (for larger farmers) and in the main cash crop producing areas. Labor conditions are poor and demand is intermittent. Fluctuations in labor demand are dictated by variations in weather patterns (varying degrees of rainfall delays and excessive rain), extensive crop pests among which coffee rust has had the most devastating consequences and fluctuations in global commodity markets.

Map 3: Poverty rates and share of population by ethnicity by department



Source: Calculations based on the 2014 ENCOVI
Note: Based on official consumption measure of poverty and national poverty lines.

Source: World Bank[9]

For the last three years, the eastern departments of Guatemala (Baja Verapaz, Zacapa, El Progreso, Jalapa, Chiquimula, Jutiapa and Santa Rosa) and a strip within the Western Highlands (Huehuetenango, Quiché, Totonicapán) have been affected by El Niño phenomenon and continue to be under stress today. These regions lie within the so-called Central American Dry Corridor (*Corredor Seco*), which starts in Guatemala and reaches into Costa Rica (see Map 4 below). Meager rainfall results in crop losses for farmers but also in lower demand for agricultural labor, as in the case of seasonal workers for the coffee harvest. Moreover, the recurrence of droughts, as in the past three years, makes it more difficult for subsistence farmers to cope with their crop and labor losses, and thus results in seasonal hunger and malnutrition. In 2014, the government declared a state of emergency and responded with food aid distributions in many of these areas.

[9] World Bank Group; Sanchez, Scott and Lopez, 2016. "Guatemala: Closing Gaps to Generate More Inclusive Growth. Systematic Country Diagnostic"

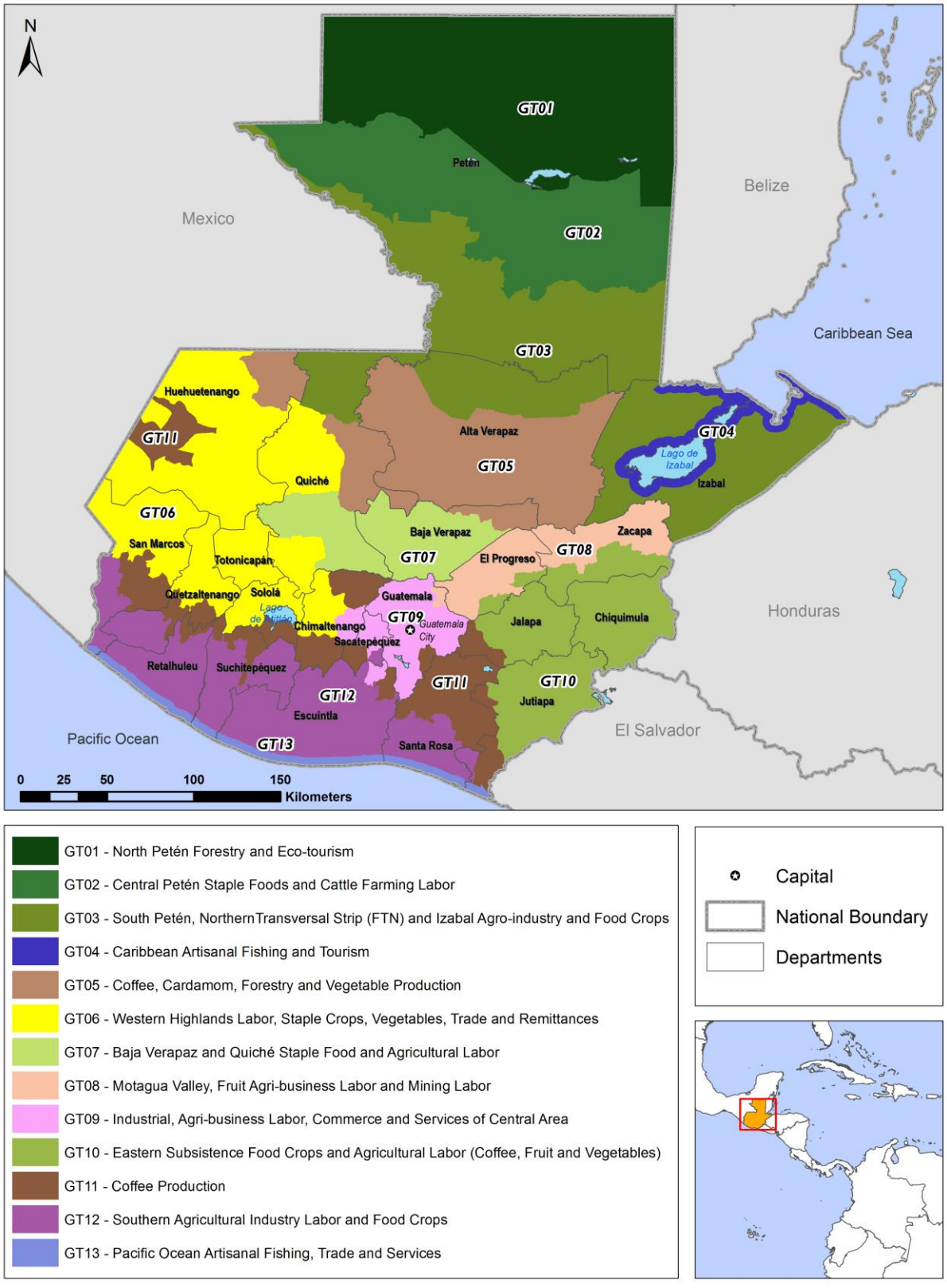
Map 4: Location of the Central American Dry Corridor

Source: ICCA[10], Inter-American Institute for Cooperation on Agriculture

In its latest Country Diagnostic for Guatemala, the World Bank talks about *two Guatemalas* with opposing characteristic and large gaps in outcomes between them. One Guatemala is rural and the other urban, one is indigenous and the other Ladino, one informal and the other formal and one lacks access to basic services while the other has the ability to pay for those services when the state does not provide them. These differences are evident across livelihood zones but also within zones across the different economic strata, as the next section aims to relate.

[10] http://www.iica.int/sites/default/files/document/2015-08/technical_note_01_2015.pdf (last accessed 28 September 2016)

2.2 National livelihood zones map



2.3 Summary of livelihood zones

Zone GT01. North Petén forestry and eco-tourism	
Main economic activities Timber extraction Xate trade Ramón nut trade **Main sources of income for poor households** Local labor in forestry **Sources of food for poor households** 20% crops 80% market purchases	Much of the zone is categorized under the Protected Areas Act, which limits the economic activities that are permitted within each category. Must of the zone is forested, providing an important source of timber and a variety of wild plants and foods and good hunting grounds. Fishing is also common. The local economy is based on the domestic and international trade of forest products (especially timber, xate leaves and Ramón nuts) and the labor opportunities the designated forest concessions provide, as well as activities related to tourism (services, handicraft sales, transport and trade), subsistence farming, some cattle ranching and low volumes of seasonal migration to neighboring zone GT02 and to Belize to work in the agro-industrial sector. Household agricultural production is low (limited to household consumption) but there is no shortage in food availability as supplies from zone GT02 and Mexico are, in general, widely available.

Zone GT02. Central Petén staple foods and cattle farming labor	
Main economic activities Cattle ranching Production of tropical fruits for export Production of staple crops **Main sources of income for poor households** Local labor in agri-business Crop sales Petty-trade **Sources of food for poor households** 70% crops 20%-30% market purchases	The zone is considered the breadbasket of the Guatemala for its extensive production of white maize, which supplies most of the domestic stocks. However, the importance of livestock, and cattle in particular, has increased considerably in the last ten years, becoming a major source of income both for households who have been able to invest into the sector and for households who find labor opportunities in cattle farms. Local households rely on producing food crops (maize and beans) and crops for export (especially pineapple, papaya and African palm) and extensive cattle farming or on working for local landowners in both agriculture and livestock rearing. Food crop production is largely carried out following traditional methods, mainly by hand, while cash crop production is modern and more technically advanced.

Zone GT03. South Petén, FTN and Izabal agro-industry and food crops	
Main economic activities	

Agricultural production of for export Cattle ranching	The zone was considered the nation's breadbasket. Today, the levels of food crop production have been reduced due to the important growth in the agro-industrial sector, especially in the production of African palm, which is replacing forests, food crop production and pasture lands. The local population is engaged in staple food crop production (maize and beans) destined for own consumption, surplus sale or solely destined for commercial purposes (amongst the large landowners). Poor households rely on the sale of agricultural labor to wealthier neighbors cultivating staple food crops and a variety of cash crops (citrus fruits, cardamom, black pepper, pineapple, squash, rubber or melon) and to large-scale private plantations (mainly cultivating African palm and bananas).
Main sources of income for poor households	
Local labor in agri-business Crop sales	
Sources of food for poor households	
20% crops 60% 20% wild foods/animal products	

Zone GT04. Caribbean artisanal fishing and tourism	
Main economic activities	The zone's economy is characterized by small-scale artisanal fishing for household consumption and trade. As well as having direct access to the Caribbean sea, this coastal zone benefits from many lakes and rivers, important livelihood sources for both fishing and increasingly significant tourism activity. Three types of fishing characterize the zone. River fishing is done with hooks and small nets. For lake fishing, gill nets and large networks of haulers are used, while sea fishing includes trawling for shrimp with nets, as well as line and trammel net fishing. Diving is also used to catch lobster and conch. Households alternate between fishing with their own equipment and working for larger-scale fishermen. The most affluent households rent their equipment for fishing and tourism.
Agricultural production of for export Cattle ranching	
Main sources of income for poor households	
Fish sales Fishing labor	
Sources of food for poor households	
60% fish 30% market purchases 10% crops	

Zone GT05. Coffee, cardamom, forestry and vegetable production	
Main economic activities	This zone is one of the most recognized areas for coffee production and the only zone with significant cardamom production. However, since the 2007 livelihood zoning, the zone has seen an increase in the production of coffee, spurred by the drop in the price of cardamom. The basis of the local economy is the production of food crops (maize and beans) and cash crops (coffee, cardamom and vegetables destined
Coffee, cardamom and vegetable production Forestry Initiatives	
Main sources of income for poor households	

Local agricultural labor Crop sales (maize, beans, coffee, vegetables)	to export markets (for example chilies, as well as cut flowers). The production of cash crops provides labor to local households. Additionally, forestry activities have also increased in recent years, thanks to government forest incentives. This is now an important economic activity for those households who own forest areas or land suitable for reforestation.
Sources of food for poor households	
60-70% market purchases 30% crops	

Zone GT06. Western highlands labour, staple crops, vegetables, trade and remittances	
Main economic activities	The basis of the local economy is a mix of agriculture, internal and cross-border trade and remittances. Although the zone is not amenable to large tracts of intensive agriculture, agriculture dominates the local customs. Households produce maize and beans for own consumption and vegetables, potatoes and fruits for sale. This zone is, in fact, the main production area for vegetables and potatoes in the country. The mountainous terrain offers ideal conditions for potato growing. The availability of irrigation in certain municipalities allows for near year-round production. Vegetable production is most prominent in the south of the zone. Migration to coffee and sugar cane production areas (zones GT11 and GT12) is also common, where harvests are performed by hand and demand for labor is high. The proximity to Mexico provides the supplies and the demand for a vibrant cross-border trade economy. Remittances form the third pillar of the economy; it is mainly the young who migrate and the most common destinations are the US and Mexico.
Vegetable, potatoes and fruit production Cross-border trade	
Main sources of income for poor households	
Local and migratory agricultural labor Remittances Crop sales	
Sources of food for poor households	
80-90% market purchases 10-20% crops	

Zone GT07. Baja Verapaz and Quiché staple food and agricultural labor	
Main economic activities	The basis of the local economy is the production of subsistence food crops (maize and beans) with traditional techniques and low yields, as well as the production of vegetables, such as tomatoes, peppers and onions, grown mainly in the San Jerónimo Valley and the municipalities of Quiché. Arid weather conditions, low rainfall and dry soils make many areas of this zone infertile and dependent on irrigation systems, which are concentrated in urban areas, and to which the majority of the population does not have access. The sale of labor for agricultural work is also an important livelihood activity, particularly for poor households who do not have access to land. While GT07 does not produce coffee, coffee plantations outside the zone are a significant wage labor source and the decline in the demand for coffee labor due to rust has significantly reduced local household incomes
Vegetable, sugar cane production	
Main sources of income for poor households	
Local and migratory agricultural labor (coffee plantations)	
Sources of food for poor households	
90% market purchases	

10% crops	

Zone GT08. Montagua Valley, fruit agri-business and mining labor	
Main economic activities Agri-business (coffee, melons/watermelons, other fruits & vegetables) Mining Timber processing **Main sources of income for poor households** Local agricultural labor Local mining labor Migratory labor (capital and Petén) **Sources of food for poor households** 80-90% market purchases 10-20% crops	The Montagua Valley is one of the driest areas of Central America. It is surrounded by mountains, the *Sierra de las Minas* (literally "The Valley of Mines") to the north and the *Sierra del Merendón* to the south. Thanks to irrigation systems from the Motagua River, the livelihood zone produces coffee and melons at an industrial scale (for export) and, on smaller scale, the area supports the production of tobacco, mangos, limes, papaya and other seasonal vegetables. The region is considered to be one of Guatemala's key areas for agri-businesses. For much of the year the agricultural industries support the poorer demographics that are engaged in daily manual labor related, especially for the cultivation of melons and coffee. Besides agriculture, two other important industries dominate the zone's economy: timber processing and mining. The timber industry supplies local and international markets. Substantial industrial mining takes place for marble, chalk, limestone and cement. The good connection and proximity to the capital city attracts laborers once the main harvest seasons in the livelihood zone are over. Workers also migrate north to Petén.

Zone GT09. Industrial, agri-business labor, commerce and services of the Central Area	
Main economic activities Agri-business Manufacturing Service sector (small and large scale) **Main sources of income for poor households** Local casual labor (various industries) Local wage labour **Sources of food for poor households** 80% market purchases 20% crops	The basis of the local economy relies on the presence of the major industrial complex in the country (agri-business, textile *maquilas*, processing factories). Poorer households with low education levels are employed as casual laborers on an ad-hoc basis, middle-income households obtain more stable full-time positions, while better-off households are among the managers, administrators and owners of the factories and processing plants. The same is true within the agro-businesses, although the participation of very poor and poor households is higher due to the abundant offer of low-skilled seasonal work. Trade and small-scale businesses are also a way of life in the livelihood zone, from the informal petty trade practiced by poor households (mostly street sales and small street food stalls) to well established small-scale businesses, such as restaurants, grocery shops, beauty parlors, taxi companies, etc. providing services to workers coming into the zone and to the local population. Additionally, the area has a high demand for various services linked to urban living and industrial settings: transport and currier services, domestic services (for private clients and businesses), security services (again for companies and households) and international call centers.

Zone GT10. Eastern subsistence good crops and agricultural labor (coffee, fruit and vegetables)	
Main economic activities	The zone is located within the "dry corridor". The zone's ecology is most suitable for the purposes of logging and grazing. However, the local population continues to grow the basic rain fed food crops at subsistence levels of production. In fact, the region is one of the first producers of black beans. It is also one of the few zones where sorghum is grown, although it is usually for fodder purposes. The local economy relies on growing food crops for family consumption, as well as some production of coffee and vegetables. In general, it is middle-income and better-off households who have been able to diversify their agricultural production into coffee and seasonal vegetables and fruits (e.g. oranges, *jocote* and mango), sometimes even replacing food crop production all together as a more profitable income generating activity. Migration to sugarcane and coffee production areas (zones GT11 and GT12) during harvest seasons is common.
Coffee, fruit and vegetable production Staple crop production	
Main sources of income for poor households	
Local agricultural labor Migration to coffee production areas in Honduras	
Sources of food for poor households	
40-50% market purchases 30-40% crops 10% animal products	

Zone GT11. Coffee production	
Main economic activities	Although coffee production is the main feature of this area, its importance as a source of income has been greatly reduced in recent years, due to the number of crises that have affected this sector (coffee rust and low prices) and especially small and medium-scale growers. As a result, coffee growers have started to grow fruit inside their coffee plantations, they sell the wood products that result from clearing plantations and pruning, in an effort to exploit the options that their farmland can offer. The zone now produces grains, vegetables, citrus and rubber alongside coffee, which continues to dominate the zone's produce. Most of the population is involved in agricultural activities, particularly related to coffee. Since coffee can be harvested at different times according to the altitude, this zone sees a lot of internal migration and immigration from other zones within Guatemala. Remittances are also notable in this zone.
Coffee and fruit production	
Main sources of income for poor households	
Crop sales (coffee & fruits) Local agricultural labor Remittances	
Sources of food for poor households	
80% market purchases 20% crops	

Zone GT12. Southern agri-business labor and food crops	
Main economic activities	The zone is famous for its sugarcane plantations, which attract seasonal laborers from across the country during the harvest and processing season (*la zafra*). Sugarcane has been grown in this region since colonial times, in large haciendas called *ingenios azucareros*,
Sugar cane, banana and palm oil production	

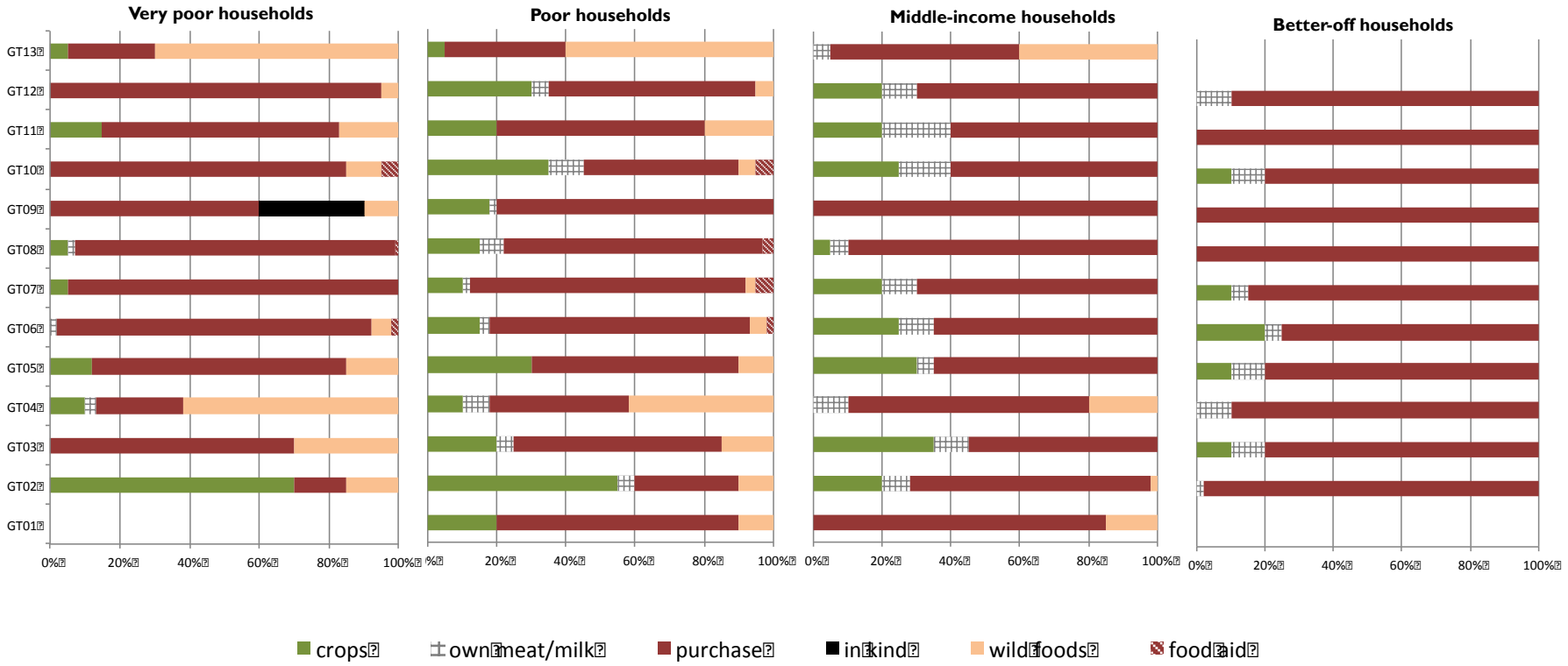
Main sources of income for poor households	which are now owned by private companies. Other important cash crops cultivated in this zone include bananas and plantains, palm oil and rubber, as well as additional fruits (pineapples, mango and papaya), all of which require artificial irrigation under the local climatic conditions and are mainly directed at export markets. Local livelihoods are essentially based on the sale of labor in the plantations located in the zone and especially in sugarcane plantations, which require the largest amount of manual labor on a seasonal basis. Households produce some food crops for own consumption and sale, but household production is entirely reliant on the season's rainfall patterns, as most households do not have access to irrigation. The largest maize producing areas are: La Maquina, Tiquisate and Nueva Concepción; all of which supply the national market for maize. Livestock also plays an important part in local livelihoods, both for poorer households who find employment in farms and for better-off households who are the owners, dairy farms are particularly common in the department of Santa Rosa.
Local agricultural casual labor (sugar cane harvest)	
Sources of food for poor households	
70% market purchases 30% crops	

Zone GT13. Pacific ocean artisanal fishing, trade and services	
Main economic activities	The zone's economy is characterized by small-scale artisanal fishing for household consumption and trade and small-scale agriculture: maize, sesame, papaya, banana and coconuts. Despite the coastal location of the zone, fishing is only an artisanal activity, using few modern techniques or equipment. As a result, it is not a high-growth industry, but it is an important means of life for the local population. All households depend on fishing as a source of food and income and many also on fishing labor as the main source of income. Labor opportunities are available working for other fishermen out at sea or working in shrimp and tilapia farms located inland. The tourist sector provides opportunities for labor and trade, including an additional market for fish during the peak tourist season. Migration towards the sugarcane production areas in zone GT12 is common
Fishing	
Main sources of income for poor households	
Fish sales Fishing labor Agricultural labor	
Sources of food for poor households	
60% fish 40% market purchases 0-5% crops	

2.4 Summary of food and income sources by livelihood zone

The following sets of graphs summarize the difference sources of food and income common within each of wealth group in each livelihood zone. They also present the approximate relative weight of each source to the annual household food balance sheet and the annual household budget. The quantitative information provided in this section was collected over a small number of interviews in each livelihood zone, and while it is not the result of a large statistical survey, the graphs provides a coherent set of information on the common patterns of access to food and income.

Table 1: Typical sources of food by wealth group and livelihood zone, as a percentage of annual food balance sheet



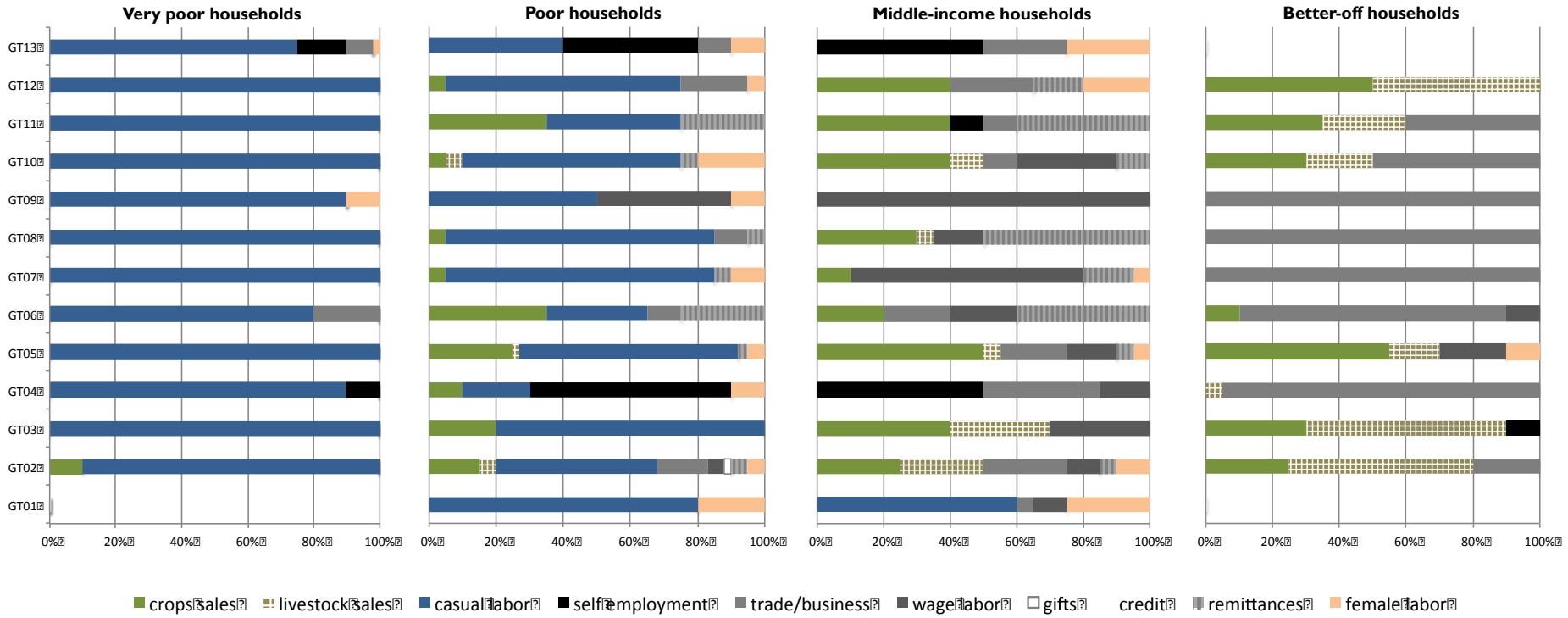
Source: FEWS NET

Overview of sources of food

The market (red bar) is the main source of food for rural households at all levels of wealth. Households own production of the national staple crops (maize and beans) provides between 10% and 20% of households total food consumption, except in zone GT02, which is the country's breadbasket. Poor households commonly differentiate themselves from very poor households for having greater access to land (through ownership or rental agreements) and their efforts to achieve some degree of self-sufficiency are evident (green bar). The same is true of middle-income households who continue to reserve some of their productive land for maize and bean production, unlike better-off households who, for the most part, have forgone cereal production all together. Animal products from the household's own stock (grey and white checkered bar) are more evident the more affluent the group is, as the availability of land and capital allow for diversification into livestock breeding. Eating wild foods (including seasonal fishing, hunting and collecting various wild leaves and fruits) is a common strategy among poorer households (pale pink bar). In zones GT04 and GT13, year-round fishing is the principal economic activity, therefore this source of food is more prominent.

Overview of sources of income

Table 2: Typical sources of income by wealth group and livelihood zone, as a percentage of annual household budget



Source: FEWS NET

A snapshot of the economic profile of each wealth group emerges from the graphs presented in Table 2. Very poor households are essentially casual laborers with very little or no access to land and no surplus for sale. They are low-skilled workers, predominantly in the agricultural sector. Poor households are also casual laborers, yet they have secured a small amount of land for crop production, sufficient to generate surplus for sale and, occasionally, diversifying into cash crop production as well as basic food crops. Poor households supplement their income with different varieties of small-scale trading. Adult women also work as casual laborers (in agriculture and domestic services) and engage in petty trade and small-scale family enterprises.

Access to land is a major issue in Guatemala originating in the coffee boom of the 19th century, which triggered massive land expropriation from indigenous populations and the privatization of communal land. The absence of strong land tenure rights exacerbates the problem today. As a result, it is the more prosperous wealth groups who own land and have the required collateral to expand agricultural production through credit, to invest in business ventures and to provide access to higher education levels and training, which will grant them access to wage labor. Better-off households are capitalist, involved in agri-businesses, cattle ranging or commerce. They represent a very small percentage of the population and they are the main providers of employment.

The role of women in the household economy has evolved and grown in importance in recent years across all wealth groups. While in very poor households women's role is mostly restricted to unpaid household and agricultural labor, women's economic contribution gains importance among poor households where adult women are engaged in paid agricultural and domestic labor and petty trade. Women from middle-income and better-off households are often well educated and take on salaried employment, for example as teachers, nurses or service sector workers, or they may own and run small businesses such as retail shops, restaurants or beauty parlors. Outside of their economic tasks, women continue to cover the bulk of the household and family care duties and they also oversee small-scale food crop production (*cultivos de patio*), poultry and small livestock – essential to household food security.

Finally, a note on emigration outside of Guatemala. Emigration has been driven by a combination of civil war, natural disasters and the overall lack of economic opportunities, and, more recently, by the increasing levels of violence and crime. Migration translates into an additional source of income for poor and middle-income households in many zones (especially GT06, GT08 and GT11), through the reception of remittances. Internal seasonal migration is an equally important feature in Guatemala, however, it has not been captured in the income graphs, where income from seasonal labor has been recorded under "casual labor".

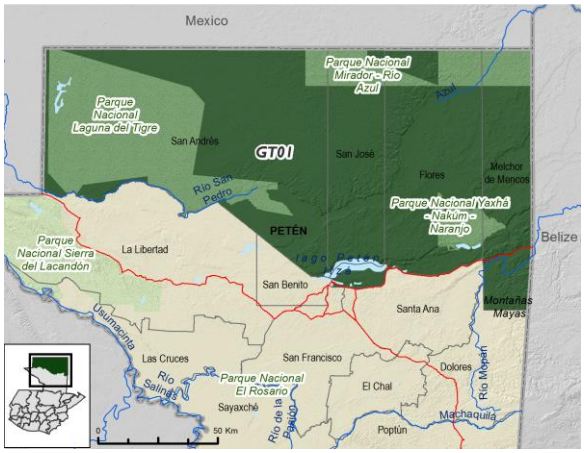
3. LIVELIHOOD ZONE PROFILES

North Petén Forestry and Eco-Tourism (Zone GT01)

General livelihood zone description

The "North Petén forestry and eco-tourism" livelihood zone is the most northern zone in the country, bordering Mexico to the north and west and Belize to the east. It is a remote zone, located at a large distance from the capital city and with limited physical access to the rest of the country. It comprises the municipalities of La Libertad, San Benito, Santa Ana, San Andrés, San José, Flores and Melchor de Mencos (all in the northern half of the department of Petén). Much of the zone is categorized as protected areas; over two million hectares are classified into several management categories: national parks, biotopes, multipurpose areas, forest concessions, core zones and buffer zones. The activities permitted within each category vary and are defined within the Protected Areas Act.

Map 1: Livelihood zone location



Source: FEWS NET

This region is the most densely forested area in the country and contains wetland forests in the northwest and tropical broadleaf forests in the remaining areas. Forest cover is mostly natural, although some reforestation has taken place thanks to government Forest Incentives. There is a wide variety of trees growing in the zone, including precious lumber woods such as cedar, mahogany, *manchiche* (or black cabbagebark) and Santa Maria (or guanandi), and secondary and reforested lumber woods like teak and beechwood (*melina*). There are also many non-timber products available in the forests, such as *xate*[11] (used as decorative foliage), allspice, natural gum[12], *Ramón tree*[13] nut (or Mayan nut), *guano*, *bayal* (a natural fiber), *sacpá* (a wild fruit), *moshán* (the leaf used to make *tamales*), honey or chilies. In terms of fauna, hunting of small mammals (deer, rodents such as the tepezcuintle, *coati* raccoons, etc.) and reptiles (iguanas, snakes) is common, and so is fishing in rivers, lakes and lagoons.

The zone enjoys a warm and humid climate, with temperatures ranging from 18 to 40 degrees Celsius (64-104 degrees Fahrenheit) and a relative humidity between 70 to 80%, resulting in a greater thermal sensation of heat. The average annual rainfall levels range from 1200 to 1700 mm/per year.

The topography is flat (ranging on average between 10 and 500 meters) with some low-rise undulations and the presence of the *Sierra del Lacandon* mountain range. The most important rivers in the zone are the Mopán, San Pedro, Blue and Santa Maria rivers. Additionally, the zone includes the Sacpuy, Yaxhá and Tigre lagoons, adjacent to the Petén Itzá Lake. The dry season last from January to June, while the rainy season is slightly longer than in the rest of the country, reaching well into December.

Population density is very low (approximately 9 inhabitants /km^2) as a result of the vastness of the area, completely rural due to the constraints that define the different types of protected areas in the

[11] *Chamaedorea ernesti-agusti*
[12] *Manilkara chicle*
[13] *Brosimum alicastrum*

use that can be given to natural resources, including the soil cover. The population is mestizo, quekchí and itzá.

The local economy is based on the trade of forest products (most importantly timber, xate leaves and Ramon nuts) and the labor opportunities the forest concessions provide, as well as activities related to tourism (services, handicraft sales, transport and trade), subsistence farming, ranching and migration to neighboring zone GT02 and to Belize to work in the agro-industrial sector. Household agricultural production is low (limited to household consumption) but there is no shortage in food availability as supplies from zone GT02 and Mexico are, in general, widely available.

A number of Multipurpose Zones (*ZUM – zonas de usos multiples*) have been designated in the zone, nine community forest concessions and two multipurpose industrial zones in Carmelita, Uaxactún, Arbol Verde, San Andrés, Las Ventanas, El Esfuerzo, Laborantes del Bosque and Custodios de la Selva. The majority of the concessions are uninhabited and use is restricted to the cooperative or civil society group that holds the license and to its workers. Much of the ZUM surface area is devoted to collecting *xate,* an ornamental leaf from the Palm tree species which is used in flower arrangements (for example for Palm Sunday offerings) and exported mainly to the US and Europe. Concessions are managed following rigorous management plans for the extraction of timber and *xate.* All plans are approved and certified by the Forest and natural resources authorities to ensure sustainable management of the local resources.

The zone includes several places of interest such as ecological reserves and archaeological sites[14]. Many of these sites are located in protected areas, areas of national importance due to their large biodiversity and also for the tourist attraction they represent. By their nature, these areas, which cover much of the geographic extension of the zone, have restrictions on their use and the establishment of human settlements within their borders is not allowed. The existence of natural and archaeological attractions has encouraged a buoying eco-tourism sector, which now provides labor opportunities for the local population. The establishment of concessions in the zone has encouraged a better organization of the tourism sector.

The main hazards affecting the zone are fires, pests, the pressure on the forest cover for the creation of grazing areas for cattle and illegal activities, such as drug dealing. The change of land use to grazing areas is prohibited by the Protected Areas regulation. Some of the most important obstacles for the development of the area are the lack of control over the territory and its regulations, the overexploitation of natural resources, the lack of diversity of employment opportunities and the difficult physical access.

There is a permanent flow of immigration from zone GT14 (from Alta Verapaz and Quiché) in search of access to the virgin land still available in the zone. However, most immigrants have been met with poor soils and lack of employment opportunities. These populations also face legal difficulties because many areas are restricted and, as a result, many new arrivals have had to resort to the invasion of land.

Markets

Market access

The most important markets are Santa Elena and Melchor de Mencos, which are located in the south of the zone, represent the main supply centers for the livelihood zone. Access to these markets is poor due to the state of the roads, the long distances and the lack of public transport. The road infrastructure is much poorer in this zone than in neighboring zone GT02. This makes access to and

[14] Namely: Tikal, Yaxha, Uaxactún, El Mirador and El Naranjo, Laguna del Tigre National Park, the Tikal, the Mirador-Rio Azul and Mirador Sierra del Lacandon, the Mayan Biosphere Reserve, the Naachtún Dos Lagunas biotope and the Yaxhá-Nakúm-Naranjo National Monument.

from markets, both for buying food and for trading goods, problematic. Local production is very limited and there are no seasonal variations in supply

Main produce sold

Timber – timber is sold by forest concessions either directly or via intermediaries. When timber is sold for export directly, it is transported by truck to the seaport of Puerto Barrios and form there to the US. Timber is also sold to national buyers and intermediaries for sale to carpenters around the country. The main trading season last from May/June to November that are the months the sawmills are in operation. The sale price is set based on the quality of the timber and can be different for national and international markets. If the timber is to be exported, the price is set at the concession after the census or commercial inventory has been carried about (between August and December). As buyers place their orders they put down an advance before extraction begins in February.

Xate – xate is sold by forest concessions and transported to the collection center at Santa Elena where cold storage trucks await for onward travel to the central wholesale market outside Guatemala City. Xate is exported to the US and Europe via the seaport of Santo Tomás and the international airport at Guatemala City (La Aurora), or overland via the border town of Tecún Umán in the department of San Marcos towards Mexico. Two major operators dominate the sector, Guatemala CEFASA or Continental, who take turns on a yearly basis to operate. International brokers are responsible for transporting the produce to its final destination. Volumes of trade increase during the dry season when selection and harvest are easier. The price is fixed according to quality grading system and also reflects the transport costs (i.e. whether the produce was collected at the concession or if it was transported to Santa Elena – a distance of 90 to 100 km each way).

Ramón tree nut – this nut is sold by forest concessions to intermediaries in relatively small quantities that can easily be transported in pick-up trucks. The supply chain is as follows: from the concession to the collection center to the transformation plant in Cobán and to local markets. The nuts are transformed into flour, which can be sold as the final product or processed into different types of foods, such as biscuits. The main harvesting and trading period falls during the dry season. There are no seasonal variations in price.

Honey and by-products (pollen, propolis, beeswax, royal jelly) – these products are sold directly by the honey producers at local markets or to intermediaries for onward transport to collection centers and export to Europe.

Casual labor markets

Local labor – local opportunities are available in the forest concessions either felling trees or harvesting xate and Ramón tree nuts. Laborers are paid by unit (a bunch of xate leaves) as long as it meets the quality requirements. The average rate is 0.75 to 1 GTQ per bunch. In four hours one person can gather an average of 150 rolls of 20 bunches each, equivalent to 3000 GTQ. Allspice harvesting is paid at 800 GTQ per 100kg sack, while harvesting Ramon nuts is paid by the pound at an average of 3.75 GTQ.

Migratory labor – occasionally local laborers migrate to zone GT02 in search of employment opportunities in the maize harvest from December to May, when local opportunities are few. They also migrate to Belize towards the end of the year to harvest sugarcane and oranges.

Staple food supplies

Maize and beans – local supplies are reserved for household consumption and last between 3 and 4 months. Markets are supplied with produce from southern Petén (zone GT02 and GT03) and from Mexico.

Credit and remittances

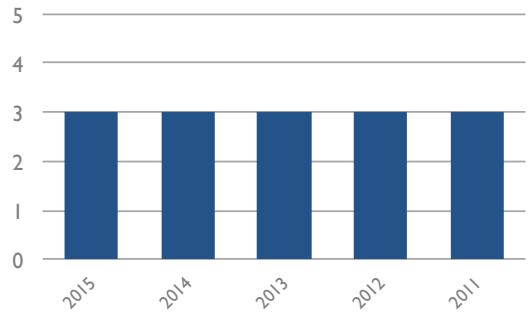
It is not common to request credit or loans, as facilities are rare. Forestry concessions operate on the basis of partial down payments credited at the time of the trade deals in the case of the timber trade and on the basis of signature of export contracts for xate. Outward migration is not very common and, as a result, remittances are equally rare.

Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

The communities' perception of food security and general livelihood security over the last five years has been average. A number of potential hazards were noted by the local population during 2015, an increase in the number of forest fires, high temperatures and a reduction in rainfall, however, the annual balance was average. In response to the increase in forest fires these events, forest concessions have hired a greater number of forest rangers to monitor the natural reserves.

Figure 2: Perception of historical food access with 1 as worst and 5 as best



Source: FEWS NET

No particular incidents were noted for the years 2011 to 2014. No external assistance has been distributed in the zone in the last five years.

Seasonal calendar

Two well defined seasons dominate the local calendar: the rainy season which is longer than in most of the country and starts in June reaching well into November and even December, and the dry season which follows from December to May. The seasons determine the timing of cropping for maize and beans and also the timing of the different activities that take place in the forestry sector. However, there is no evident lull in economic activities due to seasonality. The different activities typical of the zone are sequenced in a way that labor and income generating opportunities are available year-round. For example, those engaged engaged in timber extraction divert their labor to the harvesting of *xate* when the felling season is over. The same is true for wild food collection (common in the wet season) and fishing (common in the dry season).

Maize is grown over two cycles; the first sowing takes place in May before the rains set in. The first harvest is ready by August and is followed by a second sowing, that starts in November. The second harvest is ready by January. Beans are more prone to pests and diseases than maize, and therefore are only planted once a year in September/October and harvested in November/December. Overall, the levels of production are low however.

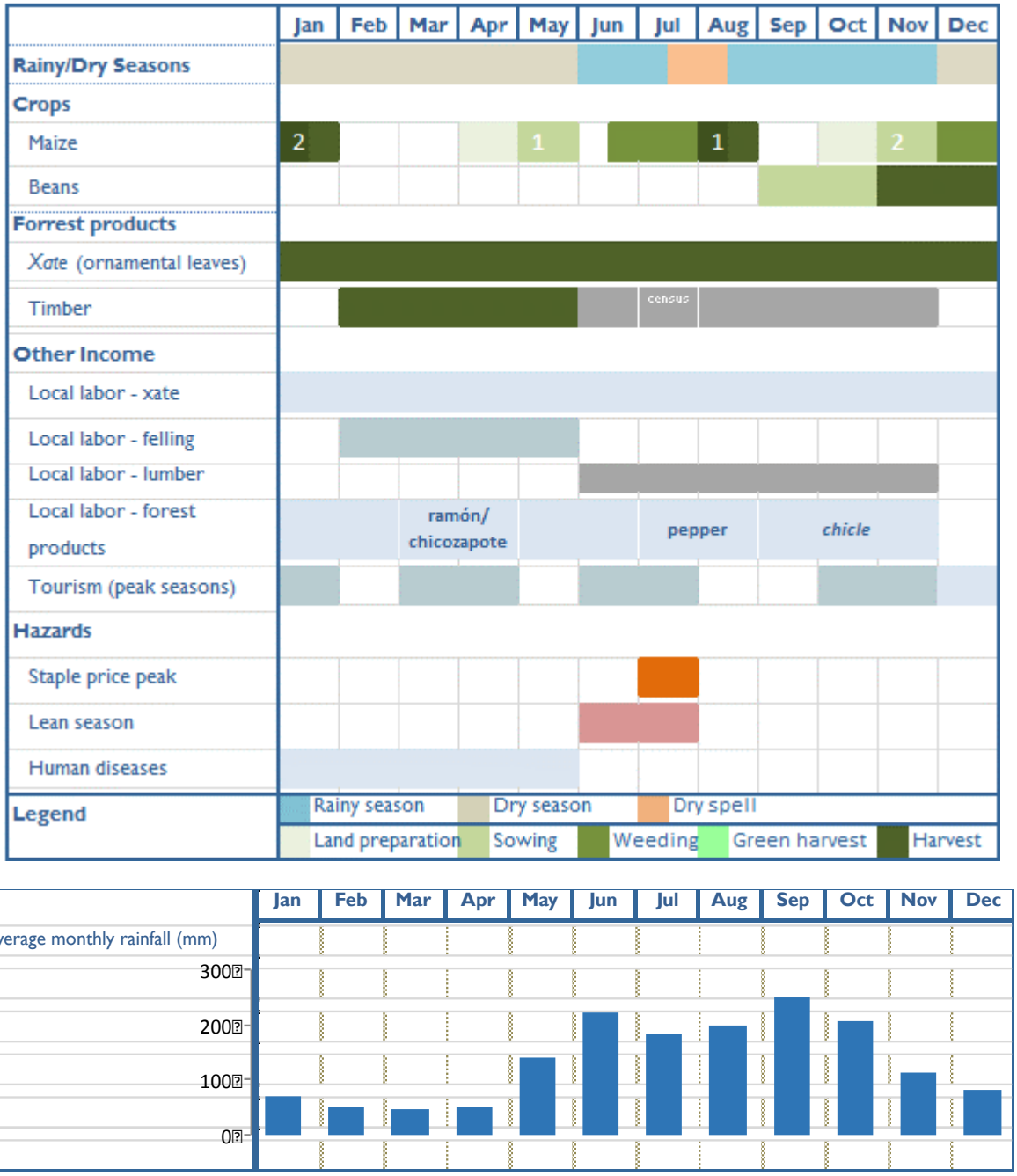
Of all the forest resources, one of the most important is *xate* as it can be harvested year-round (although harvest slows down during the peak of the rainy season) and, so far, has not been affected by climate change. The harvesting of *xate* is carried out manually, normally by women who select, gather and bunch the branches ready for transport.

Felling takes place during the dry season when access in and out of the forest is easier. Sawmills are in full operation during the rainy season. A tree census takes place every year, in July, at each concession. This allows future buyers to select the types of timber they want to purchase over the following year when operations start again. Contracts are signed and cash advances are paid.

The availability of wild foods changes throughout the year, Ramon nuts, *chico zapote* (sapodilla) are harvested during the dry seasons, between March and April. Pepper and natural gum are harvested during the wet season. The reduction of river water volumes during the dry season allows for easier fishing, while rainfall promotes the growth of wild plants and herbs, which are usually collected by the poorer households.

The tourism is present year round, but the peak tourist seasons follow the national holiday calendar and some international holidays, as well. The Christmas and New Year holidays coincides with the end of the production cycle in forest concessions and often leads to a short halt in activities.

Figure 3: Seasonal calendar for GT01



Source: FEWS NET

The dry season (February-May) promotes the spread of forest fires, while excessive rain during the wet season, especially between August and November, can cause a fall in the intensity of felling and related activities. The lean season sets in before the start of the first maize harvest, when the price of staple foods reaches its maximum annual levels.

Wealth breakdown

Due to the low population density and the limitations to the development of economic activities within the livelihood zone, the disparity across the local population in terms of wealth and economic status is not very pronounced. Only two socioeconomic groups have been defined by the local population: poor and middle-income households, when in other zones the most common subdivision is into four wealth groups. Both types of households rely on working in forest concessions and in the tourism sector as their main source of livelihood, however their supplementary sources of income vary. Thanks to higher levels of instruction, middle-income households can access formal employment. Additionally, they have sufficient capital to set up small-scale businesses that also provide stream of revenue. Poor households, unable to access employment outside of manual labor, invest their labor force in the exploitation of farmland. Households own a maximum of 2 ha of land on which they grow maize and some beans. The harvest is reserved for family consumption, as the quantities produced are not sufficient to justify travelling to the local market for sale.

Table 1: Determinants of wealth in GT01

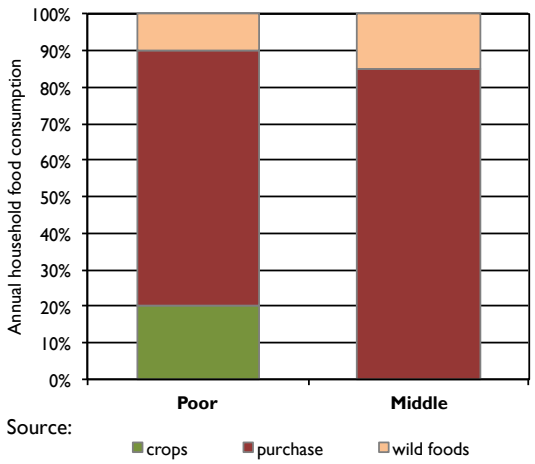
Determinants of wealth	Poor	Middle
Household percentage (%)	27	50
Household size (#)	8	5
Land holding (ha)		
Land area owned	< 2	0
Land area cultivated	< 2	0
Typical livestock holding (#)		
All livestock	4-6	5-10
Other productive assets (#)		
Agricultural tools	Basic tools	
Vehicles	Bicycle	Motorbike

Source: FEWS NET

Poor households find casual work in the tourism sector, the harvesting of xate and other forest products. Women are also engaged in the harvesting of xate and especially in the sorting and packaging before export, harvesting Ramon tree nuts and small businesses like selling prepared foods. Middle households carry out similar activities in forest concessions and are sometimes offered formal employment within this sector, for example women are employed as supervisors in *xate* selection. Additionally, middle households often own small businesses (e.g. food or clothes shops), which are commonly run by women too.

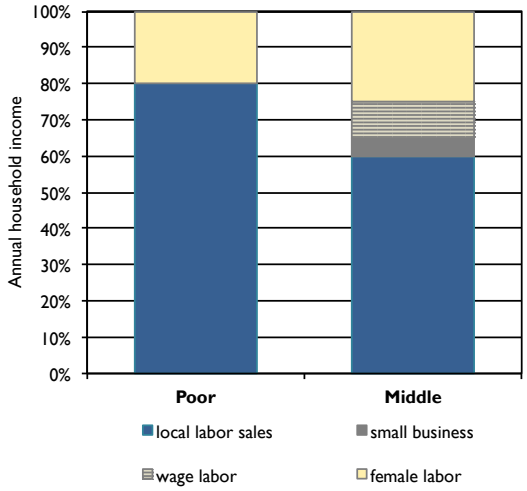
Sources of food and income (estimated weight)[15]

Figure 4: Food sources by wealth group in GT01



Source:

Figure 5: Cash income sources by wealth group in GT01



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food consumed during the year. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

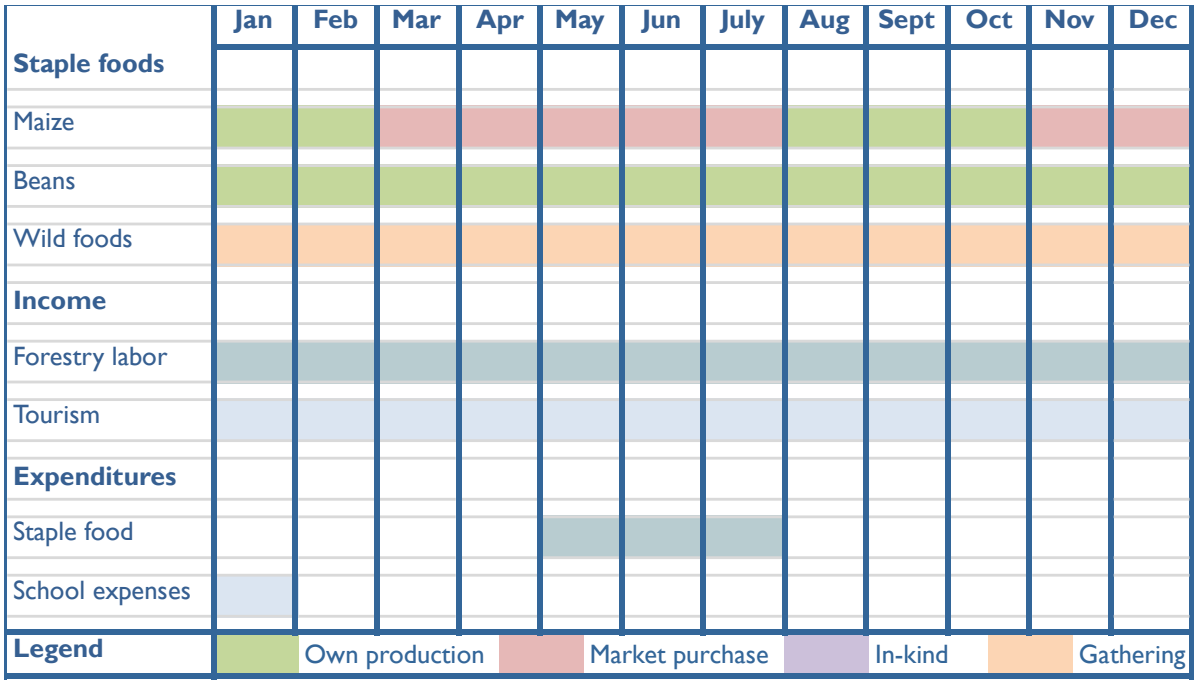
The market is the main supplier of staple and non-staple foods in the livelihood zone. Poor households chose to exploit their farmland and cultivate maize, which cover the household needs for four to five months of the year. Middle-income households are engaged in more profitable activities and as access to food is not difficult in the area thanks to imports from southern Petén and Mexico, they forgo agriculture all together. Thanks to the abundance of local flora and fauna, both types of households take part in hunting, fishing and wild food collection, which represents a considerable source of food throughout the year.

In terms of income sources, both types of households rely on local casual labor in the different forest concessions. Adult female members are also engaged as casual workers in the concessions and supplement family income with petty trade or well-established small-scale businesses such as food stores, in the case of women from middle-income households. Adult members from middle-income families can access wage labor in the concessions or in the tourism sector, this provides a stable source of income, which poor households cannot access.

[15] The quantitative information provided in this section is derived from one field interview in Flores (in the department of Petén).

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT01



Source: FEWS NET

Poor households are self-sufficient in maize for four to five months of the year in total, following each of the two harvests. The rest of the year they purchase staple foods at the local markets. Through the year households are engaged in hunting, fishing and gathering of wild foods, which provide a supplementary source of protein to the household diet.

The employment options within the zone are very limited, poor household find casual labor in the different forest concessions and in the tourism sector (in transport, restaurants, selling handicrafts, etc.). In times of need, they may migrate to areas of agricultural production outside the zone, for example further south in Petén for the maize harvest or to Belize to work in sugarcane plantations and orange groves.

The main expenditures are staple foods, which are purchased year-round and especially before the maize harvest. School expenses are also an important one-off expense at the beginning of the school year.

Hazards and household response

Crop pests - these appear when there is a change in climatic conditions. The most common are borer, rootworm and slugs (*chimilca)*, which attack beans and maize. Beatle larvae (*gallina ciega*) and ants are the most damaging. Pesticides can be used to counter them. Grubs and fungi attack the *xate* plants, reducing the quality and the availability of its leaves. In order to counter this problem, harvesting is rotated across different areas, and to more elevated areas in the case of fungi outbreaks.

Hurricanes or tropical storms – due to its location, the department of Petén is prone to heavy rains caused by tropical storms affecting the Gulf of Honduras and the Yucatan Peninsula. These occur once every five years, on average, and typically between the months of August and November. The common effects are blocking of roads, collapsing of bridges and overflowing of rivers, which obstruct access between residential areas and places of work. If crops have been damaged, the immediate results are a reduction in harvests and food stocks, which can lead to an increase in migration.

Heavy rainfall and floods – heavy rainfall hinders the selection process for *xate* leaves, it also affects the allspice harvest and reduces access by land due to the poor state of the roads. Heavy rainfall also reduces the amount of honey produced due to shorter, less intense flower bloom seasons. Flooding is not an annual hazard but is a common result of excessive rains and the overflowing of rivers.

Fire – the threat of fires is the result of the dry local conditions but also to the common use of slash and burn during the land preparation phases. Fires threaten forests and the fauna and flora that inhabit them. The abundance of smoke can also provoke respiratory problems and eye conditions if it reaches human settlements. Provoked fires are also a common hazard; as perpetrators seek to clear areas inside the forest to be able to establish settlements or to build clandestine airstrips, in the case of drug trafficking operations. To minimize this hazard, forest concessions have hired more personnel to monitor the forests especially between the months of February and May.

Increased population density and pressure on resources - due to continuous migration into the area the increased pressure on natural resources (forests, soil, water) can lead to environmental problems.

Illegal logging – illegal logging is causing deforestation of the rainforest.

Table 2: Coping strategies in response to shocks in GT01

Very poor/poor	Middle/better-off
Intensify local labor	Intensify local labor
Migration	Migration

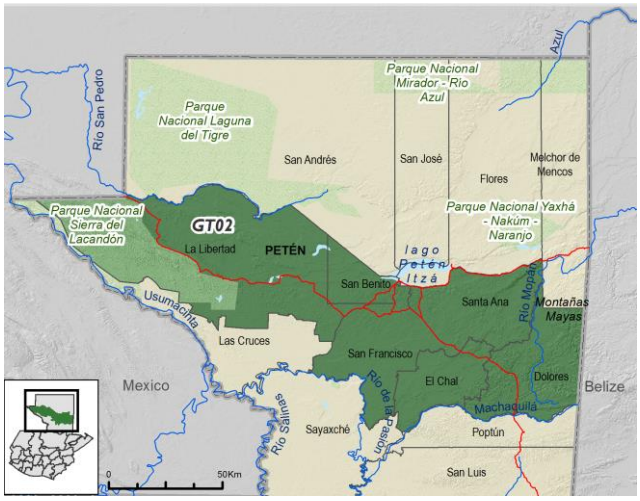
Source: FEWS NET

Central Petén Staple Foods and Cattle Farming Labor (Zone GT02)

General livelihood zone description

The "Central Petén staple foods and cattle farming labor" livelihood zone includes the municipalities located in the middle of the department of Petén16. The zone is bordered by the forest zone GT01 to the north, the agricultural zone GT03 to the south, Mexico to the west and Belize to the east. The zone is considered the breadbasket of the Guatemala due to extensive production of white maize, which supplies most of the domestic stocks. However, the importance of livestock, and cattle in particular, has increased considerably in the last ten years, becoming a major source of income both for households who have been able to invest into the sector and for households who find labor opportunities in cattle farms.

Map 1: Livelihood zone location



Source: FEWS NET

The topography of the zone is made up of large open plains and rolling hills, elevation ranges between 200 and 350 meters and includes as its highest point the *Sierra de Lacandón* mountain range (reaching 420 masl). Vegetation cover is a mixture of tropical moist broadleaf forests, rangelands and pockets of teak and Melina forests, areas reforested thanks to government initiatives and subsidies. This zone enjoys a warm and humid climate, with temperatures ranging from 8 to 44 degrees Celsius (46.4 to 111.2 degrees Fahrenheit) and relative humidity ranging between 80-85%. Annual rainfall levels average 1700 mm per year. Like in the rest of the country, there is a dry season from January to June followed by a rainy season from July to December, with a dry spell between July and August. The most important rivers are Usumacinta, La Pasión, San Pedro, Mopán, San Juan, Subín and Camalote, some of which are navigable and form part of the commercial routes in the zone. The zone also includes a number of lagoons (Oquevia, San Diego, La Gloria, El Repasto and La Pila) and ecological reserves and archaeological sites, although not as many as in neighboring zone GT01.

Although this is the most densely populated zone within Petén (particularly the municipality of Benito), overall the population density is relatively low (approx. 23 inhabitants /km^2) and largely rural, with approximately 30% of urban population. The dominant ethnic group is mestizo, but there are also minority quekchí and mopán communities. The availability of land has spurred immigration from zone GT01 and from the southern coastal areas, attracting people who are searching for available farmland and better living conditions, through either purchase or rental. Although, in general, land is not very fertile (generally shallow soils, with poor to average draining and prone to erosion) many households have reached a good degree of self-sufficiency in staple foods.

Local households rely on producing food crops (maize and beans) and extensive cattle farming or on working for local landowners in both agriculture of crops for export (especially pineapple and papaya) and livestock rearing. Food crop production is largely carried out following traditional methods, mainly by hand, while cash crop production is modern and more technified. The production of palm oil has increased as of late, bringing new jobs for local laborers. Livestock has also expanded considerably in

[16] It includes the municipalities of La Libertad, Santa Ana, San Francisco, Dolores and San Benito, and the newly created municipality of El Chal.

the last ten years, as the broad grasslands in the zone are ideal for extensive cattle breeding. Cattle ranging has been promoted further with the construction of a modern livestock market at La Libertad. This sector, however, does not provide as many unskilled jobs as agriculture does, and it is more affluent wealth groups that benefit from these improvements.

Road infrastructure has improved in the zone, which has allowed it to open to trade with the rest of the country and neighboring Mexico and Belize. The largest volume of trade with Mexico is in cattle and staple foods, while the exchange with Belize is related labor for the orange and sugarcane harvest.

Markets

Market access

The major markets are located in the capital cities of each municipality. Access to these from these markets to the rural communities is moderate to good yet; overall, the roads that connect to them are in good condition. A number of major roads connect the zone with the departments of Alta Verapaz and Izabal. The most important road is the road from Guatemala City to Flores, the capital city of the department of Petén. The Mundo Maya international airport is also located outside Flores.

Due to their proximity, trade between Mexico and Belize is also common. A small amount of the livestock raised in the zone is sold to Mexico, at a lower price and through informal channels, due to a lack of traceability. The main export point is Sayaxché. White maize is also marketed via the Usumacinta River towards Mexico, among other trade routes. Informal trade is also relevant in the western part of the zone, across the border with Belize.

Main produce sold

Maize – the first maize harvest accounts for 70% of the zone's production. The majority of this harvest is transported to Guatemala City, sometimes via the market at La Libertad. The most affluent households have direct links to clients in the food industry, while the other groups sell their produce to middlemen who travel to the communities to purchase directly at the farm-gate. The zone is a major producer of white maize and a net exporter. A small amount of maize is traded in Mexico, transported downriver along the Usumacinta River. Trade volumes for maize increase in September/October and February/March. Although supplies are higher during the harvest seasons, prices remain more or less stable throughout the year, as there is a constant supply (large landowners have modern stock facilities and they can stagger sales throughout the year).

Beans (*frijol negro*) – the zone is also self-sufficient in beans and a net exporter. About 80% of local production is destined for local consumption and the remainder is traded from San Luis to the capital city. The volume of trade peaks between November and January.

Fruits (pineapple, papaya, avocado, lychees) – fruits are sold directly from the producer to the buyer. Pineapples are mostly sold via Miami during two specific periods, February to April and October to December. Outside of these windows of opportunity, pineapples from Costa Rica flood the market and it is no longer profitable to export. Produce is transported overland to the main Atlantic seaport (Santo Tomás de Castilla port) in trucks and then by cargo ship. Papaya is also sold to the US and to the domestic market via the central wholesale market in Guatemala City. Papaya production is constant throughout the year.

Cattle –Between 10-15% of livestock production is consumed within the zone, small numbers are sold in Mexico and the vast majority of animals are sold in Guatemala City. Animals are transported to other destinations, such as the southern coast and Honduras, via the central wholesale market in Guatemala City. However, the construction of the livestock market at La Libertad seeks to retain livestock inside Petén. Farmers purchase calves in June for fattening, at the start of the rainy season when pastures start to regenerate. They sell in December before the dry season, when pasture and water availability fall again. There are no seasonal variations in prices but depend on the levels of supply and demand.

Milk and by-products – most milk is sold unpasteurized, via intermediaries to the processing plants and collection center in Guatemala City. Milk yields increase between May and February (during the rainy seasons and for a few months after it) when pasture is plentiful. Cold-storage trucks collect the milk from the farmers. There is no visible fluctuation of prices throughout the year.

Casual labor markets

Local labor: labor opportunities are available locally in agriculture and livestock farming. Demand for agricultural labor increases during the second half of the year, which includes the first maize and bean harvests and the different fruit harvests. African palm and papaya plantations provide a source of employment to households living in the vicinity of the plantations and/or processing plants, however, the labor demand generate is generally lower than for food crop production. The demand for labor in cattle farming is more stable throughout the year, but generally lower in terms of the number of jobs it generates.

Migratory labor – laborers from zone GT02 travel to Belize for the orange and sugarcane harvest seasons. They also travel across the border to Mexico in search of labor opportunities. Otherwise, the zone attracts laborers more laborers than the laborers that leave the zone. People travel from Izabal and zones GT08 and GT10, especially for the maize harvest from August to May.

Staple food supplies

Maize and beans – local households' supplies last between four to six months, depending on their socioeconomic status and their production and storage capacity, unless they produce maize and beans purely as a cash crop. Nevertheless, the zone is a net exporter of both products, so local supplies supplement households own crops.

Credit and remittances

Credit and loan facilities are not widely used by local households; only large landowners and farmers have access to commercial loans via financial institutions. Remittances are not common either in this livelihood zone, if at all, it is a minority of households within the poor and middle-income groups who receive them.

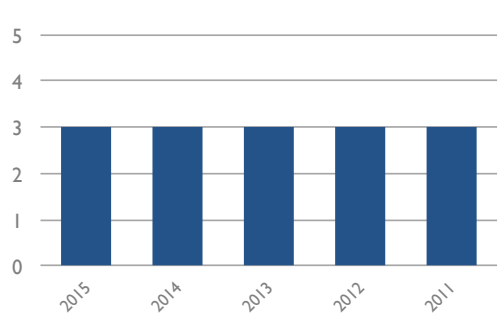
Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

The communities' perception of food security and general livelihood security in the last five years has been good or average. No particular hazards were reported for this time period.

The most recent year, 2015, was considered an average year, neither very good nor very poor. However, interviewees reported high temperatures and a decrease in average rainfall levels, which led to a reduction of pasture especially between February and May, although ranch owners were able to provide alternative fodder to their animals.

Figure 2: Perception of historical food access with 1 as worst and 5 as best

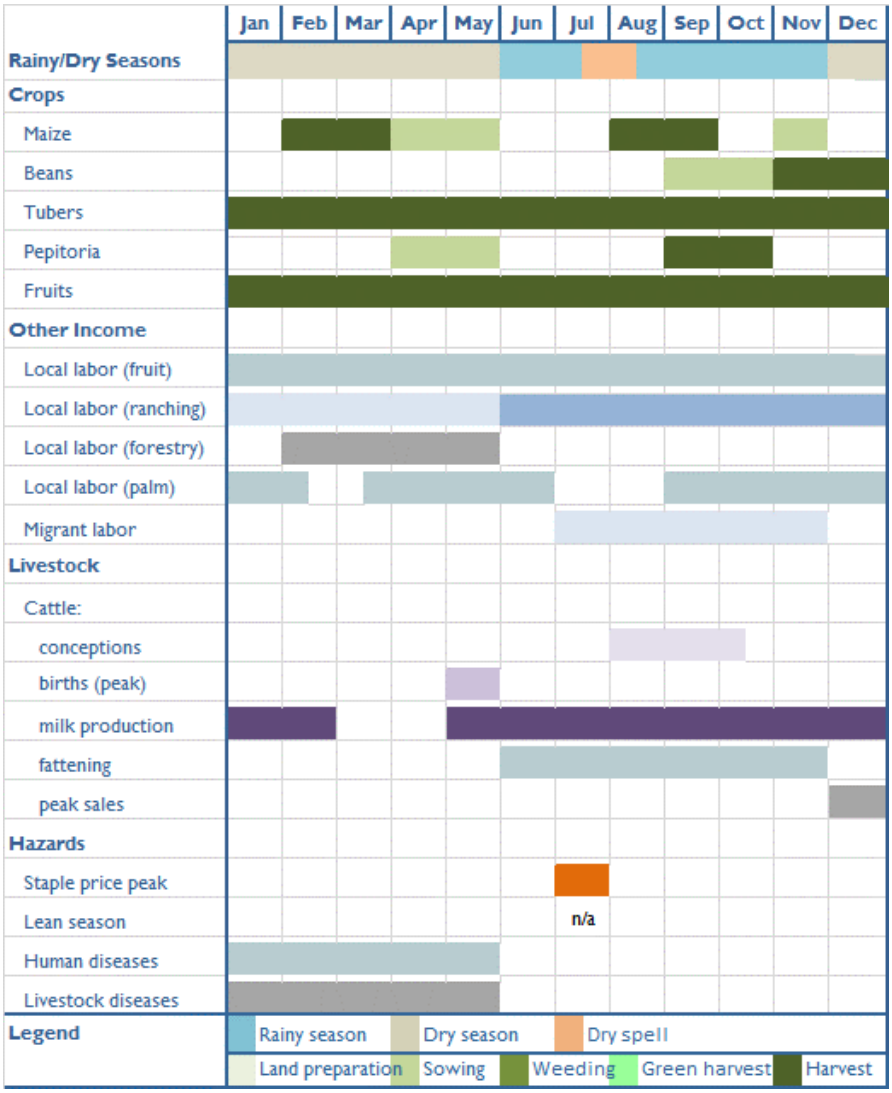


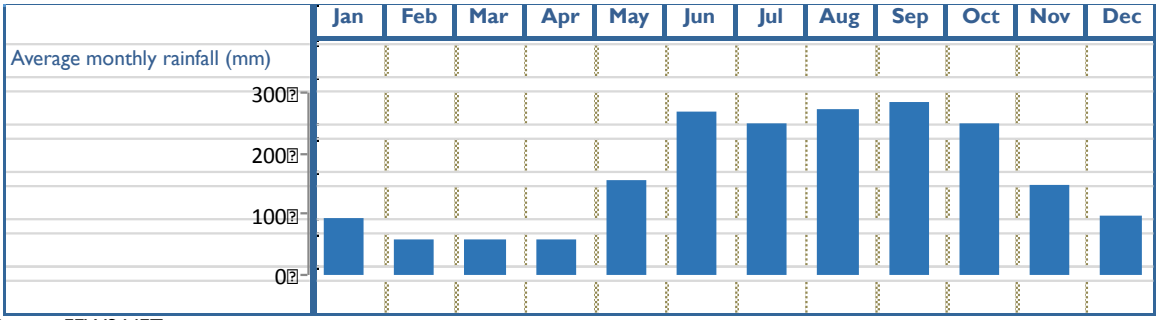
Source: FEWS NET

External assistance within the zone has been low, limited to a small number of localized distributions following flooding and only as a short-term measure.

Seasonal calendar

Figure 3: Seasonal calendar for GT02





Source: FEWS NET

The majority of crops are harvested during the rainy season. The most common variety of maize grown in the zone is white maize, which has a growing period of 120 days. There are two annual harvests, the first and most important harvest represents 70% of annual production, it is sown between April and May just before the first rains and harvested as from August. The second cycle is sown after the canícula period, which often brings dry spells and is harvested well into the dry season. Beans require 90 days till maturity. The first harvest is also the most important, accounting for 60% of annual production. The second sowing is less common because it increases the risk of crop pests.

In terms of fruit production, pineapple is harvested in June and July. Papaya is harvested between July and December, and avocado is also harvested towards the end of the year between November and December. African palm, however, can be harvested virtually year round. It is mainly private companies who cultivate papaya and African palm, providing employment opportunities to households living nearby.

Local labor opportunities are constant throughout the year but more abundant during the second half of the year. The rainy season is the busiest time of the year, because it includes the major maize harvest and the bean crop cycle as well as most fruit harvests and seasonal migration. It is also the peak season for livestock births and calf sales and purchases for fattening. Additionally, labor is available in forest commissions in the collection of xate leaves and Ramón tree nuts and also in cattle ranches supervising the animals.

Cattle births peak at the end of the dry season if the amount of rain and pasture during the previous wet season were abundant. Milk production is almost constant. Farmers purchase calves in June for fattening, at the start of the rainy season when pastures start to regenerate. They sell in December before the dry season, when pasture and water availability fall again.

No lean season was reported in this zone were the constant availability of staple food ensures good access to food and food prices stable.

Wealth breakdown

While access to land is not a problem in this zone, the ability to exploit it (i.e. access to agricultural tools and inputs and capital to invest) is the main differentiating criteria between the defined wealth groups.

Very poor households do not own any land but lease farmland from wealthier neighbors in exchange for cash. Very poor households produce staple crops, pumpkins (to produce *pepitoría*) and chilies. Their main source of income, however, is agricultural labor in maize production and in pineapple, papaya, and African palm plantations. They also perform, seasonal agricultural labor in neighboring livelihood zones and neighboring countries. Very poor households can also find work in livestock farms, employed to carry out tasks like fixing fences, overseeing livestock or sowing grass. Very poor households are highly vulnerable to fluctuations in the demand for labor that these products generate. The number of households in this wealth group is reported to be increasing because families are selling their land to more affluent groups.

Table 1: Determinants of wealth in GT02

Determinants of wealth	Very poor	Poor	Middle	Better-off
Household percentage (%)	40	30	20	10
Household size (#)	6	4	4	4
Land holding (*ha)*				
Land area exploited	2-2.8 rented	15	25-45 including pastures	> 45 including pastures
Typical livestock holding (#)				
Cattle	0	5	25-50	> 100
Equids	0	0	3 horses	3-5 horses
Pigs	0	1	1	0
Poultry	0	5	10	20
Other productive assets				
Agricultural tools	Basic tools	Basic tools	Tractor	Tractors, irrigation systems
Vehicles	Motorcycle	Pick-up truck	Pick-up trucks	Various

Source: FEWS NET

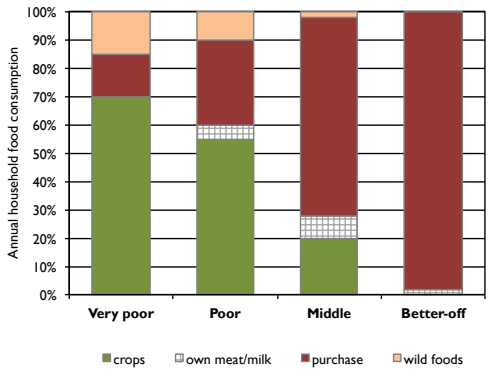
Poor households own much larger amounts of land and have formal legal rights over it. Farmland is used for growing maize and beans, chilies and tubers. Poor households can afford to hire labor at certain times of the agricultural calendar. They own some livestock (cattle, pigs and poultry)

Middle-income households produce maize and groundnuts. They own vast tracts of land, some of which are used as pasture, and also invest in acquiring more livestock. On average, middle-income households own between 25 and 50 cattle, as well as horses, pigs and poultry. Their income sources are more or less equally divided between crop sales, livestock sales and other businesses, an economic portfolio, which allows the spreading of risk to different types of hazards.

Better-off households are large landowners who rely more heavily on cattle ranching and are specifically involved in cattle fattening and trade. They produce maize, pineapples, papaya, African palm, and rubber. This group has good access to credit and savings, allowing them to respond to shocks to their livelihoods.

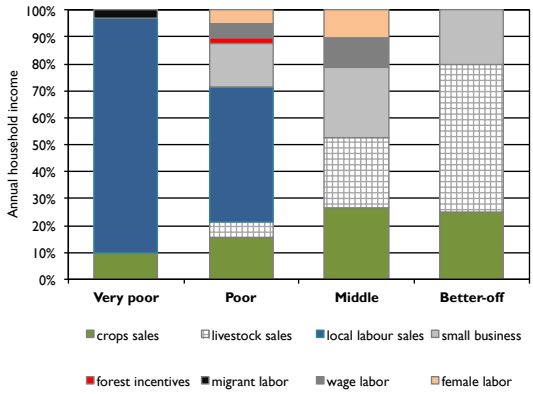
Sources of food and income (estimated weight)[17]

Figure 4: Food sources by wealth group in GT02



Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT02



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food consumed during the year. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

The importance of food crops in this livelihood zone is clearly apparent in the sources of food graph. Over half of the maize and beans consumed by poor households during the year are sourced from their own crops and close to two thirds in the case of very poor households, despite the use of family labor. The local population is among the most self-sufficient in staple crops in the country thanks to access to large tracts of land devoted to food crop production. This context also makes them vulnerable to changes in weather patterns and crops pest that may jeopardize harvests. Middle-income households produce a reasonable amount of food crops for household consumption as well as a variety of cash crops for sale, while better-off households sell all of their maize production, or forgo staple crop production all together, and rely on the market as their only source of food (supplemented by milk and meat from their cattle herds). The collection of wild foods (fishing, hunting and gathering herbs and other plants) is common among very poor and poor households, especially in those communities located near the lake and rivers and the forested areas.

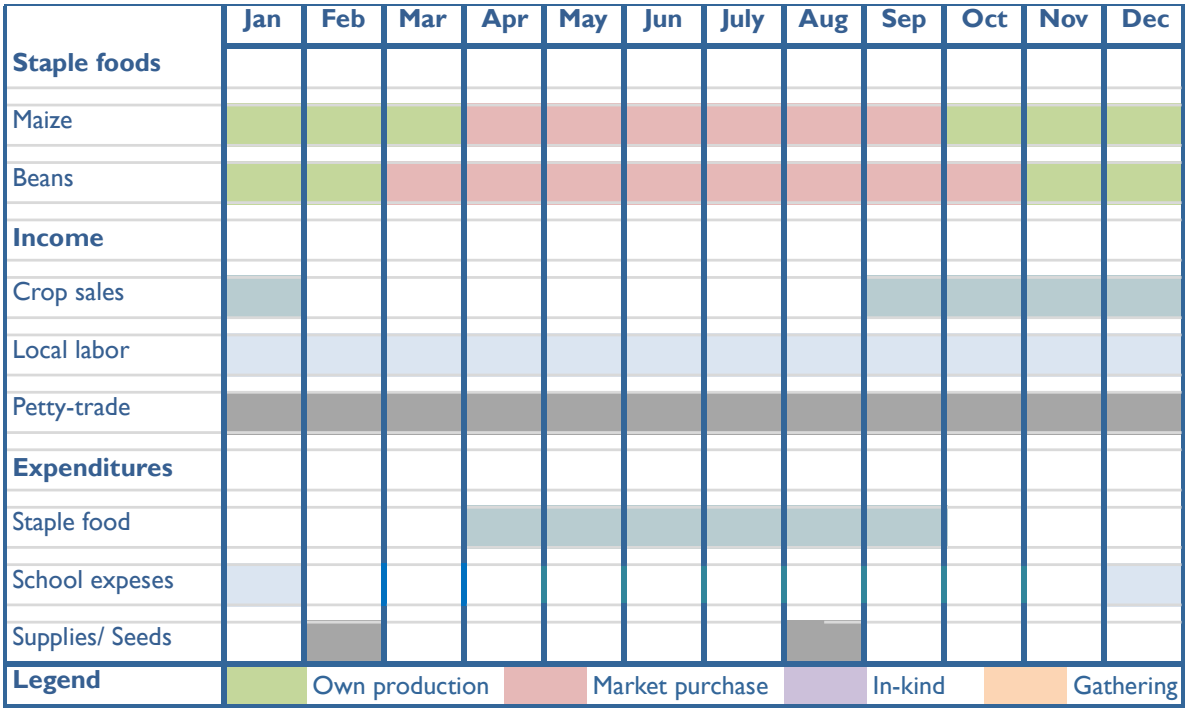
With regards to income sources, very poor households rely mainly on working for other farmers within the zone and occasionally migrating to production areas in other livelihood zones and in Belize. Local labor opportunities are available during the sowing and harvest season for maize and beans, the harvest season for fruits and throughout the year in cattle farms and forest concessions. They sell a small portion of their maize and bean harvest, as well as chilies and *pepitoria*. The women supplement the household income collecting and selling Ramón tree nuts and *xate* leaves or working as domestic helpers. Poor households have a much more diversified portfolio of income sources. As well as generating income from labor (which remains their main source of income), they derive income from crop sales; they run petty trade activities and are commonly engaged as wage laborers. Additionally, they have the possibility to sell some animals when extra cash is required.

[17] The quantitative information provided in this section is derived from one field interview in Flores, Santa Ana (department of Petén) and an interview with personnel from the Ministry of Agriculture.

Middle-income households are engaged in three main activities: crops sales (mainly selling maize, chilies and tubers). Additionally, they trade livestock and have set up small-scale businesses such as clothes shops or convenience stores. Both adult male and female members contribute to the household budget. Better-off households have the required capital to invest more heavily in their economic activities, they produce cash crops for sale and export (maize, tropical fruits, African palm and rubber), they own large ranges on which they keep cattle and invest further in livestock fattening and have supplementary businesses which provide additional cash income.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT02



Source: FEWS NET

As mentioned above, this livelihood zone is considered the breadbasket of the country and staple crops play an important role in the local economy, even for poor households. Poor households are self-sufficient in maize for half of the year and self-sufficient in beans for three months of the year. The remaining months they purchase staple foods from the local markets, all of which are produced locally.

Annual income is mainly generated from casual agricultural work in local farms and less frequently in cattle farms. Two complimentary sources of income provide additional cash at harvest time (crop sales) and on a daily or weekly basis from small-scale petty trading or small businesses depending on each household's ability and capital to invest on inputs.

Expenditure on staple foods increases as from April when household stocks start to run out and until the new maize harvest is available. School expenses are concentrated at the end of the year, and as the new school year starts in January. And expenses related to agriculture, purchasing seeds and other inputs peak before the start of each crop cycle.

Hazards and household response

Flooding – flooding occurs every two to three years but depends on tropical weather systems or the overflowing of rivers. Due to its location, the department of Petén is exposed to tropical storms and hurricanes from the Gulf of Honduras and the Yucatan Peninsula. They are most common between June and November, and especially as from September. Floods cause damage to crops and pasture lands, roads and homes, leading to food insecurity and loss of income. Sometimes animals have to be moved to higher, secure, dry land.

Price variations for meat and livestock – these cannot be predicted and do not generally follow a seasonal pattern but the general fluctuations of demand and supply. The price of meat and live animals does not necessarily change in tandem, which allows producers to adapt to the new volumes of demand for one product or the other and benefit from the higher prices.

Livestock diseases – diseases affecting livestock are most common during the dry season and can lead to a reduction of body weight, milk yields and death, as well as the additional costs of purchasing drugs and veterinary services.

Crop pests affecting fruits – for example whitefly (which can attack plants even inside greenhouses) or fruit worms. Most types of crop pests appear during the rainy season when the fruits are developing and maturing. Crop pests damage the fruits, which no longer comply to export quality requirements, reduce yields and increase the costs for farmers.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT02

Very poor/poor	Middle/better-off
Increase animal sales	Increase livestock sales
Search for community support	Resort to loans
Increase consumption of wild foods	
Purchase on credit (agricultural inputs and food)	
Seasonal migration inside or outside the zone or abroad (Mexico, Belize, US)	

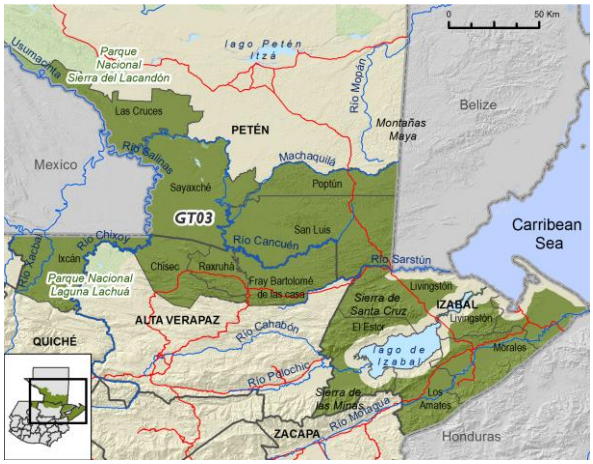
Source: FEWS NET

South Petén, FTN and Izabal Agro-industry and Food Crops (Zone GT03)

General livelihood zone description

The "South Petén, *Franja Transversal Norte* and Izabal agro-industry and food crops" livelihood zone is located in the north of the country. It covers the Northern Transversal Strip [18] (one municipality in the department of El Quiche and three municipalities in Alta Verapaz), the south of Petén department (three municipalities), and the majority of Izabal department (five municipalities). The livelihood zone borders zone GT02 to the north, zone GT04 to the south, Mexico to the west and Belize to the east.

Map 1: Livelihood zone location



Source: FEWS NET

The population density in the zone low (approximately 52 inhabitants /km^2), being one of the least populated zones in the country and also one of the largest. The vast majority of the population is rural and predominantly indigenous. The languages spoken in the zone are the Q'anjob'al, K'iche ', Q'eqchi'. Izabal department has a higher population density because it is more urbanized. It also contains a higher concentration of agri-businesses, partly due to the location of the Santo Tomás de Castilla seaport, one of the busiest in Central America.

The zone is flat, unlike much of Guatemala. Land is fertile and benefits from good levels of humidity and rainfall. The wet season here is longer than in the rest of the country, normally extending into January. This is a highly productive area, with high potential for irrigation systems thanks to its various rivers and tributaries, including two of the longest rivers in Guatemala: La Pasión and Usumacinta rivers. The zone was considered the breadbasket of the country for its production of white maize and beans, which provided a significant proportion of the domestic supply. Today, the levels of food crop production have been reduced due to the expansion of palm oil production. This zone has seen an important growth in the agro-industrial sector, especially in the production of African palm, which is replacing forests, food crop production and pasture lands.

The local population is engaged in staple food crop production (maize and beans) destined for own consumption, surplus sale or solely destined for commercial purposes (amongst the large landowners). Poor households rely on the sale of agricultural labor to wealthier neighbors cultivating staple food crops and a variety of cash crops (citrus fruits, cardamom, black pepper, pineapple, squash, rubber or watermelon) and to large-scale private plantations[19] (mainly cultivating African palm and bananas).

Cattle rearing (for meat) and small-scale milk production are important activities among middle-income and wealthy households in the area, providing additional unskilled labor opportunities besides agriculture to the local population – although this sector does not employ as many laborers as the agricultural sector does. Animals are kept in large ranches.

The population in the zone has access to fishing, hunting and gathering as survival mechanisms (they represent, both, sources of food and cash). Common pray include deer, rodents (e.g. *tepezcuinte*),

[18] *Franja Transversal del Norte*

[19] Examples of agro-industries implanted in the zone are Chiquita and Del Monte (banana producers) and REPSA, Agro-Caribbean, Palmas de Ixcán (PALIX) and Naturaceites (palm oil producers).

peccary, fish (e.g. gopher, crappie), turtles or lizards. Freshwater fishing also provides labor opportunities during the peak fishing season.

Overall, the zone has an agricultural potential which is not yet fully exploited. Household agricultural plots are not exploited in full due to lack of access to finance, the recurrence of droughts and floods and the lack of interest of the new generations of farmers who expect better agricultural policies to stimulate production. Moreover, the changes in land use from maize production to African palm (under mono-culture systems) is having a negative impact on the production of food crops and limiting the amount of land available to small-scale producers.

Markets

Market access

The most important local markets supplying the livelihood zone are the markets of Playa Grande and Chisec, Sayaxche and Rio Dulce. The external markets of Cobán, Barillas and Guatemala City are also important for this zone, as well as cross-border trade with Mexico.

The zone has poor to relatively good market access, depending on the area and the season. In the winter, unpaved roads become difficult to transit. The long distances to Cobán and to Guatemala City make marketing more difficult and increase transport costs. The eastern section of the zone, Izabal department, has better market access; road infrastructure here is good and so is the public transport network.

In general, trade routes favor a southern movement towards Cobán (GT05) and the capital city and towards the east of the country. The region interacts a lot with the GT05 where a large percentage of the local production is marketed. Moreover, this livelihood zone provides a steady supply of farm labor to work in its cardamom and coffee plantations and rain fed crops.

Main produce sold

Maize – the area with the largest maize production surplus is Fray Bartolomé, although maize is produced throughout the zone. The highest volume of production and trade fall between September and November (the first harvest) and between March and April (the second harvest). Prices peak between July and September due to the scarcity of supplies.

Beans – bean production goes hand in hand with maize production. The centers of most intense production are: San Luis Petén, Las Cruces, Playitas, Peña Blanca and Sayaxché. Most of the surplus is channeled to Cobán and then to Guatemala City. The highest volume of trade is in February-March, following the last harvest. Prices are at their highest from July to September.

Palm oil – palm oil production has expanded considerably in the zone in the last 7-8 years (since 2008 when land grabbing became a notable phenomenon in the zone). The most active regions include Chisec, Fray Bartolomé de las Casas and Chaal (Alta Verapaz), Ixcán (Quiché), Sayaxchén and San Luis (Petén) and El Estor and Livingston (Izabal). Large operators control production and marketing channels. There are no processing factories in the zone.

Banana/cardamom/black pepper/pineapple/watermelon/rubber – production is mainly intended for international markets with already established and tightly knit commercial channels. The world markets for each item dictate prices. Intermediaries purchase at farm-gate from small to medium-sized producers. Large landowners generally sell directly to international clients.

Cattle/milk – cattle are sold to intermediaries, with the capital city and Mexico as their principal end markets. Prices and trade volumes increase between December and February when pasture availability is high and livestock body condition at its best. Exchange rate fluctuations of the Mexican peso directly affect trade volumes. Milk is traded locally and over the border in Belize (via the collection center at La Libertad). Poultry and pigs are generally sold locally, year-round.

Casual labor markets

Local farm labor – labor opportunities are available locally, but it is the areas of intense maize and bean production and cattle rearing which attract the largest numbers of rural laborers for a large part of the year (between April and February). These areas include: Fray Bartolomé, Chisec, Chaal and Sayaxché. Laborers earn between 50 and 60 GTQ per day. Palm plantation labor is better paid (on average 82 GTQ/day, commonly paid on a fortnight basis); opportunities are available year-round in Fray Bartolomé, Chisec, Sayaxche and El Estor, although labor demand oscillates depending on the individual management of each plantation.

Migratory labor - coffee production areas in Cobán (livelihood zone GT05) provide employment opportunities year-round. Laborers can expect to earn between 1000 and 2000 GTQ per month. Some migration towards zones GT02 and GT12 as well as towards Mexico also exists, but it involves only a minority of households.

Staple food supplies

Maize and bean – family production covers households' requirements for 0 to 4 months of the year, depending on households' production capacity. Local supplies are supplemented with surplus from Fray Bartolomé and Sayaxché or from the Oriental region, via Guatemala City. Local bean production easily meets local demand.

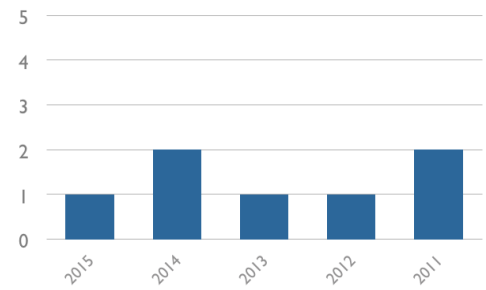
Credit and remittances

Access to private bank credit lines is only enjoyed by small and medium sized agricultural producers and producer groups. Private financial institutions available in the zone include: BANRURAL, GENESIS business FUNDEA, FUNDESOL, MICOOPE and Banco Azteca. Informal systems for borrowing money also exist, they are referred to as "gota a gota" (drip) or "rapidito" (quickly); these are private moneylenders and charge a daily interest rate.

Perception of historical food access

The zone is periodically affected by seasonal dry spells, flooding and crop pests, which severely affect agricultural production. 2011 and 2012 suffered unseasonal weather patterns, which obliged the population to carry out a second sowing and rely on the production of more resistant tuber crops (cassava and sweet potatoes). In 2013 an outbreak of Thrips disease (*Sciothrips cardamomi*) damaged cardamom plantations, while in 2014 the tar spot disease (*Phyllachora maydis Maubl*.) affected maize production. The expansion of palm oil production, especially in recent years, has caused the pollution of rivers and streams with chemical products, the replacement of forest areas and food crop production areas, the increase of the sale and rental of productive land and even the increase in violence. Figure 2 provides the classification of the last five years according to the populations perception of their food security in light of these hazards, with 1 as the lowest mark and 5 as the highest.

Figure 2: Perception of historical food access with 1 as worst and 5 as best

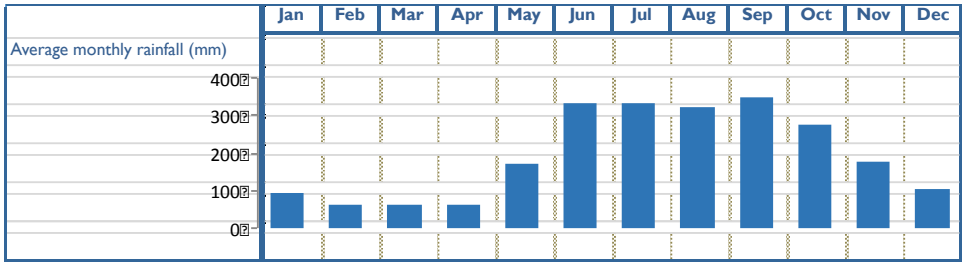


Source: FEWS NET

In general, the response to the negative effects of the hazards has been limited to household strategies. Food aid has been limited in the zone and only a small number of government interventions have taken place; for example agricultural extension services and agricultural insurance initiatives provided by the Ministry of Agriculture (MAGA, *Ministerio de Agricultura, Ganaderia y Alimentación*), yet with limited impact.

Seasonal calendar

Figure 3: Seasonal calendar for GT03



Source: FEWS NET

There are two distinct seasons, a short dry season and a long rainy season, including a dry spell between July and August. Annual average rainfall levels reach 2000 mm, humidity is highest in the northern municipalities within the zone. Temperatures vary between 25°C and 40°C (64° F-95°F). Such weather patterns allow for two maize crops per year; the first and most important in terms of output is from March to September, the second from November to February. There are also two cycles of beans, which follow similar cropping months as maize. Rain fed crop production provides most labor opportunities during the sowing and harvest season.

In terms of cash crops - which are cultivated exclusively by middle-income and better-off households - cardamom is harvested from August to December and again from February to March. Black pepper is harvested between August to September and once again between April and May. *Pepitoria* (a condiment made with squash seeds powder) is harvested and prepared between May and September. Bananas, pineapples and citrus fruits are harvested during most of the rainy season.

The production of African palm, banana and rubber in commercial plantations is constant, yet agricultural tasks depend on the individual management of the plantation, which determines labor opportunities. Most labour is employed for clearing and harvesting.

Fishing peaks between September and April, although it is a year-round activity thanks to the many rivers and permanent tributaries. In Sayaxché, located on La Pasión River, a more developed fishing sector provides labor opportunities.

Overall, the period with most economic activity is October to March when labor demand in both large-scale plantations and for local producers is high. The months of lowest activity are June to September, a pre-harvest period of intense heat, during which labor opportunities are scarce and, additionally, the fishing season is closed (May-August). The lean season varies in length and intensity for different households, but sets in at least 3-4 months before the start of the maize harvest.

Wealth breakdown

Table 1: Determinants of wealth in GT03

Determinants of wealth	Very poor	Poor	Middle	Better-off
Household percentage (%)	20	55	20	5
Household size (#)	8-10	6-8	4-6	3-5
Land holding (ha)				
Land area owned	0	0.1	3-20	40-200 (including pastureland)
Land area cultivated	0	0.5-1.5	3-20	40-200
Typical livestock holding (#)				
Cattle	0	0	10-15	75-150
Sheep/goats	0	0	0	0
Pigs	0	0	2-5	2-5
Poultry	1-5	15-20	40-60	-
Other productive assets (#)				
Agricultural tools	Machete & file	Machete & hoe	Appropriate agricultural tools	Tractor, plow, machinery
Vehicles	0	Bicycle	Bicycle, motorbike	Truck

Source: FEWS NET

Access to land and capital to invest in agricultural and livestock rearing activities are the most visible determinants of wealth in the "South Petén, FTN and Izabal agro-industry and food crops" livelihood zone. Households considered to be very poor are landless peasants who rely exclusively on the sale of their labor to local and more distant farms. Poor households have sufficient capital to rent small plots of agricultural land (often of poor quality) on which they grow the basic staples (maize and beans) and are able to cover 2-3 months of household staple food consumption, as well as generating some crop sales. They use rudimentary agricultural tools (machetes, hoes and files). Poor households work essentially as casual local farm laborers (in rain fed cultivation and cattle rearing) and in plantations (palm oil, banana and cardamom). The economic status of poor households is defined by factors external to them: the demand for labor and the price of wages. This puts them in a vulnerable position because they lack the means to resort to other occupations or income sources, a situation that results from their initial lack of access to land in particular.

Middle-income and better-off households produce cash crops (cardamom, groundnuts, citrus fruits, squash, pineapple and/or rubber) besides food crops. They are well-established farmers and participate in the formal trade in agricultural production. Land ownership varies considerably among these two wealth groups, and can reach up to 200 ha, although on average, middle-income households exploit 15-20 ha and better-off households 80-120 ha. A second important difference with poorer households is their ability to build up a considerable herd of cattle, especially true among the better off. The sale of live animals, meat and milk provides the bulk of the annual income of better-off households – more than the income derived from crop sales. Middle-income households also profit from the sale of a number of animals per year. Additionally, larger investments in education means members of middle households can be employed as skilled laborers (e.g. construction workers, drivers or teachers).

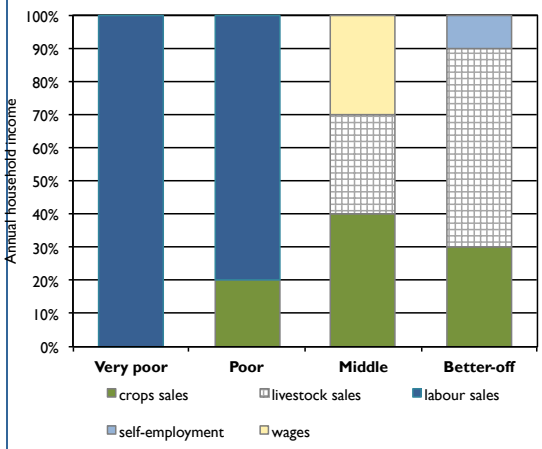
Additional advantages enjoyed by the more affluent groups are access to information on prices and market conditions, a situation that allows them to make informed decisions regarding the production and marketing of their products. The possibility of hiring trained personnel, providing specialized technical assistance, also makes a difference. These groups also have access to formal credit and savings. Besides owning much larger amounts of agricultural land, they have better quality soils that ensure greater productivity – the least productive plots are usually rented out to poorer households.

Sources of food and income (estimated weight)[20]

Figure 4: Food sources by wealth group in GT03

Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT03



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

Poor and middle households produce staple crops for their own consumption, while very poor and better-off households depend on the market to a larger extent for their food security. Very poor households are obliged to purchase all of their food as they cannot access land to cultivate it, not even through rental agreements, while better-off households, with better market information and access, sell a large portion of their maize production and achieve a more diversified diet through market purchases. It makes more economic sense for better-off sell their maize production and purchase it back when prices are low. Poor households can subsist on their own harvests from August to September and from February to March, but depend on the market the rest of the year, as very poor households do. Very poor and poor households turn to fishing, hunting and collecting wild foods (e.g. *chipilín, macuy/hierbamora* or amarynth/*bledo* leaves) to complete their diets, especially during the lean season (May to September) when staple food prices reach their maximum levels. Changes in market availability and prices will affect this wealth group the most, as will do fluctuations in the demand for farm labor or a drop in labor rates.

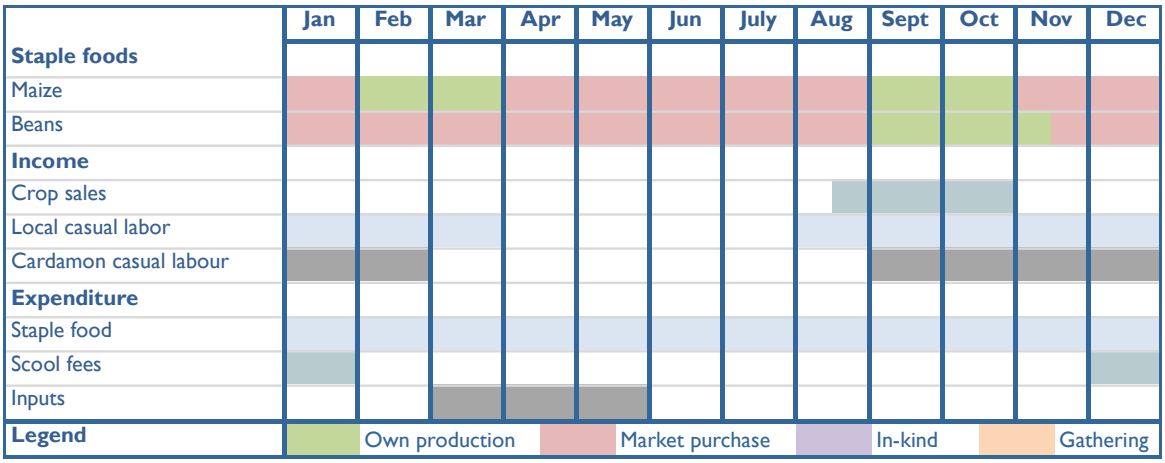
The differences between poorer and more prosperous households becomes very apparent in figure 5. Very poor and poor households depend entirely on the availability of local farm labor and are sometimes obliged to migrate (mostly inside the zone) to search for employment opportunities in plantations and agro-businesses. Crop sales are an important economic activity in the zone for all but landless households; poor households sell maize and beans, while middle and better-off households sell cash crops (mainly groundnuts and cardamom). It is cattle ranching, however, that provides the most profitable business in the livelihood zone. This activity is the specialization of the better-off.

[20] The quantitative information provided in this section is derived from 3 field interviews in the municipalities of Puerto Barrios, Sayashe and Fray Bartolome.

Middle households also profit from the sale of livestock, yet the wage labor carried out by at least one member of the household, a skilled worker, is equally important.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT03



Source: FEWS NET

Poor households cultivate sufficient maize and beans to cover their household needs for 2 to 3 months, the rest of the year they purchase staple foods from the local markets. May to September is a particularly difficult time as income sources are few and food prices increase, until crops are ready for harvest once again, providing direct income from crop sales or working as harvest labour. Poor households are generally employed as laborers locally and only migrate within the zone to the palm production areas depending on the fluctuations of labor demand. Two additional periods of increased pressure on the household budget are January, the start of the school year, and March-June when agricultural tools need to be replaced and seeds purchased for the new agricultural season. Food costs increase annually, between May and August when availability is low. More cash than average is also spent during Independence Day celebrations (September) and the Christmas celebrations.

Hazards and household response

Dry spells – dry spells and the delay of the start of the rainy season are particular damaging between May and July when sowing has started and rainfall is crucial for a good growing season.

Heavy showers and flooding – heavy showers leading to localized flooding along the main rivers can occur between October and November. Normally maize and beans have been harvested by then, but excessive rain and waterlogging can delay the start of the next sowing period and damage crops which are still in the ground (sweet potatoes and most cash crops).

Crop pests - these appear annually, mostly after the dry season. The most common are stalk borer, rootworm and *chimilca* slugs, which attack maize and beans. Grubs and ants are the most damaging types of crop pests. Most households use pesticides to counter them.

Expansion of African palm production – the change in land-use has been particularly visible in the last 7-8 years, with many areas dedicated to food production and forestry being turned into palm plantations. Additionally, cases of river pollution have gone as far as being titled as “ecocide” by environmental protection organizations. A particularly damaging example was the pollution of sections of La Pasión river (Petén) by the Spanish company REPSA (Empresa Referestadora de Palma

de Petén SA), accused of criminally negligent activity resulting in massive killing of wild life and disturbing local livelihoods in 2015[21].

Hurricanes (along the Caribbean coast) – they occur approximately every three years and can have very damaging consequences for crops and pastures.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT03

Very poor/poor	Middle/better off
Charcoal sales	Access to (additional) credit
Engaging debt (informal loans)	Lay-off workers
Migration to plantation areas for labor	Increased livestock sales
Increase wild food consumption and sale	
Migration outside the zone	

Source: FEWS NET

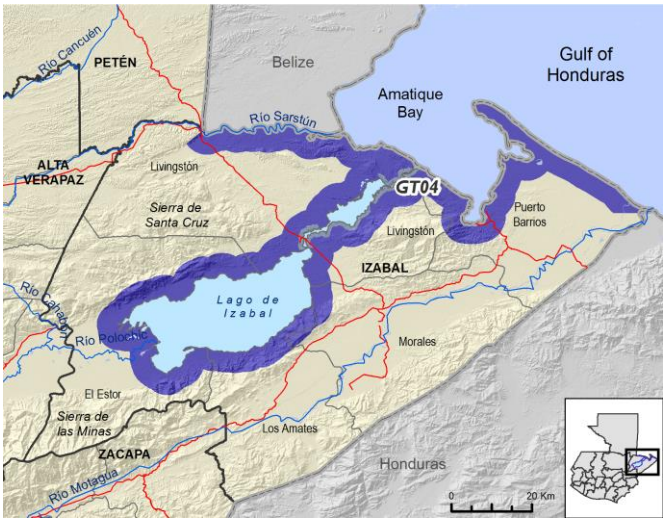
[21] http://eradicatingecocide.com/2016/01/05/guatemalan-court-upholds-ruling-on-ecocide/ (last accessed 10 August 2016)

Caribbean Artisanal Fishing and Tourism (Zone GT04)

General livelihood zone description

Located on the eastern coast of Guatemala, the "Caribbean Artisanal Fishing and Tourism" livelihood zone borders the Caribbean Sea at the Amatique Bay to the east, Belize to the north and Honduras to the south. The zone includes the municipalities of Puerto Barrios, El Estor, Los Amates, Morales and Livingston (in the department of Izabal) and the municipality of San Luis (in the department of Petén).

Map 1: Livelihood zone location



Source: FEWS NET

This zone benefits from many lakes and rivers, important livelihood sources for both fishing and increasingly significant tourism activity. Lake Izabal, the largest lake in Guatemala, is in the southern part of the zone. Other important tourist destinations include the wetlands reserves at Punta de Manabique, the Amatique Bay, Del Diablo Keys, Playa Dorada, Punta de Palma, the Dulce River and Livingston. The most important rivers are the Dulce, Montagua and Sarstun, which carry fresh water to the sea, causing significant and often sudden changes in salinity and water clarity, contributing to the unique marine flora and fauna in the zone. The marine fauna species include sardines, sea bass, catfish, crab, shrimp, lobster and shellfish such as abalone. Amatique Bay, which extends about 100 km, is a large estuary and important natural resource, supplying significant quantities of farmed and wild-caught fish to the Gulf of Honduras. The coral reef spanning the Amatique Bay and running southeast across the Gulf of Honduras provides a habitat for countless marine species and is a vital natural resource for coastal communities throughout the region. The reef supports major fisheries and local food supplies, provides coastal protection from storms and supports a robust and growing marine tourism industry. Considered a subtropical rainforest, the zone is known for its mangroves, wetlands, manatees and sea turtles. Due to its high biodiversity, 40% of the zone is a designated protected area. Another unique feature of the zone is the presence of the Garifuna, a minority population of African descent, which comprises about 8% of the population and lives mainly along the coast and in the town of Livingston. The population density in this zone is of approximately 100 inhabitants /km^2.

The main livelihood activities in this zone are fishing, tourism and subsistence agriculture production. Three types of fishing characterize the zone. River fishing is done with hooks and small circular mesh nets (*jaiberos*) to catch mainly bream fish and freshwater crab. For lake fishing, gill nets and large networks of haulers are used to catch finfish, including tilapia, *guapote* and crappie. Sea fishing includes trawling for shrimp with nets, using hooks for sharks and rays and trammel nets to catch sardines and *manjúa*, catfish and lobster. Diving is also used to catch lobster and conch. Small-scale, artisanal fishing using basic fishing equipment is carried out in the bay, which has a capacity of 100 TM per month (regulated by the local fishing authorities). Rain fed agriculture, mainly the cultivation of maize, and the raising of dual-purpose cattle, are other forms of livelihood activities in the zone. Maize production is a relatively new activity in the zone, emerging due to an increase in the predatory lionfish population, which limits the fish supply. Tourism is a growing source of income in the region, with particular concentration in urban areas and along the coast and rivers. Tourism activities include jobs as employees in hotels, restaurants and shops and as guides and traders.

Markets

Market access

The main local markets in the zone are Puerto Barrios, Rio Dulce and Livingston. About 30% of fish is sold at these markets and the remaining 70% is sold outside the region, mainly in Guatemala City, but also in the Zacapa market in zone GT09, the Chiquimula market in zone GT12 and around Lake Izabal and Bocas del Polochic in zone GT03. There is no specific fish market in the zone; fish and seafood are sold at the above markets or marketed directly to customers or intermediaries.

It is costly to bring goods to market in the zone. Secondary roads are made of dirt, often deteriorating in the rainy season, so access is dependent on weather conditions. As a result, markets are accessed primarily by water, using motorboats and cargo ships, which are expensive and do not run on a daily basis. Private transport is also used. The costs of transporting goods by sea or lake are very high and have the biggest impact on the poor, as the transport cost will be added later to the cost of food. The difficulty accessing markets directly forces people to market their products through middlemen who pay lower prices, since they factor in transportation costs. The lower the socioeconomic group, the more intermediaries are involved in marketing the product. Thus, better-off households, in some cases, sell their products directly.

The population doesn't generally leave the zone to purchase food, but rather obtains purchased food from local markets. The maize comes either from zone GT09, from the banks of the river Motagua, and is available in the zone from February to October or from Zacapa and is available from November to February. Beans usually come from Ipala, Chiquimula and are available at markets year-round.

Main products sold

Sardines, manjúa, lobster, shark and finfish - Sardines are caught locally off the coast, sold to intermediaries and taken by truck to Guatemala City and the highlands. The highest volume in trade of sardines occurs from May to July, when heavy rainfall causes a sudden reduction in ocean water temperature, enabling sardines to spawn and complete their annual sardine run. The remainder of the year the fish do not migrate and therefore trade is irregular and prices remain high. Lobster is caught locally, sold to intermediaries and taken by trucks to other departments and Guatemala City. The peak lobster trading occurs during the tourism season in March and April and the price is highest at this time. Shark is harvested locally and sold to intermediaries who use refrigerated trucks to transport the meat and fins for export as well as to be sold in the capital city. The peak season for shark trading is August to December. For this type of meat, the price generally stays constant year-round, except for the month of December, when the price increases, due to reduced availability since Belize doesn't export shark during this month. Finfish is caught locally and sold directly to consumers within the zone. May to July is the peak season for finfish and the price stays constant year-round due to adequate supply.

Maize - maize is grown locally, primarily by poor households, and is sold to intermediaries who pick up maize at the farm gate. The maize is then transported in trucks up to 300 km to be sold at municipal and departmental markets as well as in the capital city. The peak in maize trading occurs in January/February and October/November shortly after the harvests. The January/February harvest is usually smaller due to lower humidity and access to water outside of the main rainy season. The decreased supply of maize often means prices are higher after this harvest. Other important products sold at municipal markets from outside the zone are beans, oil and corn from neighboring zones. Intermediaries and local traders bring these items into the zone and are able to access municipal markets most easily during the dry season.

Casual labor markets

Migrant labor - the primary casual labor markets include banana and palm migrant labor in Puerto Barrios and Morales and agricultural migrant labor in the pastoral areas around Puerto Barrios and

Livingston. Both forms of casual labor occur from April to July during the growing season. Banana and palm workers are paid 60-70 GTQ per day and pastoral laborers are paid 40-50 GTQ per day, returning home daily or weekly with their wages.

Staple food supplies

Fish - fish is the staple diet of the poor and very poor, providing between 40-60% of daily food[22]. Because households can catch their own fish during the course of their daily local livelihood activities, they do not have to purchase fish. For the middle wealth group, fish is also a staple food, providing 20% of daily calories, however they consume better quality fish.

Maize - maize serves as a staple food for these households for about 4 months of the year. The remaining months of the year maize from outside the zone is purchased at local markets and shops.

Credit and remittances

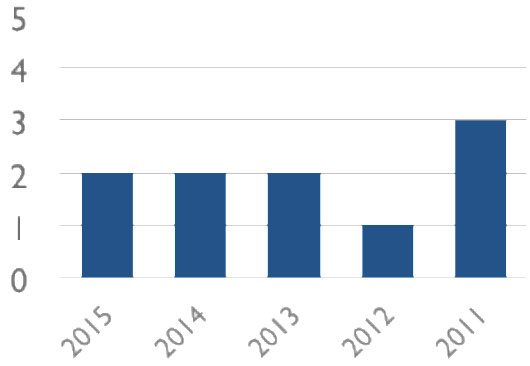
Access to formal credit is limited in the zone. Loans for fishing equipment, fuel or bait generally have an interest rate of 20%, paid monthly, and can be obtained from pawnshop lenders. Large loans can be risky, as they often require the upcoming harvest or productive assess as collateral, putting food security during the forthcoming year at risk.

Only a small percentage of the population in the zone receives remittances, less than 3%, and these are primarily middle-income households within the Garifuna community. There is a high permanent migration rate among the Garifuna, with significant Garifuna populations now living in the United States, which explains the remittance trends.

Perception of historical food access

The perception of food access quality over the past five years shows a general concern that there is poor access to food in the zone. Asked to rank access to food over the last five years from 1 to 5 with 1 as worst and 5 as best, households ranked 2013, 2014 and 2015 as 2, considering there to be significant difficulties accessing adequate food. Flooding occurred all three years, which caused loss of fishing equipment and prevented households from obtaining fish as well as wages from fishing labor. In 2014, an increase in the lionfish population caused a widespread decline in fish caught and decreased the earnings of fishermen. In 2015, a prolonged draught decreased agricultural production and an increase in the cost of maize, further limiting food access. Households considered 2012 the year with the worst access to food, ranking it 1. High temperatures and a low rainfall that year prevented female fish from spawning, resulting in decreased fishing yields as well as failed agricultural crops due to draught. 2011 was perceived as a year with moderate food access quality, ranked at 3, with the only hazards being annual small-scale flooding.

Figure 2: Perception of historical food access with 1 as worst and 5 as best



Source: FEWS NET

Households are most vulnerable during the peak rainy months in October and November. This is hurricane season and excessive rains and flooding cause damage to fishing equipment and weather

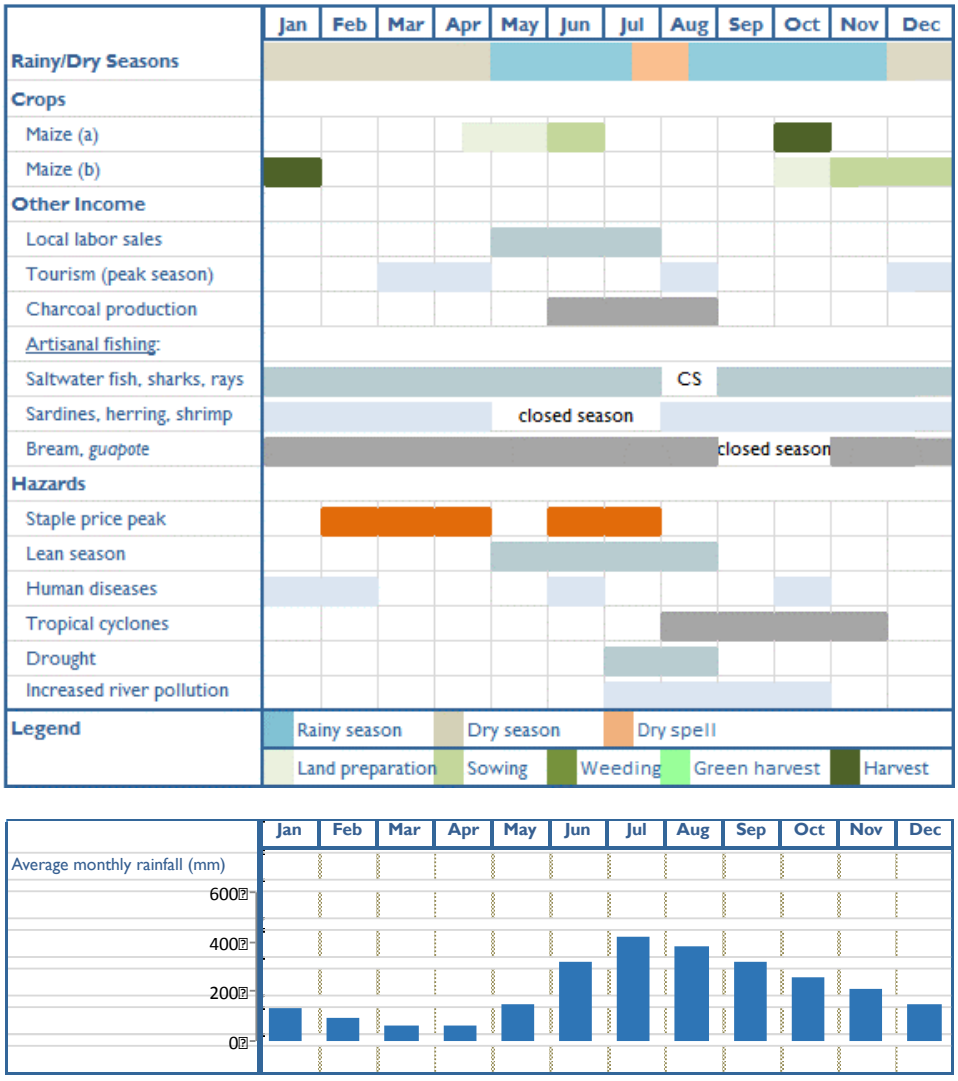
[22] This percentage may seem very high, but communities continually stressed the importance of fish in the daily diet due to the ease of access.

conditions prevent fishing all together at times during these months. March and April are also months when food access is low due to the dry season, which causes a decline in fishing and agricultural wages.

Fishing bans to prevent overharvesting during spawning occur at different times throughout the year for each fish species. Fishermen dependent on these species must interrupt business activities during the ban, reducing fish sales and labor earnings, so fish bans create temporary obstacles to food access for these households. For sardines, herring and shrimp, bans occurring during May, June and July, whereas for bream the season is closed during September and October. For other saltwater fish, sharks and rays August is the closed season. Better fishing regulations and coordination of bans were mentioned as external assistance the municipality could offer to improve food access quality during certain times of the year.

Seasonal calendar

Figure 3: Seasonal calendar for GT04



Source: FEWS NET

The zone has two crops of maize, with harvests in October and January-February. The land preparation and sowing for the October harvest occurs in April, May and June and in October, November and

December for the January-February harvest. The months of land preparation, sowing and harvest are important opportunities for very poor households to earn wages from farm labor, which account for close to a third of their annual income.

The rainy season in this seaboard zone is characterized by tropical cyclones, which occur from August through November. The months with the most rain are October and November, during which severe flooding causes loss of fishing equipment and interrupts fishing activities. The dry season follows, from December to April. A dry spell, known as *la canícula*, occurs from mid-July to mid-August and causes a decline in fishing and agricultural wages, as well as reduced yields for the October maize harvest.

The fishing season varies significantly depending on the species of fish to be harvested. Sardines and other herring species, the most important fish within the zone, are available throughout the year, however, fishing stops from May through July during the closed season. During the sardine ban, fishermen in the lower parts of the zone harvest red and brown mackerel, which are used as a subsistence species. Finfish, including sea bass, bream and tilapia, are harvested throughout the year purely for subsistence use. The greatest concentration of finfish fishing occurs in the Bocas del Polochic and Dulce rivers and in Lake Izabal. The closed season for bream occurs in September and October. It is the fishermen who depend on these finfish species who are the most affected by the floods in October and November, as well as an algae that occurs during the rainy season, known as *barbasco*, which kills fish and reduces yields, particularly impacting the freshwater fishermen around Lake Izabal. The closed season for shark and ray fishing occurs in August. During fishing bans, fishermen cannot perform their main livelihood and must search for alternative work, often migrating to agricultural areas within the zone to perform farm labor. As sardines are the predominant fish species harvested, it is during the closed season for sardines in May, June and July, that the greatest number of fishermen must search for other work and we see a peak in local labor sales. Small-scale artisanal fishing occurs year-round, except during the closed season for each species.

Different from agricultural livelihood activities with distinct busiest seasons, fishing is a regular activity that happens year-round, keeping fishermen busy on a continual basis, except during bans on the particular species they rely on. Tourism peaks in the zone in March-April, August and December and generally coincides with the times when fish are in ample supply and there are no bans. The price of staple products increases from February through April and again in June and July. For fish products this is due to the increase in demand, which occurs with increased tourism in March and April and to scarcity of fish during the June and July sardine ban. For staple grains such as maize, the price increase is due to its scarcity, especially in June and July, which is the time of the first planting when little maize remains from the previous harvest. The staple food price peaks do not occur in the Livingston area, however, whose coastal supply system ensures stable prices throughout the year.

Wealth breakdown

The population in this zone can be divided into four main socioeconomic groups, the very poor, poor, middle and better off. The primary determinants of wealth are land that is owned or rented and productive fishing assets, such as trammel nets, fishing boats and equipment and refrigeration units. Landholdings or access to land rental determines how much maize a household can cultivate or how many cattle they can raise. The type and quantity of boats and fishing equipment owned are significant determinants of wealth since larger, sturdier boats with the ability to travel farther distances and work in deeper waters, motorized equipment and fish coolers greatly increase earning potential and reduce vulnerability to storms and threatening conditions during the rainy season. Very poor and poor households generally cultivate between 0.5-4 *mz* (0.35-3 ha) of rented land, growing mainly maize for household consumption. They may also own a few lime trees. Middle-income households cultivate between 20-40 *mz* (30-60 ha) and better-off households cultivate between 65-640 *mz* (1-10 *caballerías,* or 45-450 ha) of land, used mainly for raising large herds of cattle and growing African palm for oil production. In terms of productive fishing and agricultural assets, very poor households generally only own trammel nets and machetes. Poor households, in addition to trammel nets, may own a dugout canoe or speedboat, small tools like pumps and engines and fish coolers. Middle-income households generally own as many as 5 trammel nets, multiple fishing boats, refrigeration units and a tractor and other mechanized machinery for soil preparation. Their boats are more resistant and can access fishing sites that are deeper and farther offshore. Better-off households generally own about 15 motorized fishing boats, sophisticated equipment for fishing such as large refrigeration units, additional boats for tourism activities, a tractor and other agricultural machinery. Members of this wealth group enjoy benefits such as permission to fish in Belize, which increases their chances of catching fish during the closed season in the livelihood zone. This group uses trawl fishing gear, which is illegal and threatens the food security of other fishermen.

Table 1: Determinants of wealth in GT04

Determinants of wealth	**Very Poor**	**Poor**	**Middle**	**Better -off**
Household percentage (%)	60	25	12	3
Household size (#)	7-8	4-5	4	4
Land holding (ha)				
Land area rented or owned	0.35-0.7 rented	0.7-11-1 owned	0	0
Land area cultivated	0.35-1	0.75-1	0	0
Typical livestock holding (#)				
Poultry	3-5	10-15	0	0
Cattle	0	0	030	0
Other productive assets (#)				
Trammel nets	0-1	2	5	0
Fishing boats	0	0	5	15
Dugout canoes	0	1	0	0
Fish coolers	0	0	1	2
Boats for tourism	0	0	0	1-2

Source: FEWS NET

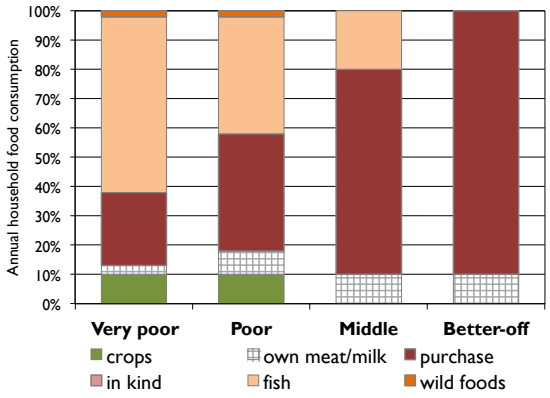
As these assets indicate, the main sources of income for each wealth group are closely linked to land and fishing equipment owned. Rental of boats and fishing equipment and labor hire are important components of the fishing business in the zone. Equipment rental and hiring labor enables households who have capital to earn high returns on these investments, as well as provides low-income households increased earning opportunity through fishing activities which they would otherwise not be able to perform due to lack of equipment. Many fishermen from middle and better-off income households own their own boats and are able to hire a crew of laborers, use motorized equipment and coolers to increase quantity of fish caught and sales and rent out their boats and equipment for additional income.

Very poor households generally live in the more remote areas of urban centers and live in homes made of bamboo with tin or thatched roofs and earthen floors. They don't have indoor plumbing but use outhouses and only about 40% of homes have electric light. Very poor households have on average 7-8 members and they are illiterate, as most do not complete primary school. For the area

around El Estor and Polochic, however, household size increases and can commonly reach 12 members. Poor households generally have 4-5 members and live in homes made of wood or concrete, with tin roofs and concrete floors. Most people in this wealth group complete primary school. Their homes are also very basic, with an outhouse and only about 40% have electric light. These two lower-income group households have significant restrictions on market access for selling their fish and maize and for purchasing inputs, limiting their chances for generating income. Because they rely on their own production, these households have small granaries, which allow them to store maize for 2-3 months. However, the high humidity of the area affects grain storage and limits storage beyond this period. The middle wealth group lives closer to urban centers and has on average 4 household members who have completed school. Their homes are cement and have septic tanks, indoor bathrooms and light powered by electricity or a generator. These households engage in more individual or family fishing and are often hired by boat owners to work for them. Others participate in activities involving mechanical fishing and a small percentage works in tourism, either as employees or traders. Better-off households also have on average 4 members and live in cement homes that are fully equipped with indoor plumbing, electricity and other conveniences. Members of this wealth group are professionals with the highest level of schooling who run fishing or trading businesses, requiring significant capital and hired labor.

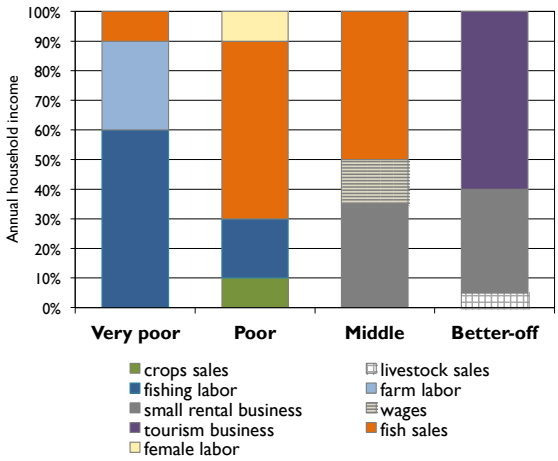
Sources of food and income (estimated weight)[23]

Figure 4: Food sources by wealth group GT04



Source: FEWS NET

Figure 5: Cash income sources by wealth group GT04



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

There is a significant difference in types of food consumed and livelihood activities among the different wealth groups in the zone, depending primarily on quantity of land cultivated and the amount and quality of fishing equipment owned. Fish is a staple food for the very poor and poor, accounting for 40-60% of their diet. The second most important food source for these households is

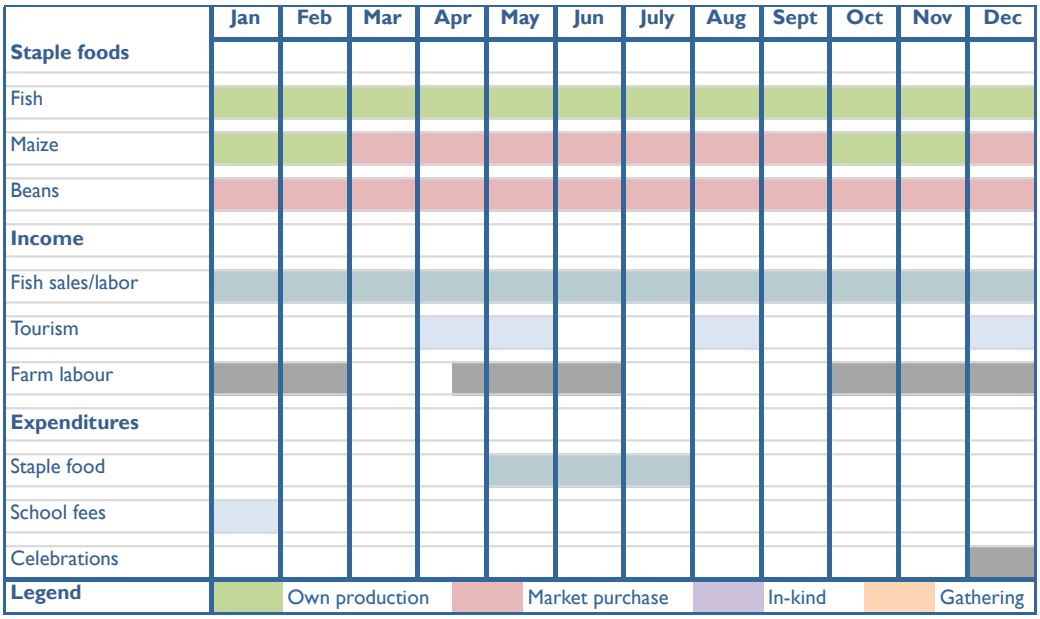
[23] The quantitative information provided in this section is derived from one field interview in the municipality of Puerto Barrios (department of Izabal).

purchased foods, which provide 25-40% of daily calories, with poor families able to purchase more of their food than very poor households. Very poor households do not own fishing boats or other productive assets, so they must work for other fishermen, or during the closed season, search for unskilled agricultural work on farms outside the zone, relying on their labor to generate income. Fishing labor accounts for 60% of annual income for very poor households and farm labor, such as land cultivation, weeding and harvesting, accounts for 30%. Poor households do not own fishing boats, but they own trammel nets and dugout canoes, which allow them to catch enough fish to feed their families and sell the surplus. Fish sales are the most important income source for poor households, providing 60% of annual income. Fishing labor is the second most important income source and provides 20% of their annual income. Poor families also cultivate small quantities of maize on 0.7-1 ha of rented land, which provide an additional 10% of income in crop sales annually. Very poor households cultivate less than 0.7 ha of land, growing just enough maize for household consumption, but do not supplement their income with crop sales. The women of poor households also perform domestic services in hotels and sell prepared foods, which provides about 10% of annual income for poor households. Poor and very poor households also supplement their diet by foraging foods such as bananas, taro, herbs, mushrooms and data palms (*pacayas*), and to a lesser extent hunting for rare animals, such as iguanas. Among the Garifuna population, collecting wild bananas and taro is more common. Home-raised poultry is a nutritional alternative for very poor and poor households, and provides between 3-8% of daily calories.

Middle and better-off households rely almost exclusively on purchased foods, which account for 70-90% of their diet. These may include more costly, good quality fish, shrimp and seafood, beef, pork, rice and fruits and vegetables from outside the zone. Unlike the very poor and poor who rely on fish as their primary food source and face difficulties during the closed season and rainy months when fish are in short supply, the middle and better-off groups are less vulnerable to weather and market conditions because they can afford to buy purchased food. Middle-income households who own fishing boats and sophisticated equipment, hire fishing labor from lower-income households for their fishing businesses. Earning about half of their income from fish sales, middle-income households have access to good quality fish from each day's catch and fish provides about 20% of their diet. Middle and better-off households also have enough land and money to own cattle, adding beef and milk to their diet. Lower-income households own only poultry, which contributes nominally to their diet. Better-off households are able to earn a significantly higher income due to owning many motorized fishing boats as well as boats for tourism activities. This wealth group earns 35% of its income from small rental businesses that rent out fishing equipment and 60% from tourism businesses, which include boat tours and hotel, restaurant and shop management. Better-off households are also able to sell some of their dual-purpose cattle, adding another 5% to their annual income from livestock sales.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT04



Source: FEWS NET

Fish is the main source of food for the poor throughout the year. Since fishing is their primary livelihood activity, poor households catch their own fish or receive a portion of the day's catch as part of their wages for fishing labor. Poor households do not purchase fish. Maize is the second most important staple food for the poor. Households cultivate two crops of maize, which fulfills their household consumption needs for 4 months out of the year, during January and February and October and November. The remaining 8 months of the year they purchase maize at markets from outside the zone. Beans are another staple food for poor households. Since beans are not grown in the zone, households purchase dried beans year-round from markets and shops.

Fishing labor and fish sales are the most important sources of income for low-income households. Very poor households do not own their own fishing equipment and so rely on fishing labor for about 60% of their income. Poor households own dugout canoes, which they are able to use to catch enough fish to not only meet their household needs but to have a significant surplus to sell. Poor households earn about 60% of their income from fish sales. Farm labor is a secondary income source for very poor households who do not have fishing equipment to earn income from fish sales. During the peak of the sardine ban in May and June when fishing labor isn't needed and the rainy months of October and November when weather conditions prevent fishing, very poor households seek agricultural labor. The January-February and October maize harvests are important opportunities for farm labor. During the course of the year very poor households meet about 30% income needs from farm labor. While tourism has generally been a livelihood activity of middle and better-off wealth groups, with increasing tourism activity and businesses within the zone, during the peak tourism season in April-May, August and September some poor households may supplement their income with jobs as low-wage employees in hotels, restaurants and shops.

The main expenditure for poor households is staple foods, which are purchased year-round. Staple food purchases peak during the lean season from May to July, as there is no maize harvest during this time and the staple fish source, sardines, is in limited supply due to the closed season from May

through July. Other expenses during the year include school fees and supplies, which most families buy in January, and the purchase of clothes in December for Christmas.

Hazards and household response

Proliferation of lionfish – a predatory species native to the Indo-Pacific that can live up to 15 years, lionfish have been an increasing problem along Guatemala's Caribbean coast since the late 1990s. There are no local predators of this invasive species and fish do not recognize lionfish as a predator. Equipped with venomous spines and unique tentacles that attract prey, lionfish are excellent predators and their venom can cause serious injury to fishermen and divers. The proliferation of lionfish in the zone has had a significant impact on the marine ecosystem and local livelihoods, diminishing native fish species of ecological and commercial importance. Lionfish predation is seen as one of the most important threats to local livelihoods. It affects the fish population throughout the year, causing a widespread decline in fish and consequently reducing incomes for fishermen.

Mismanagement of natural resources – overfishing in the zone is a problem which local authorities aim to address by seasonal bans (*vedas*), which regulate fishing of particular species during their reproductive periods. While not exactly a threat, the fishing bans and lack of clear policies around them, make them perceived as a threat, particularly by the poor who feel policies favor wealthier fishermen who have better gear and can access deeper waters when local fishing sites close.

River pollution – the contamination of the Motagua, Dulce and Polochich rivers is a permanent hazard that occurs annually from July through October. River pollution is mainly caused by agricultural chemicals used in the processing of African palm near rivers. These river pollutants kill fish species, both in rivers and in the ocean as the contaminated water reaches the sea, and significantly reduce the quantity of fish caught.

Tropical storms – tropical cyclones occur each year from August to November, causing flooding, loss of equipment and reduced fishing activity. The strong winds and rains make fishing conditions at sea unsafe, jeopardizing the physical safety of fishermen, their productive assets and their homes. This threat results in loss of income due to the interruption of fishing, particularly affecting poor households. In addition, storms also hinder transport and access to food and markets for all wealth groups, since water supply routes are limited by navigation difficulties and there are few land access routes.

Drug Trafficking – trafficking of narcotics within the zone occurs throughout the year, limiting access to fishing areas. This results in reduced income for poor and better-off households.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT04

Very poor/poor	Middle/better off
Migration to other areas within the zone in search of work	Increase other livelihood activities such as tourism and cattle raising
Agricultural labor and the collection of firewood for charcoal sales	Increase tourism activities/ search for tourism jobs
Increase consumption of local foraged foods, such as taro and pineapple	Increase crop production
Migrate with families in search of fishing jobs in Puerto Barrios, Livingston and Belize	Rely on savings

Source: FEWS NET

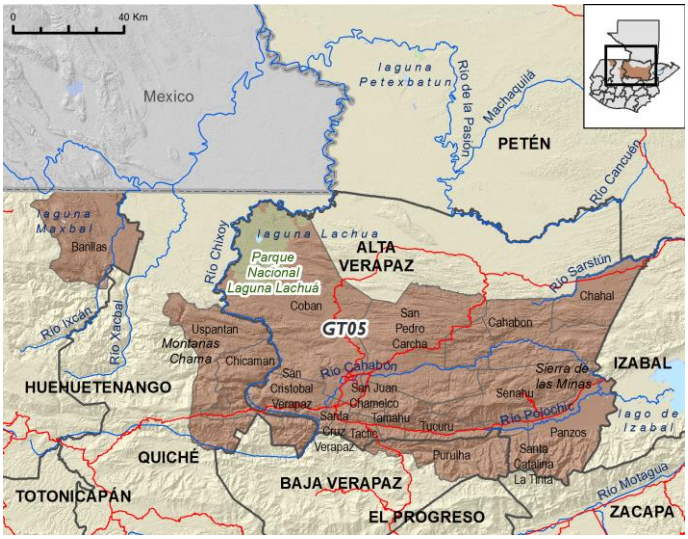
Coffee, Cardamom, Forestry and Vegetable Production (Zone GT05)

General livelihood zone description

The "Coffee, cardamom, forestry and vegetable production livelihood zone" occupies the south of Alta Verapáz department and the central belt of Quiché department, both located in the center of Guatemala. The livelihood zone borders zone GT03 to the north and zones GT07 and GT08 to the south, both also coffee producing zones.

The population density in this zone is low (138 hab/km^2) and the population is predominantly indigenous and mostly rural. The languages spoken are K'iche', Q'eqchi', Poqomchi', Achi' and Uspanteko.

Map 1: Livelihood zone location



Source: FEWS NET

It is a mountainous zone including the Chamá mountain range, almost 200 km long and ranging between 1000 and 1500 m above sea level. The zone contains precious natural resources: large forested areas and high value wood. Rainfall levels range between 2000 and 4000 mm/year depending on altitude levels. Like in most of the country, there is a single dry season (January to April) and a single wet season (May to December) punctuated by two months of high temperatures (July and August). January and February often experience temperatures below freezing point.

The basis of the local economy is the production of food crops (maize and beans) and cash crops (coffee, cardamom and vegetables destined to export markets, for example chilies, as well as cut flowers, yet in much smaller quantities). The production of cash crops provides labor to local households. Trade and labor migration to the main towns and cities and to large-scale plantations supplements local agricultural activities. This zone is one of the most recognized areas for coffee production and the only zone with significant cardamom production. Guatemala is the leading supplier of cardamom and has replaced the traditional first exporter, India, although Guatemala only produces the small varieties of cardamom. The department of Alta Verapaz accounts for approximately three quarters of national production[24]. Cardamom is cultivated at high altitude where low temperatures prevail, in open fields without shade, unlike in India where it is grown under forest canopy.

However, since the 2007 livelihood zoning, the zone has seen an increase in the production of coffee, spurred by the drop in the price of cardamom since the 2008 global financial crisis[25]. Additionally, in recent years forestry activities have also increased, thanks to government forest incentives known as PINPEP and PINFOR; the first aimed at small producers and PINFOR aimed at large-scale landowners. The initiatives include direct state subsidies to farmers to conserve and protect the forest and to invest

[24] http://pdf.usaid.gov/pdf_docs/PA00KNZM.pdf (last accessed 12 August 2016)

[25] Coffee producers in this zone have managed to take control of the coffee rust disease, which has affected many coffee-producing areas in Central America. Much of the response has involved replacing old coffee trees by new varieties, which are rust-resistant. As a result, coffee growing communities no longer feel vulnerable to coffee rust. Additionally, coffee is deemed more profitable than cardamom, despite its wide price fluctuations on the international markets.

in reforestation. This is now an important economic activity for those households who own forest areas or land suitable for reforestation. Overall, the combination of well implemented cash crops (coffee and cardamom); new cash crops (vegetables) and state funded forestry have contributed to the diversification of activities in this livelihood zone.

Markets

Market access

The most important markets supplying the livelihood zone are the markets of Carcha, Tactic, Cobán, San Cristobal, la Tinta Uspantán and local municipal markets inside the zone.

The zone has good market access to the main municipal markets, however rural markets are more difficult to access. Road access worsens during the rainy season as roads are not well maintained and landslides are common, especially in the most mountainous areas. The main road to Cobán was blocked for a number of years due to a large landslide and access continues to be a problem today. The areas in the Zona Reyna (neighboring Ixcán and Barillas) are the most difficult to access, greatly increasing transport costs to and from the area.

Main produce sold

Coffee and cardamom – coffee is sold at farm gate to local traders or to larger commercial intermediaries. Generally small-scale producers sell locally, middle-scale producers sell to large intermediaries and exporting companies, while large-scale producers sell directly to international clients. Cobán is the concentration point before export. Coffee is traded between the months of October and March (November to January is the period of peak sales). Cardamom is commercialized mainly between August and February. Prices all along the market chain are influenced by the futures market prices. Most of the cardamom production is destined to the Saudi Arabian market.

Vegetables – vegetables are marketed by large agro-industries. Generally, these companies have contractual agreements with individual producers, often grouped in producer associations, which establish the trade conditions and prices. The companies provide the inputs for production. Vegetables are produced year-round.

Casual labor markets

Local farm labor - opportunities are available locally, especially in the coffee and cardamom producing areas in Verapaces, Barillas and Huehuetenango. Demand for labor peaks from November to March (coffee) and from September to December (cardamom). Labor rates range between 25 and 40 GTQ per day.

Migratory farm labor - laborers from this livelihood zone migrate to the sugar cane producing areas along the southern coast (zone GT12), north towards zone GT03 to work in palm plantations or to the Oriente region to work in rain fed agricultural production (maize and beans) and coffee plantations. Some cross-border migration also exists, mainly towards Honduras to work in coffee plantations.

Staple food supplies

Maize and bean – family production covers households' requirements for 0 to 4 months of the year depending on households' production capacities. Locally supplies are supplemented with surplus from zone GT03 (northern Ixcán, Petén), Cobán and Mexico (black market imports).

Credit and remittances

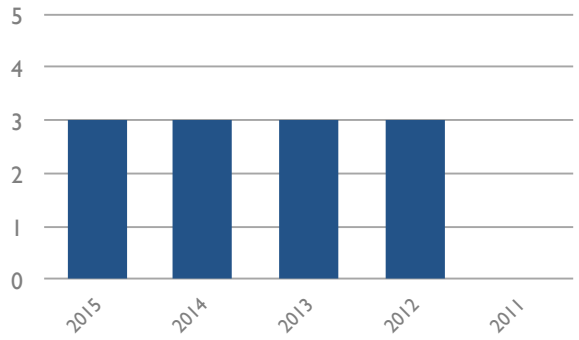
Remittances are particularly important in this livelihood zone and it is estimated that close to half of poor and middle-income families receive (some) remittances from family members living outside Guatemala, mostly in the United States. Credit is available to most families (formally or informally). Funds are used to pay for agricultural inputs and to cover mortgage payments used to fund the migration out of the country.

Perception of historical food access

Although the zone has suffered a number of shocks affecting coffee and cardamom production, the local perception of food security levels has been average (neither particularly good nor particularly bad) and stable over the last five years.

Coffee rust, the most economically damaging coffee disease worldwide, has affected plantations annually since at least 2012. Cardamom has periodically been affected by thrips (*Sciothrips cardamomi*).

Figure 2: Perception of historical food access with 1 as worst and 5 as best

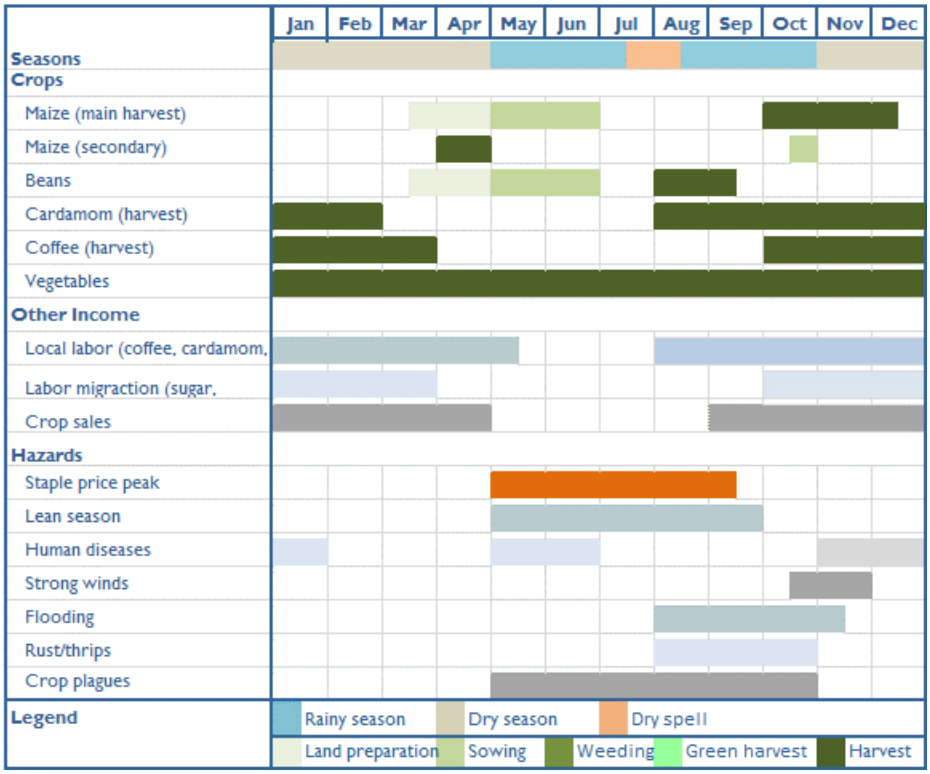


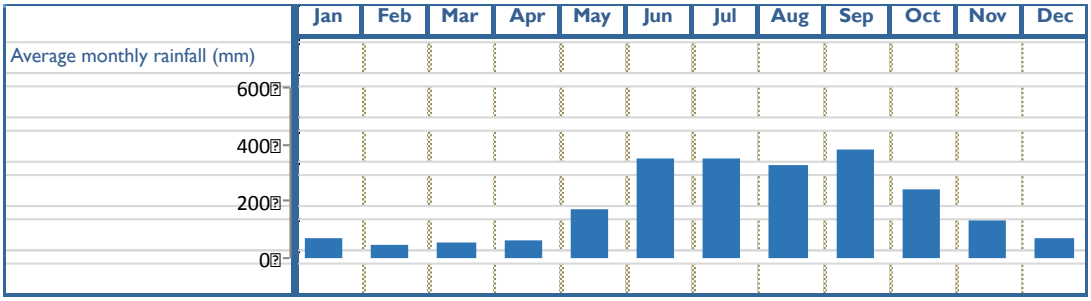
Source: FEWS NET (no data available for 2011)

Following the effects of the prolonged heat wave in 2013, food assistance programs were initiated in the most affected areas, particularly in the department of Quiché. Later, in 2014 and 2015 two instances of drought caused important damages to crops, especially along the low-lying areas in the zone. During 2015 and early 2016 food assistance programs were implemented by the government. However, as indicated by key informants, assistance has been inconsistent and insufficient and has not been directed to those most in need.

Seasonal calendar

Figure 3: Seasonal calendar for GT05





Source: FEWS NET

The start of the rainy season in May signals the time for sowing maize and beans. This first maize season is the most important in terms of production levels. It is harvested from October and until the end of the year. Beans are harvested three months later. The second maize harvest is not common everywhere in the zone; it is most typical of Cobán area. Here, maize is sown for a second time in October and is ready to be harvested from April the following year.

Coffee harvest starts in October, peaking between December and February. The harvest can be extended until May/June in areas with lower altitude. The cardamom peak harvest starts in August and continues for seven months until February, although harvest can continue year-round in the largest plantations. After harvest, cardamom fruits must be dried, either under the sun or over wood-fires. Vegetables are produced using more or less sophisticated irrigation methods and can be grown

year-round. The subsequent harvests of coffee, cardamom and vegetables provide a relatively long season of high demand for agricultural labor.

Labor demand also increases during the land preparation season for maize/beans and the subsequent application of fertilizer (April/May and September) and also during the harvest season. The bean harvest and the second maize harvest also increase demand for labor. March to August is a relatively calm period in the local agricultural sector. As a result, this time period (labeled 'lean season' in the calendar above) represents the most vulnerable period for poor households as labor opportunities are few and the drop in the availability of staple foods increases food prices.

Wealth breakdown

The variations in land tenure across the different wealth groups are not as significant as in neighboring zones. However, it is the different levels of access to agricultural tools, inputs and marketing channels that marks the difference in household income levels. The limits to the expansion of agricultural activities are also one of the reasons why many households have opted to support the migration of at least one of its members, in search of better opportunities outside the country.

Table 1: Determinants of wealth in GT05

Determinants of wealth	Very poor	Poor	Middle	Better-off
Household percentage (%)	27	50	20	3
Household size (#)	8-10	6-8	5-6	4-5
Land holding (ha)				
Land area owned	0.35-1	0.3-3	0.7-3	> 3
Land area cultivated	0.35-1	0.3-3	0.7-3	> 3
Typical livestock holding (#)				
Cattle	0	0	0	10
Sheep/goats	0	0	0	0
Pigs	0	1-2	1-2	0
Poultry	2	3-8	10-20	>20
Other productive assets (#)				
Agricultural tools	Basic tools	Basic tools & pesticide sprayer	Small-scale irrigation systems,	Tractor, plow, machinery
Vehicles	0	Bicycle	Pick-up truck	Truck/pick-up truck
Reforestation subsidy	0	0	2-20 ha	2 ->20 ha

Source: FEWS NET

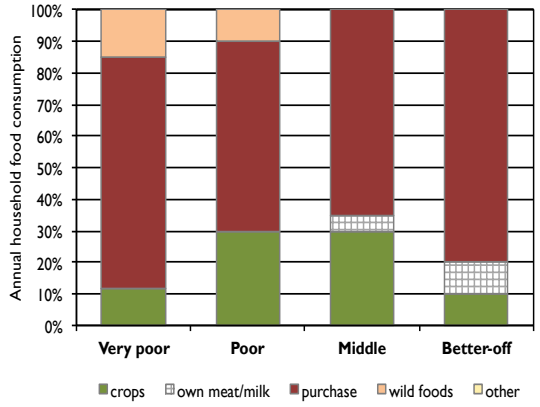
Access to land and capital to invest in agricultural activities are the most visible determinants of wealth in the "Coffee, cardamom, forestry and vegetable production" livelihood zone. All households living in this zone cultivate land, varying from 0.35 ha to 3 ha or more, depending on access to the land itself and to agricultural tools, and the possibility of acquiring irrigation systems and hiring agricultural labor. The type of crops varies with wealth, very poor households focus on the production of staple foods (maize and beans), while poor households have small coffee and cardamom plantations and small vegetable plots. Middle-income and better-off households produce the same three cash crops but have more substantial infrastructure in place (including irrigation, tractors and vehicles and better marketing contacts), which allows them to access larger markets, even international clients.

Livestock is not very important in this livelihood zone and animals are mostly kept for household consumption. Most households keep poultry and some keep a small number of pigs. Better-off households invest in cattle as a source of milk and meat and as an easily liquidable asset.

Middle-income and better-off households have access to Forestry Incentive Certificates, a benefit granted by the state in order to promote commercial reforestation in the country. It consists of a direct cash contribution to cover part of the costs of establishing and maintaining forest plantations on suitable land. These are awarded to owners (or groups of landowners) of a minimum of 2 ha and are managed by the *Instituto Nacional de Bosques* (INAB).

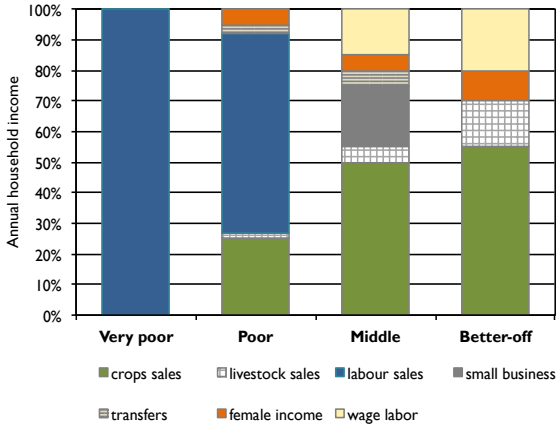
Sources of food and income (estimated weight)[26]

Figure 4: Food sources by wealth group in GT05



Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT05



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

All households depend on the market to secure their access to food. Very poor households can cover between 2 and 3 months of household needs thanks to their own maize and bean production. They rely heavily on wild foods to complement their diets. Common wild foods gathered include *macuy, quilete* and *bledo/*amarynth; all three are types of leaves. Poor and middle-income households reserve a similar amount of their agricultural production for household consumption and sell the rest. Better-off households choose to sell most of their agricultural produce (including maize and beans) when prices are high and purchase the staple foods at a profit. Only middle and better-off households have access to their own sources of animal protein.

Despite having access to land, very poor households can be considered permanent laborers; agricultural labor is their only source of income, leaving them completely exposed to seasonal changes in demand and external factors affecting labor rates. They work mostly in coffee and cardamom plantations for wealthier local households. They find casual labor (paid on a daily or weekly basis) during the land preparation phase, the crop spraying and fertilization seasons (which are the two most labor intensive agricultural activities), and during the harvests. Occasionally, migration to the southern coast or north towards Petén is also a strategy for very poor and poor households. Poor households mitigate some of their dependency on labor income thanks to the sale of crops (maize, beans and small amounts of coffee, cardamom and vegetables), limited remittances and a variety of income generating activities carried out by the female members of the household (e.g. selling *tortillas,* weaving or carrying out casual domestic work).

The importance of agriculture as a direct source of income becomes most apparent for middle and better-off households (see figure 5). These households focus on the production of cash crops (coffee, cardamom and vegetables). Vegetables are produced especially by middle-households; they represent a more economically viable crop at small-scale, with lower initial entry costs than coffee or

[26] The quantitative information provided in this section is derived from x field interviews in the municipality of Fray Bartolomé (in the department of Alta Verapaz).

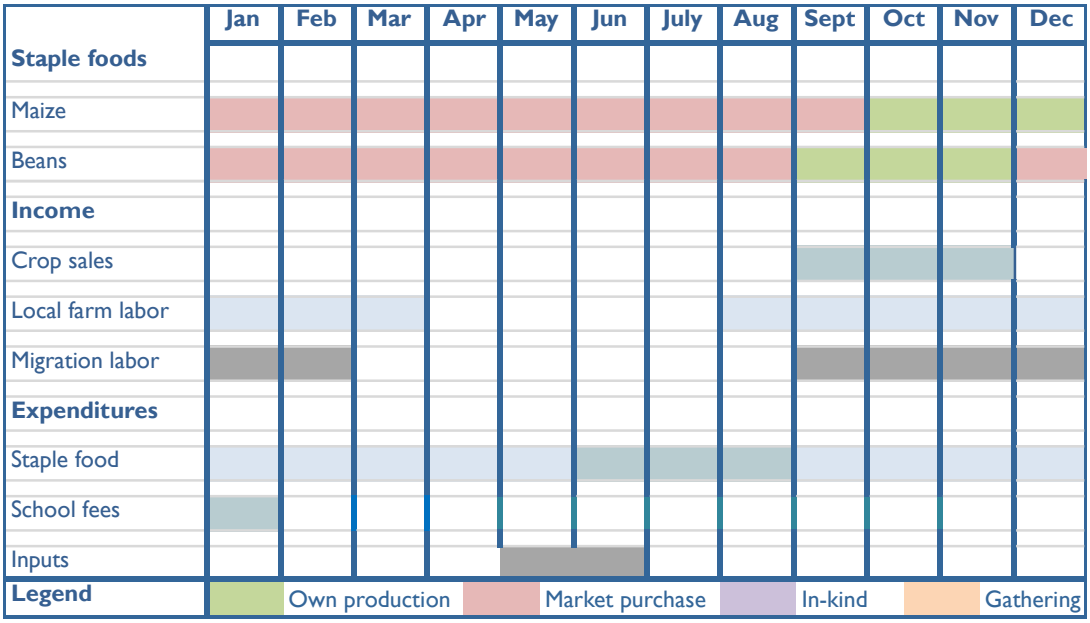
cardamom. Middle households also have sufficient income to invest in small-scale businesses (small shops, market stalls and other types of trade), providing an additional source of income that is less exposed to agricultural hazards. Livestock sales are most prominent for better-off households who own larger concessions of land appropriate for cattle rearing.

Remittances are a source of income for poor and middle-households; however, the amounts are small and not constant. Better-off households, estimated at only 3% of total households, are sufficiently well placed in the local economy not to rely on migration.

Women's economic contribution is important in all wealth groups. Female household members in the very poor group take care of household chores and some agricultural tasks. In the poor wealth group, women are often involved in selling homemade foods, working as domestic labor or washing laundry for others. Women in the middle group work as cooks in restaurants, door-to-door sales, or in qualified jobs such as nurses. In the most affluent group, women have had access to a higher education, which allows them to qualify for better paying, permanent jobs.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT05



Source: FEWS NET

Although poor households only grow a single crop cycle per year, they cultivate sufficient maize and beans to cover their household needs for 2 to 3 months (from September to December, more or less). The rest of the year they purchase staple foods from the local markets. May to September is a particularly difficult time for poor households, as income sources are few and food prices increase until crops are ready for harvest once again - providing income directly from crop sales or working as harvest labour. Poor households are generally employed as laborers locally between the months of August and March. One or more members of the family normally migrate to work in plantations inside or outside the zone during the same time period (the main harvest season). Two additional periods of increased pressure on the household budget are January, the start of the school year, and May-June, the start of the new agricultural season, when seeds need to be purchased and agricultural tools replaced.

Hazards and household response

Crop pests affecting Cardamom - of the various pests infesting cardamom, Cardamom thrips is the most destructive and persistent pest, found in almost all cardamom growing areas. Larvae and adult thrips attack the leaves, flowers and Cardamom capsules to suck the sap, resulting in qualitative and quantitative crop losses, as well as impacting labor demand.

Coffee rust - coffee rust, or *roya* as it is known in Spanish, has been devastating coffee farmers throughout Central America for the past few years. In fact, Guatemala, Honduras and El Salvador declared coffee rust a national emergency in 2013[27]. The rust is a fungus that infects the plant's leaves, making them fall and leaving the plant unable to absorb the sunlight it needs to survive. Infection is hard to contain. Coffee rust can appear at any time of the year but is most prevalent during the wettest months (August to October).

Fluctuations in the price of cash crops – coffee and cardamom prices follow the world market for futures contracts. It is estimated that drops in price occur approximately every 4 years.

Dry spells – dry spells and the delay of the start of the rainy season are particularly damaging between May and July when the sowing of maize and beans has started and rainfall is crucial for a good growing season. Lack of rain also affects cardamom and coffee, which are however less affected by excesses in rainfall.

Heavy showers and flooding – heavy showers leading to landslides occur especially between September and November. The most damaging effect is the blocking of roads, which increases transport costs.

Deforestation – exacerbated by the demand for firewood to dry cardamom, which has also led to the illegal felling of trees.

Frost – especially damaging for vegetable crops, which are more sensitive to drops in temperature.

In order to cope with changes in weather patterns, price drops and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT05

Very poor/poor	Middle/better off
Reduce expenditure on surplus items	Access to (additional) credit
Engaging debt (informal loans)	Increased livestock sales
Migration to plantation areas for labor	Migration
Migration outside the zone	
Sale of assets	

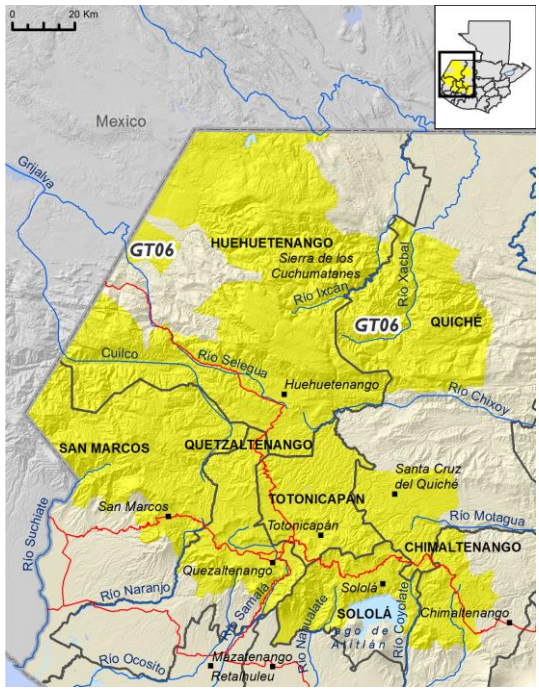
Source: FEWS NET

Western Highlands Labor, Staple Crops, Vegetable, Trade and Remittances (Zone GT06)

General livelihood zone description

[27] http://www.bbc.com/news/world-latin-america-21392257 (last accessed 15 August 2016)

Map 1: Livelihood zone location



Source: FEWS NET

The "Western Highlands, labor, staple crops, vegetables, trade and remittances" livelihood zone occupies the majority of the west of the country, including the departments of Totonicapán, Sololá, and Huehuetenango, the northern half of the departments of San Marcos, Quetzaltenango and Chimaltenango, as well as the western half of Quiché, all located within the Guatemalan highlands (the *Altiplano*).

Most of this territory lies at 1000 meters above sea level (masl) and over, and consists of a mixture of highland plains and escarped mountains and volcanoes – including the highest in the country, exceeding 4000 masl, which are situated in the Sierra de los Cuchumatanes. The variations in altitude are reflected in the wide variety of soils types found in the zone and result in barriers to agricultural expansion. Parts of the zone are covered in forest, where the *pinabete* (*Abies gutemalensis*) is found; a species of pine tree unique to this area. Deforestation is, however, a recurring problem, especially in San Marcos. The department wit the best-preserved forest cover is Totonicapán, which is also the most mountainous. The main rivers in the area are Nahualá, Samalá, Quiché, Motagua, Xequijel, Chixoy, Cabuz, Río Blanco and Río Azul. They are used in irrigation systems. Additionally, the zone includes lake Atitlán.

Temperatures across the zone vary from the temperate zones of the highlands to much colder areas in the upper parts of volcanoes and mountainous areas (temperatures range between 8°C and 29°C, falling as low as -4°C between December and February). Wide-ranging rainfall levels characterize the zone too, including areas with very low rainfall (500 mm/year) to very humid areas where precipitation exceeds 5000 mm per year and constitute the wettest areas of the country. This variability in rainfall has its origins in the abrupt topography of the zone and the direction of the winds from the Atlantic Ocean in transit to the Pacific Ocean, which collide with the Sierra de los Cuchumatanes and discharge most of the rain there. The lowland areas are the most convenient for agricultural production, yet they also compete with urbanization needs of the zone. The population density is high (approx. 276 hab/km^2) but mostly rural; only the six capital cities of the departments count more than 15000 inhabitants each.

The basis of the local economy is a mix of agriculture, internal and cross-border trade and remittances. Although the zone is not amenable to large tracks of intensive agriculture, agriculture dominates the local customs. Households produce maize and beans for own consumption and vegetables[28], potatoes and fruits[29] for sale. This zone is, in fact, the main production area for vegetables and potatoes in the country. The mountainous terrain offers ideal conditions for potato growing: altitude levels between 1500 and 3000 and a temperate climate. The availability of irrigation allows for near year-round production. Vegetable production is most prominent in the south of the zone. Local farms provide labor opportunities for households with limited access to land. Migration to coffee and sugar cane production areas (zones GT11 and GT12) is also common, where harvests are performed by hand and demand for labor is high. Additionally, the proximity to Mexico attracts laborers due to higher wages.

[28] Common commercially grown vegetables include: snow peas (*arveja china*), broccoli, cauliflower, Brussels sprouts, onions, leafy greens and tomatoes.

[29] Common fruits include: strawberries, blackberries, raspberries, citrus, avocado, apples and peaches.

Mexico also provides the supplies and the demand for a vibrant cross-border trade economy. Remittances form the third pillar of the economy; it is mainly the young who migrate and the most common destinations are the US and Mexico. Low education levels mean most migrants search for opportunities in low-skilled sectors (domestic services, construction, transport and other manual work). The impact of remittances in this livelihoods zone is particularly visible in the well-developed construction sector, especially in the municipalities located along the international border.

The Serranía de los Cuchumatanes (the Cuchumatanes mountain range, in the department of Huehuetenango) is located within this livelihood zone, yet it is characterized by a unique livelihood pattern based on sheep rearing and potato growing, and should be considered separately. Here, maize and bean production is not common. Households focus on rearing sheep (local breeds and improved breeds), mainly destined for consumption within the region - despite the area's potential to supply other regions. This area, which includes the municipalities of Chiantla, San Juan Ixcoy and Todos Santos, was deemed too small to be considered as an independent livelihood zone. It has been included within the boundaries of livelihood zone GT06, but its inhabitants do not share exactly the same type of livelihoods.

The lakeside areas surrounding lake Atitlán, in the department of Sololá, also display a unique set of livelihood patterns different to those in zone GT06, even if located within its borders. Of all communities living near the lake, about 20% communities live from the tourism industry and do not engage in agriculture. Additionally, women are often involved in handicraft sales. A further 5% of communities in the area live off fresh water fishing and local fish sales.

Markets

Market access

The most important markets supplying the livelihood zone are the markets located in the capital town of each municipality. Formal cross-border trade with Mexico takes place at the two main border markets of La Democracia and La Mesilla, both in Huehuetenango. Nonetheless, smuggling is very common and has several points throughout the border where there are no controls. As a result, a great variety of product becoming from Mexico are being marketed in the zone, such as food, hygiene related products and other basic household goods.

Overall, market access within the zone is limited due to poor infrastructure, dominated by gravel roads in poor condition, and the mountainous terrain, which impedes travel and transport in general and especially during the wet season when landslides are common. The poorest communities are always located far from urban centers, where road access is worse. Their remote location translates into poor market integration and fewer or less advantageous opportunities for local farmers to sell their produce, and also higher costs for all consumer goods arriving in the area.

Main produce sold

Vegetables – vegetables are mostly sold to intermediaries who transport the produce to the main markets in the department or directly to the collection center outside Guatemala City (CENMA – *Central de Mayoreo*). From there, vegetables are also exported to El Salvador. Vegetable gluts during the rainy season make sale prices fall. Households with access to irrigation systems can achieve year-round production. Although vegetables are produced throughout the zone, the southern municipalities within the zone[30] have the highest production levels.

[30] Including the following areas: San Antonio Sacatepéquez, San Pedro San Marcos, Tejutla, San Marcos, Palo Gordo, San Lorenzo and Ixchiguan (in San Marcos); Almolonga, Zunil, San Juan Ostuncalco and Concepción Chiquirichapa (in Quetzaltenango); Totonicapan, San Andrés Xecul, San Cristóbal and Momostenango (Totonicapan); Chiantla, Aguacatan, Colotenango, San Sebastián Huehuetenango and Colotenango (in Huehuetenango); and Sacapulas, Nebaj, Uspantan, Cunen, Zacualpa, Joyabaj and Pachalum (in Quiché).

Potatoes – potatoes are sold directly by farmers to local consumers at local markets and to intermediaries for onward transport to the national collection center and sale to urban consumers or export to Central American markets. In irrigated areas that are free from frost, production continues year-round divided in three harvests. Production increases during the rainy season months, because during the dry season, crops require irrigation and yields are lower, which on the other hand increases sale prices.

Fruits – the peak harvest and trade period falls between July and October. Prices are highest at the beginning and at end of this period. Fruit is sold locally or transported to the main collection center in Guatemala City for sale across the country. A small fraction of the total produce is sold to international retailers.

Manufactured products from Mexico –Cross-border trade has become an important livelihood strategy for many households, informal trade among poorer households and formal and well-established trade among middle and better-off households. Cross-border trade is constant, year-round. A network of intermediaries ensures distribution of the goods further inland from the international boarder. While the two departments located by the Mexican border (San Marcos and Huehuetenango) see the largest volumes of imports, the sale of products manufactured in Mexico is visible throughout the zone. Moreover, the devaluation of the Mexican peso has increased the demand for Mexican products, now cheaper for Guatemalan consumers.

Sheep/sheep meat (local creole breeds and improved breeds) - the Serranía de los Cuchumanes is the main center of production and includes two major livestock markets, where over 300 animals are traded per week. Live animals and meat are sold to local consumers and to intermediaries. Young animals are also sold to other local producers for fattening. Prices tend to fall at the start of the rainy season (May-July) when the number of animals on the market increases as families have used up their food stocks and require the extra income. It is believed that the supply of this zone is not enough to match the demand of the same zone.

Casual labor markets

Local farm labor – local opportunities are available during harvest time and also during land preparation, sowing and fertilizing the land. Labor rates average 40 GTQ/day if lunch is provided by the landowner, to 75 GTQ/ day without lunch. Daily labour is paid at the end of the day's work.

Migratory labour – three destinations are common: 1) zones GT11 (coffee plantations) and GT12 (sugar cane plantations) for harvesting work between November and March, 2) Mexico to work as agricultural labour between November and February and 3) the US on a more permanent basis, to carry out a variety of low skilled jobs (for example in agriculture, the service sector or in construction).

Staple food supplies

Maize and beans – local production is mainly reserved for household consumption. In fact, the local varieties of maize and beans are most appreciated by the local population and production levels are not high enough to warrant export to other areas. From February onwards, most households' own stocks are empty and families must resort to purchasing maize at the local markets. Staple foods are supplied primarily from Mexico (smuggled in), from zones GT02 and GT03 (Petén and the Northern Transversal Strip) and from zone GT12. Beans are also supplied from zone GT10 in the east of Guatemala.

Credit and remittances

The use of loans is common in the area, the most frequent type being informal loans, which incur high interest rates. Poor and middle-income households often rely on loans during the preparation of the new agricultural season (March-May) and also at the start of the school year, in January. Informal loans are also used to finance migration. Usually interest rates range between 5% and 10% per month. In comparison, households with access to credit offered by cooperatives and commercial banks face

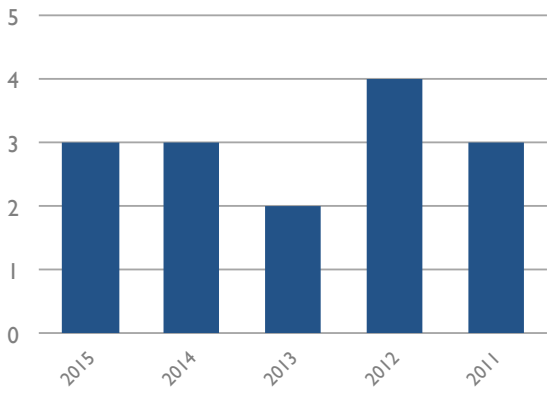
interest of 14%-22% annually. There are many credit unions in the area, attracted by the high levels of remittances being transferred to families living in this zone.

Remittances are very common in the zone, as it includes the areas of the country with the highest migration rates. International transfers represent an important source of livelihoods for poor and middle-income wealth groups. The inflow of remittances is present throughout the year, although there are some dates when they increase, such as for the end of the year holiday season or the start of the school year. Amounts vary widely, from 100 up to 3000 USD per month. The amounts that migrants manage to send back to their families often depend on whether the person is still indebted to the people smuggler (the *coyote*), if he/she found a job in the host country and if part of the remittances sent is to be invested in the construction of a home for his/her return or solely to support the family.

Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

Figure 2: Perception of historical food access with 1 as worst and 5 as best



Source: FEWS NET

Two outstanding events have affected the zone. The most recent was the November 2012 7.4-magnitude earthquake, which hit the region of San Marcos town and surrounding areas. Although the death toll was limited (52 people), the tremor led to numerous landslides and countless buildings and homes damaged [31]. Nevertheless, the impact of the earthquake was most notable in urban areas and rural respondents reported good levels of food security. Earlier, in October 2011, the zone was affected by "storm 12-E" (so called for being the 12th tropical cyclone to hit during the 2011 hurricane season in the Pacific). Over 300 mm of rain fell in the first 24 hours, leading to the overflowing of a number of rivers and landslides affecting homes, roads and bridges[32].

Besides these two natural disasters, the most recurring hazard affecting the zone are extended periods of *canícula*, a dry spell which normally falls between mid July and mid August - the middle of the growing season for staple food crops. The last three years (2013 to 2015) have been affected by extended *canícula* periods.

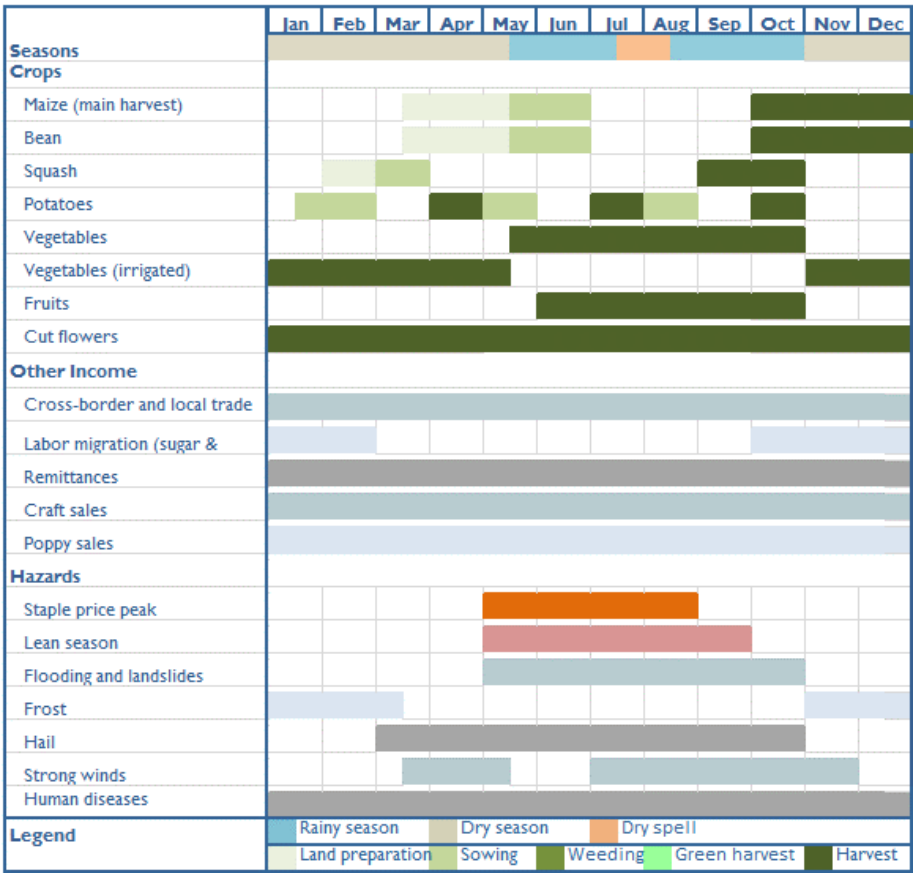
In response to the impact of disasters, the government and international organizations have supported families in the zone. The government has focused on food distribution (often in an inefficient and politicized way), while international development agencies have distributed agricultural inputs. International agencies do not have the ability to cover the entire population, so the impact of distributions as been relatively negligible.

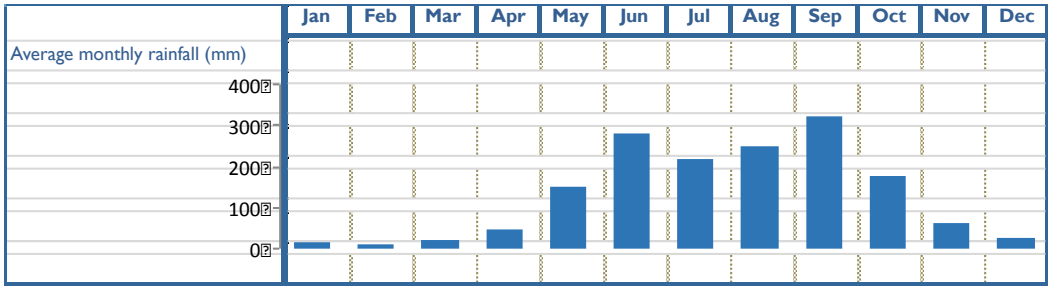
Seasonal calendar

[31] http://earthquake-report.com/2012/11/07/massive-earthquake-out-of-the-champerico-guatemala-coast/ (last accessed 28 August 2016)

[32] http://www.insivumeh.gob.gt/meteorologia/Temporal_Octubre_2011.pdf (last accessed 30 August 2016)

Figure 3: Seasonal calendar for GT06





Source: FEWS NET

Similar to the rest of the country, there are two main seasons during the year. A dry season, from late October/early November to April and a wet season, running from May to October. July and August bring a dry spell, when rainfall drops and temperatures tend to increase, which in the last years has become longer and less predictable across the region.

The bulk of land preparation activities take place at the end of the dry season, between mid-March and the beginning of the rains. Maize and beans are sown at the same time, and will be harvested from October until the end of the year and reserved mostly for household consumption. Potatoes and vegetables are the main cash crops. Potatoes have a three-month growing season. They are planted twice during the rainy season: in May and again in August and harvested in July and October.

Households with access to irrigation systems enjoy a third season, planted in January/February and harvested in April. This last harvest is generally smaller, but fetches a higher market price as the wet season gluts have long been sold. Overall, only around 25% of municipalities have irrigation systems and the majority of households produce rain fed potatoes only. The same is true of vegetable production; the majority of households focus on rain fed production due to lack of irrigation. Larger scale vegetable growers, however, cultivate year-round.

Opium poppy production and sale is increasingly common across the zone. Many households rent land for production during the dry season, as profits are attractive. This is especially common in communities at high altitudes. Mexican cartels have improved the types of inputs used in production, including varieties from Afghanistan. Poppy seeds are sown after the potato harvest. If well managed, one *cuerda* (0.04 ha) of poppy seed production can yield 2.5kg of opium latex, valued at 15,500 GTQ (a profit of 5,000 GTQ on average). There are three harvests per year.

Local agricultural production provides a more or less constant supply of casual work opportunities. Better-off households provide labor opportunities on their farms but also in their businesses and trade activities. Local laborers also migrate towards livelihood zones GT11 and GT12 to work in the coffee and sugar cane plantations, as well as to the south of Chiapas. This outward migration usually occurs from October to February in line with the harvesting times.

Other typical local sources of income do not suffer marked seasonal variations; cross-border trade with Mexico takes place year-round and the inflow of remittances is also constant, with small peaks during the main national festivities. Demand for staple foods increases during the 'lean season' when household maize and bean stocks are empty or close to empty and the new agricultural campaign has only just begun. It is during this period (May to late August) that food prices increase due to the added demand, spurring increased demand for Mexican imports, which are often cheaper, and a heavier reliance on remittances. December also sees an increase in the flurry of economic activity. The end-of-year festivities bring an increase in consumption and, as a result, a heightened need for the extra cash to cover the seasonal expenditure.

The most common hazards strike during the rainy season, months when the zone is prone to heavy rainfall and landslides hail storms and strong winds. The dependency on the timely start of the rainy season for most crops means the period between May and October is also a time of heightened vulnerability, when a delay to the start of the rain or a lengthening of the *canícula* season can have damaging consequences for harvests.

Wealth breakdown

Access to land is difficult in this mountainous region, yet agriculture is well routed in the local traditions and mores. Agriculture is based on smallholdings, where most households produce maize and beans for household consumption and potatoes and vegetables as cash crops. However, it is off-farm activities, especially trade, that provide the largest economic benefits in the zone. As a result, land ownership only tells part of the story and, in fact, is a key defining factor between very poor and poor households in particular. Very poor households do not own any land and work as farm and off-farm (male and female) laborers to make a living. Poor households have access to between 1 and 3 *cuerdas* (0.04-0.12 ha), whether rented or owned or a mixture of both, which allows them to cover the household's needs in staple foods for 3 to 4 months of the year and to generate a third of their annual income from the sale of maize, beans, potatoes and vegetables. Another important difference between very poor and poor households is that poor households have been able to finance the migration of one of their family members outside the country and, as a result, receive remittances.

Table 1: Determinants of wealth in GT06

Determinants of wealth	Very poor	Poor	Middle	Better-off
Household percentage (%)	15	73 (72.95)	12	< 1 (0.05)
Household size (#)	10-12	7-10	5-7	5-7
Land holding (ha)				
Land area cultivated	0 (no rental)	0.04 – 0.12 ha	.16 – 0.83 ha	>1ha
Typical livestock holding (#)				
Cattle	0	1-3	3-5	> 5
Sheep/goats	0	2-6	6-30	0
Pigs	0	2	4	0
Poultry	2-4	4-10	10-15	4-10
Other productive assets (#)				
Agricultural tools	Basic tools (hoe, pickaxe, shovel, machete) No post-harvest storage facilities.	Same as VP	Basic tools, irrigation system, mechanical equipment, post-harvest infrastructure	Irrigation, greenhouses, mechanical equipment, post-harvest infrastructure
Vehicles	0	Bicycle	Car	Pick-up truck
Business capital	Low	Low	Medium	Considerable

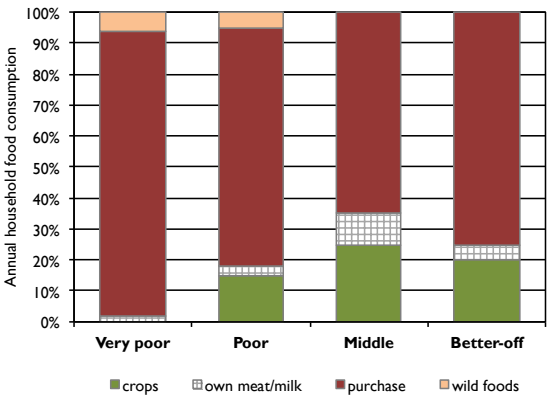
Source: FEWS NET

Middle-income and better-off households own considerably larger plots of land, but most of their annual income is derived from commercial activities outside agriculture. Better-off households own sufficient land to be able to rent out surplus land to households from whom increasing their agricultural production is a worthwhile investment; mainly poor households without sufficient capital to engage in more expensive off-farm income generating activities. For middle-income and better-off households, it is the ownership of their own means of transport that is crucial, as well as access to strong commercial networks. Middle-income households are market traders, brokers and employees of private and public enterprises. Better-off households are importers and exporters of different commodities, including but not limited to rain fed crops and vegetables. The poor are the agricultural suppliers of the middle-class intermediaries and together with the very poor, supply labor for local production.

Livestock do not play a very important role in the local economy, yet most households own poultry, small ruminants and cattle, except very poor households who can only maintain a small flock of chickens. Animals are a source of protein for the household and also represent an informal means of savings. The notable exception is the Sierra de los Cuchumatanes, where raising sheep is central to the local economy.

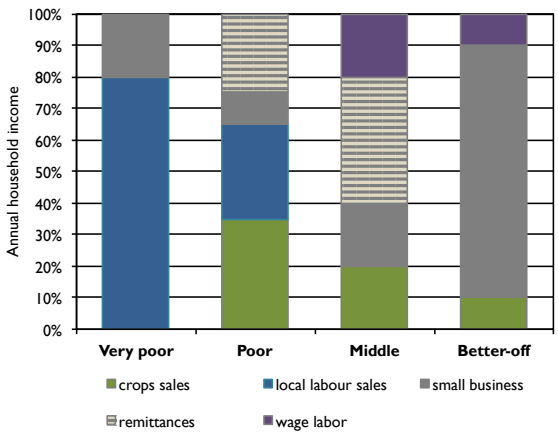
Sources of food and income (estimated weight)[33]

Figure 4: Food sources by wealth group in GT06



Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT06



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food consumed during the year. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

Due to the difficulties in developing large-scale agricultural production in this mountainous livelihood zone, households' crop production can only cover a limited proportion of households' annual needs. It is the market that ensures access to food for the vast majority of the year for all wealth groups. In fact, for many households it is more economically efficient to forgo growing crops and to purchase staple foods, yet most continue to grow some maize and beans due to the strong traditional ties to agriculture, and especially maize production. Additional sources of food include meat and milk from own livestock (poultry, sheep and goats, pigs and cattle) and eggs, and, for very poor and poor households especially, wild foods. Wild foods refer to a variety of wild leaves (e.g. *güisquil* or *quilete*), which are available during the rainy season.

In terms of income sources, four major categories characterize the local economy: labour, trade, crop sales and remittances. Very poor households are casual laborers, who supplement their income with petty trading, i.e. the sale of homemade goods (e.g. *tortillas*) or small quantities of manufactured goods and household items. They work in local farms (especially in vegetable production) and migrate to sugar cane and coffee producing areas on a seasonal basis. They also work as low skilled off-farm laborers: as construction workers, shop assistants, domestic workers, etc. The influx of remittances has led to a buoying local construction sector and source of labor opportunities.

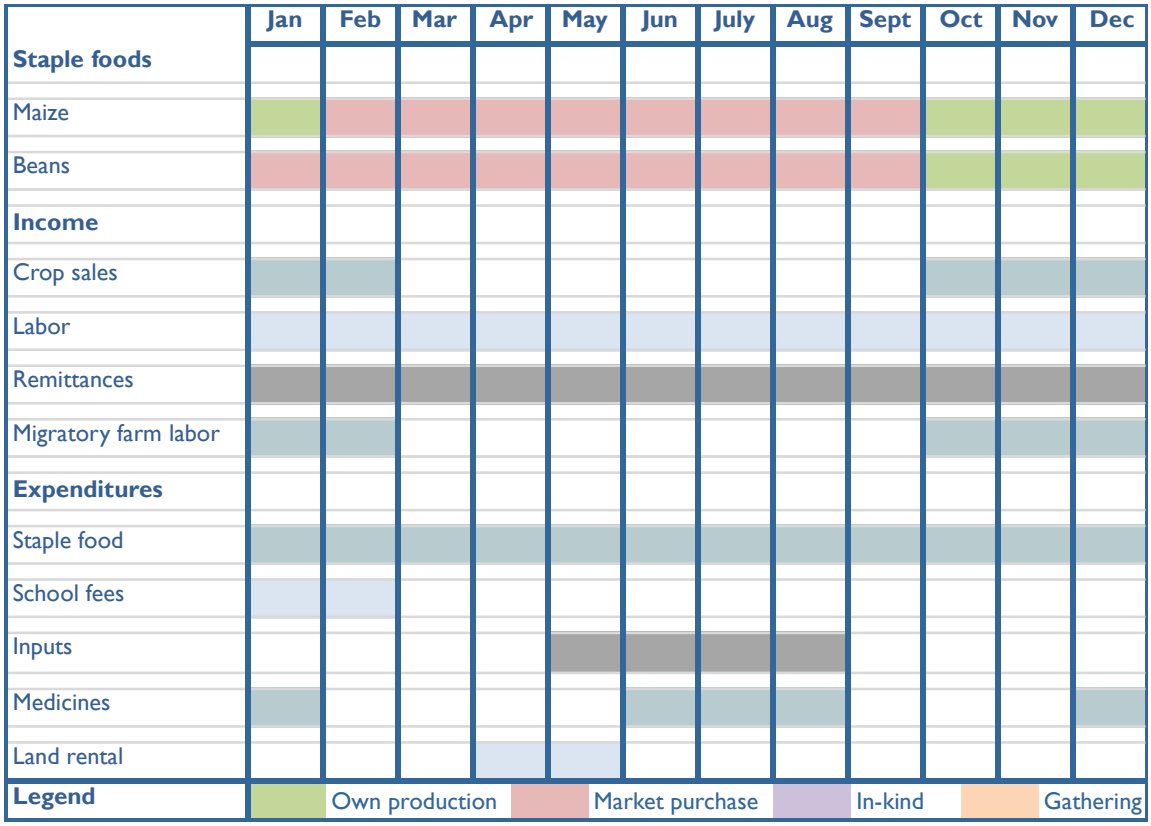
At the opposite side of the wealth spectrum, better-off households are medium to large-scale businessmen engaged in cross-border trade and local trade of important volumes of goods. Some maintain landownership and cultivate a variety of food and cash crops. These households also include wage-laborers, employed in the public and private sector in the main towns within the zone.

[33] The quantitative information provided in this section is derived from six field interviews, in Huehuetenango, Chiantla and Soloma municipalities (all three in the department of Huehuetenango t), and in San Marcos, Quetzaltenango, and Panajachel municipalities (department of Sololá).

The two wealth groups that lie in the center, poor and middle-income households, share some characteristics with their poorer and richer counterparts. Poor households rely less on labor than very poor households because they have been able to invest some capital into agriculture, yet they still rely on working for others during the peak of the season. Middle-income households also hold on to agriculture as a source of income, but divert more of their capital towards trade and also have the support of a wage earner. Most importantly however, these two wealth groups receive remittances from family members living outside Guatemala. This external financial contribution represents between 25% and 40% of their annual income. The level of out migration from this zone is very important and, as a result, remittances are an integral part of the local economy.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT06



Source: FEWS NET

Poor households are self-sufficient in staple foods for four months of the year, from harvest time in October until the beginning of the new year. The remaining eight months they purchase staple foods from the local markets. Annual income is generated from three major sources: crops sales during the harvest season, local and migratory labour (both farm and off-farm labour) during the harvest seasons and less frequently during the rest of the season, and remittances at more or less regular intervals during the year. Agricultural inputs, including land rental, represent a heavy expense for poor households between the months of April and August, the start of the agricultural season. School fees and related expenses are due in January/February, while medical expenses increase during the cold months of December and January and in the middle of the rainy season.

Hazards and household response

Delayed rainfall/extended dry spell (canícula) – changes to weather patterns leading to a reduction in rainfall levels or an increase in temperatures can damage crops, and lead to harvest losses which directly affect the price of staple foods to consumers and the amount of labor demand. Few households have access to irrigation to offset the effects of dry spells.

Flooding and landslides – excessive rainfall in short amounts of time between June and October can lead to localized flooding of rivers and, more frequently, to water saturation and landslides, especially in the most escarped areas where forest cover has been lost. As well as causing damage to crops and homes, landslides and flooding can lead to roadblocks and communities becoming isolated.

Frost, hail storms and strong winds – also cause damage to crops. Frost is common during the months of November and December. Hailstorms are common during the rainy season, especially between May and June. Strong winds are usual between July and October.

Deportations – most migrants are residing outside Guatemala without formal authorization. As a result, deportations are common and can take place at any time during the year. Loosing the right to stay in the host country leads to an important loss of income, not only of the income forgone in the host country but also the added difficulty of repayment of any outstanding debts linked to the migration process.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT06

Very poor/poor	Middle/better off
Migration	Increase irrigated agriculture
Engage debt / mortgaging assets	Increase livestock sales
Migration to plantation areas for labor	Rely on formal credit
Increase petty trade	
Sale of assets	

Source: FEWS NET

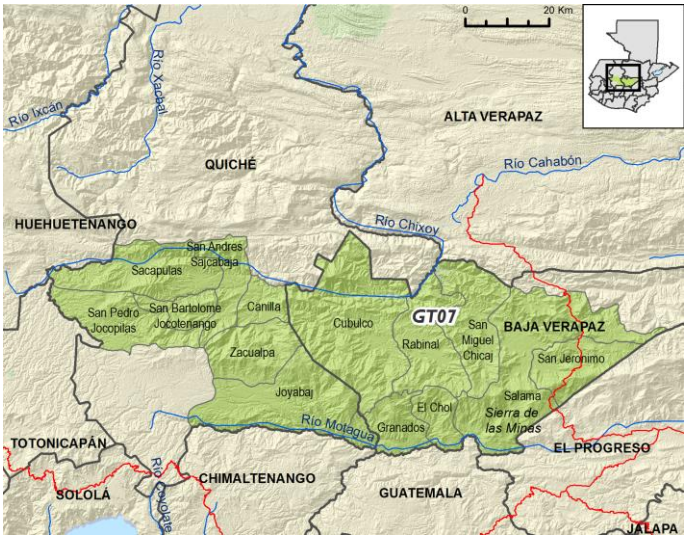
Baja Verapaz and Quiche Staple Food and Agricultural Labor (Zone GT07)

General livelihood zone description

The "Baja Verapaz and Quiché staple food and agricultural labor" livelihood zone includes the municipalities of San Jerónimo (Baja Verapaz), San Pedro de Jocopilas and San Bartolomé Jocotenango (Quiché), and is located north of the capital, in the center of Guatemala. It is bordered to the north by zone GT05, to the east by zone GT08, to the south by zone GT09 and to the west by zone GT06.

The population density in this zone is relatively low (128 hab/km^2), with 66% of the population living in rural areas. There is a large indigenous population, including Achi', Kaqchikel and K'iche' ethnicities.

Map 1: Livelihood zone location



Source: FEWS NET

The climate in this zone is warm-dry with temperatures ranging from 15 to 30 degrees Celsius (59-86 degrees °F), with an average temperature of 20 degrees Celsius (68 °F). The average rainfall is 600-700 mm/year in the central and southern parts of the area and 1500 mm/year in the north. Like in most of the country, there is a single dry season (November to May) and a single wet season (June to October), with two months of high temperatures (July and August). The majority of the zone lies in the "dry corridor", which is characterized by lower rainfall and drought-prone conditions, and requires the near exclusive use of irrigation for vegetable production, a phenomenon unique to this zone.

The topography of the zone is varied; most of the area is mountainous with some valleys, such as the San Jerónimo Valley in Baja Verapaz. A diversity of forests exists in the zone, including dry subtropical, subtropical broadleaf and coniferous forests. Many of these wooded areas are used for timber and the extraction of firewood. The El Chol, Matagua, Chixoy, Salamá and Negro rivers flow through the zone, providing the surrounding areas with a valuable irrigation source, as well as the Chixoy River Hydroelectric Reservoir.

The basis of the local economy is the production of subsistence food crops (maize and beans) with traditional techniques and low yields, as well as the production of vegetables, such as tomatoes, peppers and onions, grown mainly in the San Jerónimo Valley and municipalities of Quiché. The sale of labor for agricultural work is also an important livelihood activity, particularly for poor households who do not have access to land.

Arid weather conditions, low rainfall and dry soils make many areas of this zone infertile and dependent on irrigation systems, which are concentrated in urban areas, and to which the majority of the population does not have access. For this reason, it is an area with low-yield crops and the zone is very vulnerable to shortages of rain, which affect both the harvest and labor market. In the high-altitude areas of the zone, which have lower temperatures, crop production is slower and there is a longer growing period between planting and harvesting.

Fluctuation in the price of basic grains (maize and beans), limited access to land, a history of monocropping techniques which degraded soil, and lack of employment opportunities are some of

the other factors that have contributed to increased poverty in the region. Additionally, indiscriminate burning due to slash and burn agricultural practices causes the spread of fires, disrupting natural balances in the habitat. This produces conditions for sudden pest outbreaks, which significantly affect crops, and consequently availability of and access to food. Prolonged droughts due to irregular rainfall cause disruption in the production of basic grains, which forces people to replant during a single season, affecting both crop yields and household economies.

For these reasons, the majority of the population is highly dependent on the sale of agricultural labor and their main food source is purchased at markets. Income from labor, rather than home agricultural production or crop sales, enables households to meet their daily food needs. Due to the poor growing conditions, stocks of maize and beans meet most household needs for only between 2-5 months of the year, with the poorest households having the fewest stocks, lasting as little as 2 months. During the remainder of the year basic grains must be purchased. If the demand for agricultural labor decreases and/or crop production is limited, the poor adapt their diet by reducing the number of meals, which results in increased rates of chronic malnutrition. Economic hardship has forced people to leave their communities in order to sell their labor in agricultural activities outside the zone. This strategy of using migration to generate income needed for subsistence causes family disintegration. Other minor livelihood activities in the zone are livestock rearing at the household level and handicrafts, such as textiles and ceramics.

Markets

Market access

The most important markets supplying the livelihood zone are the markets of Salamá and Rabinal, Baja Verapaz (food markets). The cattle market is in Joyabaj, Quiché, and in each municipality during the annual livestock fairs. There are also small local food markets in each municipality.

The zone has good access to urban and municipal markets; however, rural markets are more difficult to access. In rural communities, the terrain is rugged and the poor state of road infrastructure, particularly poorly maintained dirt roads, makes access to markets difficult. The rural population is quite dispersed and distances to markets are long, making transport costs high, which further limits market accessibility, particularly for poor households. The high transport costs increase food prices, and since poor households depend on food purchases at market to meet their household needs, they are particularly vulnerable to price changes, which can easily threaten food security. In addition to formal vendors, informal vendors from lower-income households sell their surplus production of maize, beans, vegetables and fruits. A small percentage of these informal vendors are women, who sell fruits, vegetables and prepared foods (tortillas).

Commercial activities in the zone are carried out mainly by better-off groups of the population from urban areas. These affluent businessmen are the commercial intermediaries for the middle-income and poor. Their role is to purchase agricultural products and handicrafts from producers, and bring them to market.

In the zone, migration jobseekers go primarily to the municipalities of Salamá, where agribusinesses and farms belonging to the middle and better-off are located, which offer employment during times of planting and harvesting.

Main products sold

Vegetables – vegetables, such as tomatoes, onions and potatoes, are produced by local farmers year-round due to irrigation systems, and sold direct to consumers or through intermediaries at local markets. The price is the lowest from January to mid-May, and the highest during the rainy season from mid-May to June and over the Christmas holiday in December.

Casual labor markets

Local farm labor – laborers go to the municipalities of Salamá, and to a lesser extent San Jerónimo and San Miguel, where agribusinesses and farms belonging to the middle and better-off are located, which offer employment during times of planting and harvesting. Coffee plantations offer the main labor opportunities locally, although the production of coffee is lower than in other livelihood zones.

Migratory farm labor – farm laborers from this livelihood zone migrate to GT05, GT11 and GT12 to assist with harvesting coffee and sugarcane. The migration period for coffee labor is from October to March, when laborers travel to Cobán, Alta Verapaz, and the piedmont, where they receive 25-45 GTQ per day for coffee harvest labor. Laborers travel to the southern coast to harvest sugarcane from November to April, where they receive 40-60 GTQ per ton harvested. Moreover, there is continual and increasing migration to the United States, particularly in the west of the zone (especially in Pachalum and other municipalities in Quiché).

Staple food supplies

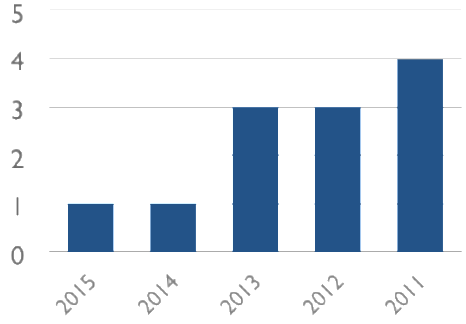
Maize and beans – family production covers households' requirements for 2 to 6 months, depending on household socioeconomic status and production capacities. For maize, local supplies are supplemented with surplus from Mexico, smuggled in and taken by intermediaries to Huehuetenango and then distributed to local markets within this zone. Other supply areas include Petén and the Northern Transversal Strip and north of Quiché, from where the maize is taken to local markets. These municipalities in GT02 and GT03 provide about 20% of the basic grains consumed in the zone. Local supplies of beans are supplemented with surplus from Huehuetenango and Petén and the Northern Transversal Strip, which are then distributed to local markets. Basic grain prices are lowest from mid-September to November, and highest from March to August, during the time of scarcity, as well as in December due to the Christmas holiday.

Credit and remittances – Credit is available to most families (formally or informally). Poor households rely on informal credit year-round, paying high interest rates on loans that are subject to collateral (crops) or to repayment with labor. Only the middle and better-off households have access to formal credit, because they have collateral to back up the loans. Remittances are not a significant contribution to household economies within the zone. It is mainly the poor and middle-income households that receive remittances. Family members from very poor households do not have the economic ability to migrate.

Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

Figure 2: Perception of historical food access with 1 as worst and 5 as best



Source: FEWS NET

The local perception of food security levels shows a significant decrease in perceived access to food over the last five years. Drought, coffee rust and frost were three significant challenges that occurred in both 2014 and 2015, making these two years the worst in recent memory for food security. Already a region facing challenges due to low rainfall and dry soil, the drought and accompanying heat waves in 2014-2015 not only significantly lowered grain and vegetable yields and labor opportunities, it also created a change in temperature and humidity which spawned a proliferation of fungal diseases, such as rust. Coffee rust is the most economically damaging coffee disease worldwide and has affected plantations

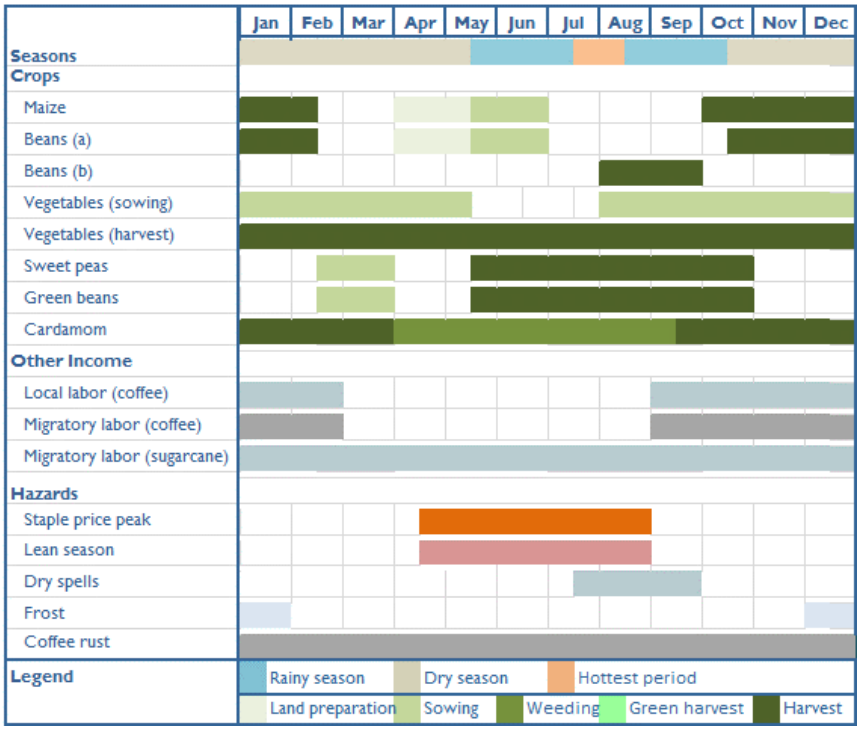
annually since at least 2012. While GT07 does not produce large amounts of coffee, coffee plantations outside the zone are a significant source of wage labor and the decline in the demand for coffee labor due to rust has significantly reduced household incomes in the zone, impacting the ability to purchase food.

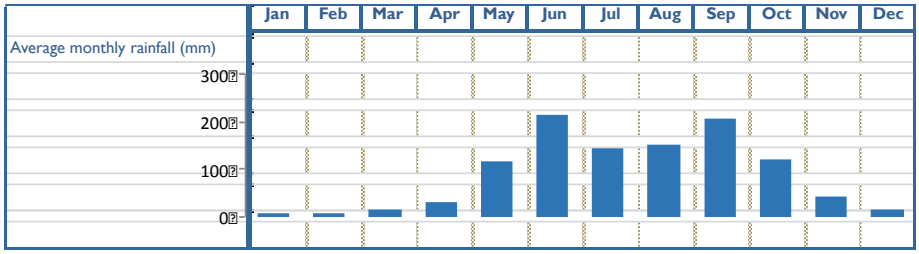
Frost is a serious hazard for households growing maize and beans, as well as vegetables. The months of greatest vulnerability for households are between November and December, during the maize and bean harvest. In both 2014 and 2015, frost occurred during these harvest months, causing cold burn and a near total loss to these crops. In 2013, drought and coffee blight were the main hazards, while in 2012 coffee blight was the primary challenge. In 2011, heavy rains from August through October caused soil saturation and landslides, but did not result in significant crop losses.

Government assistance, as well as food aid from the World Food Program (WFP), has been directed to the zone since 2011. The Food and Agricultural Organization (FAO) also provided technical assistance programs in 2011 and 2012. However, assistance has been inconsistent and insufficient.

Seasonal calendar

Figure 3: Seasonal calendar for GT07





Source: FEWS NET

There are two seasons in the zone, the rainy season (June to October) and the dry season (November to May), with a dry spell in July and August. Agricultural production goes hand in hand with these seasons.

The start of the rainy season in May signals the time for sowing maize and beans. There is one season for maize and two seasons for beans, although the first bean season is the most important in terms of production levels. Maize and the first bean crop are harvested from October through December. The second bean harvest occurs in August and September, but few households plant during the second season. Vegetables are produced using more or less sophisticated irrigation methods and can be grown year-round. During the harvest season, food products are cheapest, but as crop supplies diminish, prices increase. Economic activity, particularly agricultural labor, peaks during the first harvest season from October to December. Labor can also be found on coffee plantations both within and outside the zone from September through February, and sugarcane harvesting from October through May.

During the lean season, between April and August, there is less economic activity, fewer products are available and prices are higher. These are the months of greatest vulnerability for households as there are no jobs available harvesting maize or beans and very few job opportunities on the coffee and sugarcane plantations. Limited employment coincides with price spikes for basic foods and the hunger season. These months are also the time of the annual dry spell, which in recent years has caused a delay in rains and affected harvest dates and yields. Frost occurs in December and January and can cause crop loss, as well as illness.

Wealth breakdown

The main differences between socioeconomic groups in the "Baja Verapaz and Quiché staple food and agricultural labor" livelihood zone are based on access to land, ability to cultivate, crop diversity, access to markets, productive and liquid assets and ability to find labor opportunities.

Roughly 40% of the population lives in extreme poverty, characterized by barely acquiring access to land for housing and a very small area of rented land for cultivation; own crops represent a minimum percentage of the food these households eat. Therefore, the very poor depend heavily on agricultural labor employment to generate the revenue needed to meet their basic needs.

Table 1: Determinants of wealth in GT07

Determinants of wealth	**Very poor**	**Poor**	**Middle**	**Better-off**
Household percentage (%)	40	30	25	5
Household size (#)	≥ 8	5-7	4-5	3-4
Land holding (ha)				
Land area cultivated (owned + rented)	0	0-0.7 (rented)	1-3	>10
Typical livestock holding (#)				
Sheep	0	0-2	1-5	0
Cattle	0	0	1-2	-
Pigs	0	0-1	2-3	-
Chickens	1-6	1-10	10-20	-
Other productive assets (#)				
Agricultural tools	Basic tools, hoe, machete	Basic tools, hoe, machete	Basic tools, pumps,	Tractors, irrigation systems, greenhouses, metal silos
Vehicles	0	0	Transport vehicle	Trucks, 4x4s

Source: FEWS NET

The poor, who make up roughly 30% of the population, have more access to land, but have few crops due to the small size of their land and the poor quality of their soils. For this reason, poor households also need to sell their labor. The middle wealth group, consisting of 25% of the population, has increased production as they have access to more land and better soil quality (mainly in the valleys). Farmers in this group have diversified their crops beyond basic grains, to include crops such as vegetables, and also have an educational level that allows them access to more skilled jobs. The better-off wealth group, making up 5% of the population,

has much larger land holdings with better quality soils for cultivation. Perhaps most importantly, this group has irrigation systems that allow them to grow crops year-round, even during the dry season, and diversify with vegetables and coffee. Better-off households also own grain silos, which enables them to store grain for consumption and sale during more months of the year, giving them additional advantages during the lean season when grain prices are high.

Owning land is also a key determinant between wealth groups because legal land ownership increases eligibility for credit and migration opportunities. Only the middle-income and better-off groups have property titles, which allow them access to assets, such as formal credit to increase their production and savings. The poorest groups, who do not have land titles, cannot access formal credit and, therefore, cannot improve their production conditions, limiting their income level. Land ownership is a key element in migration to the United States, as the title serves as collateral to pay for the trip. For this reason, only middle and better-off households can think about migrating north.

The type of crops grown varies with wealth. Very poor and poor households focus on the production of staple foods (maize and beans), while middle-income households have small vegetable plots, and better-off households produce vegetables and some operate coffee plantations. Better-off households have more substantial infrastructure in place (including irrigation, tractors and vehicles and better marketing contacts) which allows them to access larger markets.

Livestock is not very important in this livelihood zone and animals are mostly kept for household consumption. Most households keep poultry and some keep a small number of pigs. Better-off households invest in cattle as a source of milk and meat, and as an easily liquidable asset.

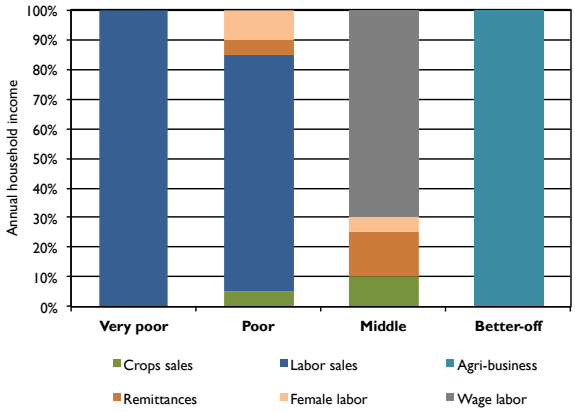
The increasing challenges of finding agricultural labor due to drought and coffee rust mean many households have opted to support migration of at least one family member to search for work outside the zone or outside the country. International migration, however, is only an option for the poor and middle-income households.

Sources of food and income (estimated weight)[34]

Figure 4: Food sources by wealth group GT07

Source: FEWS NET

Figure 5: Cash income sources by wealth group GT07



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

All households depend on the market to secure their access to food. Very poor households can cover up to two months of household needs, thanks to their own maize and bean production; otherwise, they obtain their food almost exclusively by purchasing it from market. They are generally too poor to rent land that might produce food for themselves, and too poor to own animals for consumption or sale. Poor households purchase roughly 80% of their food from market, but also often rent land where they grow crops (maize and beans) for their own consumption. Occasionally, they have a surplus that they sell. They don't have adequate areas to store crops for long-term use, so generally have at most a three-month supply, and thus tend to consume the crops as they are harvested. Homegrown staple crops account for about 10% of the diet of poor households. Although many households may have up to a dozen chickens, these tend to be sold rather than eaten. Some households receive food aid from the World Food Program, other NGOs, or friends and relatives, accounting for about 5% of their annual food consumption. Households in the temperate areas of Salamá, and especially Quiché, are able to forage for wild food, such as fruits, roots and tubers.

Middle income and better-off households purchase most of their food, between 70-85% of food consumed, but they also consume meat and milk from the animals they raise, and crops they produce. For middle-income households, roughly 20% of the food consumption comes from their own crops and 10% from their own livestock. Better-off households meet about 10% of their food needs from their own crops, and 5% of their annual food consumption are from their own meat. The types of food consumed by households vary depending on wealth group.

Very poor households are essentially permanent laborers; agricultural labor is their only source of income, leaving them completely exposed to seasonal changes in demand and external factors affecting labor rates. They work mostly in basic grains and vegetable production, and on coffee plantations for wealthier local households, and sugarcane plantations in zone GT12. They find casual labor (paid on a daily or weekly basis) during planting and harvest seasons. Increasingly, migration to

[34] The quantitative information provided in this section is derived from 2 field interviews, one in Canillá (Quiché) and one in Salamá (Baja Verapaz).

the southern coast or north towards Petén is also a strategy for very poor and poor households. Poor households also rely on labor payment, which provides about 80% of their annual income. They mitigate some of their dependency on labor income thanks to the sale of crops (maize, beans and some vegetables), and a variety of income generating activities carried out by the female members of the household (e.g. washing clothes or carrying out casual domestic chores). Women also sell fruits such as lemons and mangoes, and sell food they have made such as tortillas. A small percentage of poor households also engage in informal work including handicrafts, such as textiles and ceramics. Payments are received by some poor households, who have family members working outside of the area, even in other countries such as the United States.

There is a significant shift in livelihood activities for middle and better-off households. Middle-income households typically have salaries from wage-paying jobs such as teachers, nurses, policemen, sales assistants and civil servants, which provide roughly 70% of their income. They may also sell a few animals. These households typically own more land so that in good seasons they have surpluses of maize and beans to sell, crop sales accounting for about 10% of their annual income. Some women sell items such as jewelry, cosmetics, used clothing and perfumes. Some receive remittances from family members who are working abroad, especially in the United States.

Better-off households typically are engaged in a wide variety of agribusiness and commerce enterprises, including trade, export, agricultural production (such as melons and coffee) and other businesses (such as banks and lending agencies), which provide 100% of their annual income. Better-off households are affluent and stable enough due to large land holdings and grain storage silos that they often have up to a year's supply of food staples on hand.

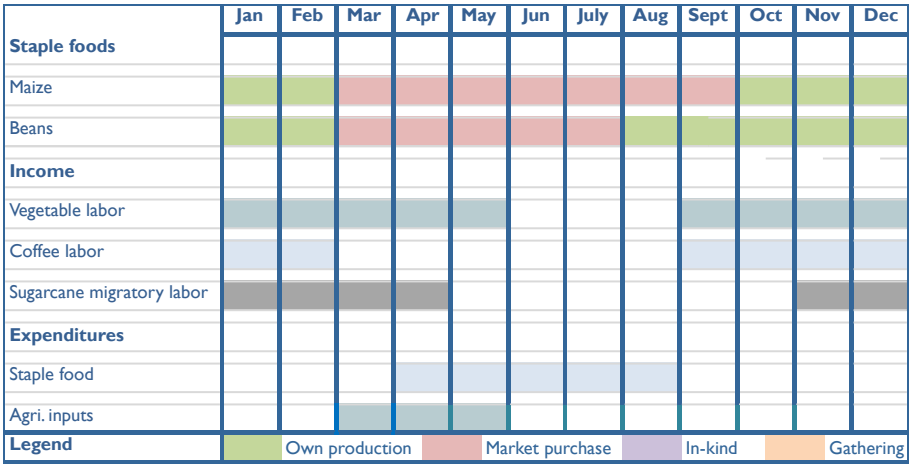
Remittances are a source of income for poor and middle-households; however, the amounts are small and not constant. Better-off households, estimated at only 5% of total households, are sufficiently well placed in the local economy not to rely on migration.

Women's economic contribution is important in all wealth groups. Female household members in the very poor group take care of household chores and some agricultural tasks. In the poor wealth group, women are often involved in selling homemade foods, working as domestic labor or washing laundry for others. Women in the middle group work as cooks in restaurants, door-to-door sales, or in qualified jobs such as nurses. In the most affluent group, women have had access to a higher education, which allows them to qualify for better paying, permanent jobs.

Calendar of major sources of food and income for poor households

Poor households rely on food purchased at the market to meet their food needs. Household crop production supplements purchased food, ranging from providing between 5-10% of total annual food consumption. Poor households cultivate sufficient maize to cover their household needs for about two months (between October and December). Bean consumption follows the same pattern as maize for the first harvest. For the second bean harvest ending in February, reserves may last 1-2 months. The rest of the year poor households purchase staple foods from the local markets. Members of poor households migrate to the area of Cobán, Alta Verapaz and the piedmont (livelihood zone GT11) during the months of October to February to help with the coffee harvest, while sugarcane laborers migrate to the south coast during the months of November to April for the cane harvest. Throughout the year, households have significant expenses during the Christmas season. Two additional periods of increased pressure on the household budget are January, the start of the school year, and March to May, the start of the new agricultural season, when seeds need to be purchased and agricultural tools replaced.

Figure 6: Main components of the food access calendar for poor households in GT07



Source: FEWS NET

Hazards and household response

Drought – drought and dry spells affect all socioeconomic groups since they decrease crop yields, increase the cost of staple foods and can require replanting in times of failed harvest, which calls for additional spending for seed and inputs. Dry spells and the delay of the start of the rainy season are particularly damaging between May and June when the sowing of maize and beans has started and rainfall is crucial for a good growing season. In a zone where the majority of livelihoods are dependent on agricultural labor, crop failure due to insufficient rain can have a devastating impact on the labor economy.

Coffee rust/blight - coffee rust, or *roya,* as it is known in Spanish, has been devastating coffee farmers throughout Central America since 2012. In fact, Guatemala, Honduras and El Salvador declared coffee rust a national emergency in 2013[35]. The rust is a fungus that infects the plant's leaves, making them fall and leaving the plant unable to absorb the sunlight it needs to survive. Infection is hard to contain. Coffee rust can appear at any time of the year but is most prevalent during the wettest months (June to October).

Frost - frost is a hazard for households growing maize and beans, but is especially damaging for vegetable crops, which are more sensitive to drops in temperature.

Flooding and landslides - heavy showers leading to landslides occur especially between August through October. The most damaging effects are the loss of crops and the blocking of roads, which increases transport costs.

Fluctuations in staple food costs – price fluctuations of staple foods affect all wealth groups, but most severely impact very poor and poor households, who rely entirely on purchased food to meet their household needs and have minimal disposable income.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

[35] http://www.bbc.com/news/world-latin-america-21392257 (last accessed 15 August 2016)

Table 2: Coping strategies in response to shocks in GT07

Very poor/poor	Middle/better off
Eat less-preferred and cheaper foods	Change diet to incorporate cheaper foods
Migration to plantation areas for labor	Use savings, transfer (liquidate) investments
Engaging in illegal income generating activities (e.g. opium poppy production or drug trade)	Sale of assets
Take children out of school to help with income generation	Make use of social assistance programs
Migration outside the zone	Change crop/land use, including making use of drought or flood resistant seed varieties
Spend savings	Build irrigation systems
Take out informal loans	Access credit
Sale of assets	

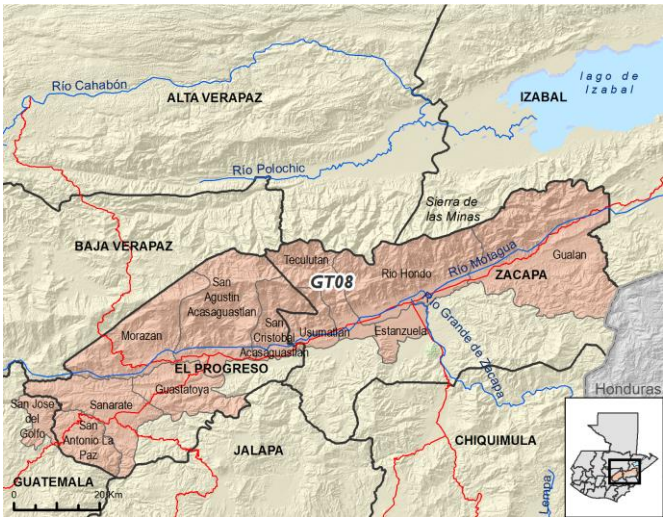
Source: FEWS NET

Motagua Valley, Fruit Agri-business Labor and Mining Labor (Zone GT08)

General livelihood zone description

Located on the east of Guatemala (directly north-east from Guatemala City), this thin strip of land borders livelihood zone GT10 to the south and has access to the Caribbean Sea on the east. The "Montagua Valley, fruit agri-business labor and mining labor" livelihood zone constitutes part of the "dry corridor", a large area of dry tropical forests in Central America[36] known for its recurrent droughts alternated with excessive rains and severe flooding. The Montagua valley is indeed one of the driest areas of Central America.

Map 1: Livelihood zone location



Source: FEWS NET

The Montagua Valley is surrounded by mountains, the *Sierra de las Minas* (literally "The Valley of Mines") to the north and the *Sierra del Merendón* to the south. As a result, the topography varies considerably, from low-level plains along the valley floor to mountains of up to 2900 meters above sea level. The temperature and precipitation rates vary as much as the landscape; lowland flat plains have hotter and drier climates (with highs of almost 40 degrees Celsius) whereas the higher altitudes have humid, wetter and cooler climates and are thus typically more fertile. Both *Sierras* have a wide variety of vegetation and forests (both deciduous and evergreen). Communities are located both along the valley floor and higher up on the mountainsides. The population density is low, with approximately 70 inhabitants /km^2.

The livelihood zone produces coffee and melons at an industrial scale (for export) and, on smaller scale, the area supports the production of tobacco, mangos, limes, papaya and other seasonal vegetables. The region is considered to be one of Guatemala's key areas for agro-industry. For much of the year the agricultural industries support the poorer demographics that are engaged in daily manual labor related, especially, to the cultivation of melons and coffee.

Besides agriculture, two other important industries dominate the zone's economy: timber and mining. The timber industry supplies local and international markets. Substantial industrial mining takes place for marble, chalk, limestone and cement. Stone slabs are also extracted in traditional ways. People who are engaged in timber and mining activities are usually considered employees; they are not casual laborers. A good percentage of the local population is also employed in the supporting industries of the area (bottling plants, breweries, hotels and commercial companies). Daily manual labour is also available when agriculture is not in harvest or planting season. Otherwise, laborers typically migrate to Guatemala City for the other part of the year in search of income.

Markets

Market access

[36] Covering the lowlands of the Pacific coastal area and most of the central pre-mountain regions in El Salvador, Guatemala, Honduras, Nicaragua and parts of Coast Rica and Panama. http://www.fao.org/resilience/ressources/ressources-detail/fr/c/330164/ (last accessed 1 September 2016).

Guastatoya, Teculután, Zacapa y Gualán are the most important markets supplying the livelihood zone. Access to market is good in this area with a major trans-zone highway connecting Guatemala City and the Caribbean coast. This provides ideal conditions for intermediaries to transport local produce to the major cities (including Guatemala City) and for international companies to transport export produce in containers directly to the port from the production sites.

Main produce sold

Melon and watermelon – these are the main export products, produced by commercial farmers and sold mostly to the United States and Europe. 95% of the produce is exported. The produce is transported in containers by land and then by sea. It is sold directly to foreign companies. A small percentage is sold wholesale to local firms for sale to the domestic market. The peak trading seasons are April and December. The export pricing structure is well established, which eliminates price fluctuations, and domestic demand, being so low, does not affect the price.

Tomatoes and chilies – these products are not produced for export. They are sold directly to the local market or to intermediaries who sell domestically. The trading seasons are March and April as well as September to December. For local markets, trucks suffice as transportation and containers are used for longer distances (i.e. up to 200 km). The price varies according to the saturation of the domestic market, the higher the volume of supply the lower the price falls. Prices tend to increase in December and between May and June; these two periods coincide with high demand for the Christmas/New Year celebrations and low seasons for produce.

Coffee - Coffee is sold directly to intermediaries who operate in international markets. Smaller organic producers (Fair Trade producers) also exist - they export directly to Europe. The harvesting and trading season for coffee falls between November and February. Coffee prices are mainly affected by external (international) factors; they are dictated by the international demand on world futures markets. Additionally, there are different price brackets according to the quality and grading of the bean.

Maize and beans – local production is usually sold in local markets rarely beyond a radius of 20 km. The means of transport include small trucks, pick-ups and even donkey carts. The harvest season is from September to December, when, due to the increase in supplies, the price drops. There is a shortage in March to June and thus the price rises again.

Timber industry - The timber industry converts the raw tree into sawn wood. About 60% of the market is domestic. The remainder is exported to the United States. Timber companies have contracts with international intermediaries. Prices are dependent on demand but rarely fluctuate due to the stability and predictability of the product and the market.

Minerals - Cement, lime, marble and talc. This industry operates year-round and is also an important employer for locals. Most of the production is for domestic buyers who operate on fixed contracts. Cement is the biggest industry.

Sugar cane – sugar cane is produced by mid to large-scale producers. It is sold mainly to intermediaries, which transport the produce to different domestic markets. The main harvest season is October to May.

Casual labor markets

Local labor – the local labor offerings in the local agri-businesses are varied:

Melon farming - seasonal opportunities are concentrated in the department of Zacapa, more specifically the municipalities of Zacapa, Estanzela, Teculatán, Rio Hondo and Usumatlán. The season runs between November and May. Average payment is 1300 GQT per fortnight during the season. The two poorest wealth groups typically undertake this type of casual work.

Coffee harvest - this work can be found in Gualán and Usumatán (department of Zacapa) and in Morazán, San Agustín, San Cristóbal Acasaguastlán and San Antonio La Paz (department of El

Progreso). The season runs from November to February and laborers are paid, on average, 40 GQT per sack of coffee collected.

Mango harvest – mango harvest labor is available in Usumatlán, Río Hondo, Cabañas, Teculutlán and Huité (department of Zacapa) and in Sanarate, Guastatoya, El Jícaro, Morazán and San Agustín Acasaguastlán (department of El Progreso). The harvest season is short, it lasts from March to May and average payment is 60 GQT per day - paid directly to the laborers at the end of the day.

Lemon harvest – lemons are cultivated in Río Hondo, Teculutlán, Estanzuela, Gualán and Usumatlán (department of Zacapa) and in Sanarate, San Agustín, San Cristóbal Acasaguastlán and El Jícaro (department of El Progreso). The harvest season runs from July to December and average payment rates are 30 GQT per sac.

Mining industry – opportunities are available year-round in San Antonio, La Paz and Sanarate (department of El Progreso). On average, daily labor is paid at 60 GQT and available three to four days per week, while full-time wages reflect the national minimum wage (2747 GTQ).

Seasonal migratory labor – the good connection and proximity to the capital city attracts laborers once the main harvest seasons in the livelihood zone are over. Workers also migrate north to Petén.

Staple food supplies

Maize and beans – family production covers households' requirements for one to four months of the year depending on households' production capacities. Local supplies are supplemented with a surplus from Chiquimula (GT010) and Petén (GT03).

Credit and remittances

Of the four wealth groups, middle-income and better-off households are the only ones who can access credit in the formal banking system. The very poor and poor resort to loans with private lenders who impose high interest rates. Occasionally, they also resort to small informal loans, which they return in kind or in labor.

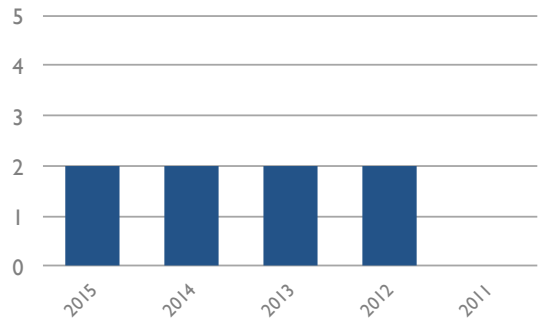
Remittances are not as important in this livelihood zone as in other livelihood zones (e.g. zone GT06), since work is available year-round and there are fewer reasons to migrate. However, between 10 to 20% of poor and middle-income households receive remittances from family members working outside the livelihood zone or abroad, for example in the United States.

Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

The two most common hazards affecting this livelihood zone are drought (the El Niño phenomenon) and coffee rust. Both hazards have affected the zone simultaneously for the past four years (2012 - 2015), reason why these years have been given a classification of 2 (below average). External assistance came from the World Food Programme (WFP) and the Government, primarily for food supplies but only to a small percentage of the population and, therefore, at a negligible scale.

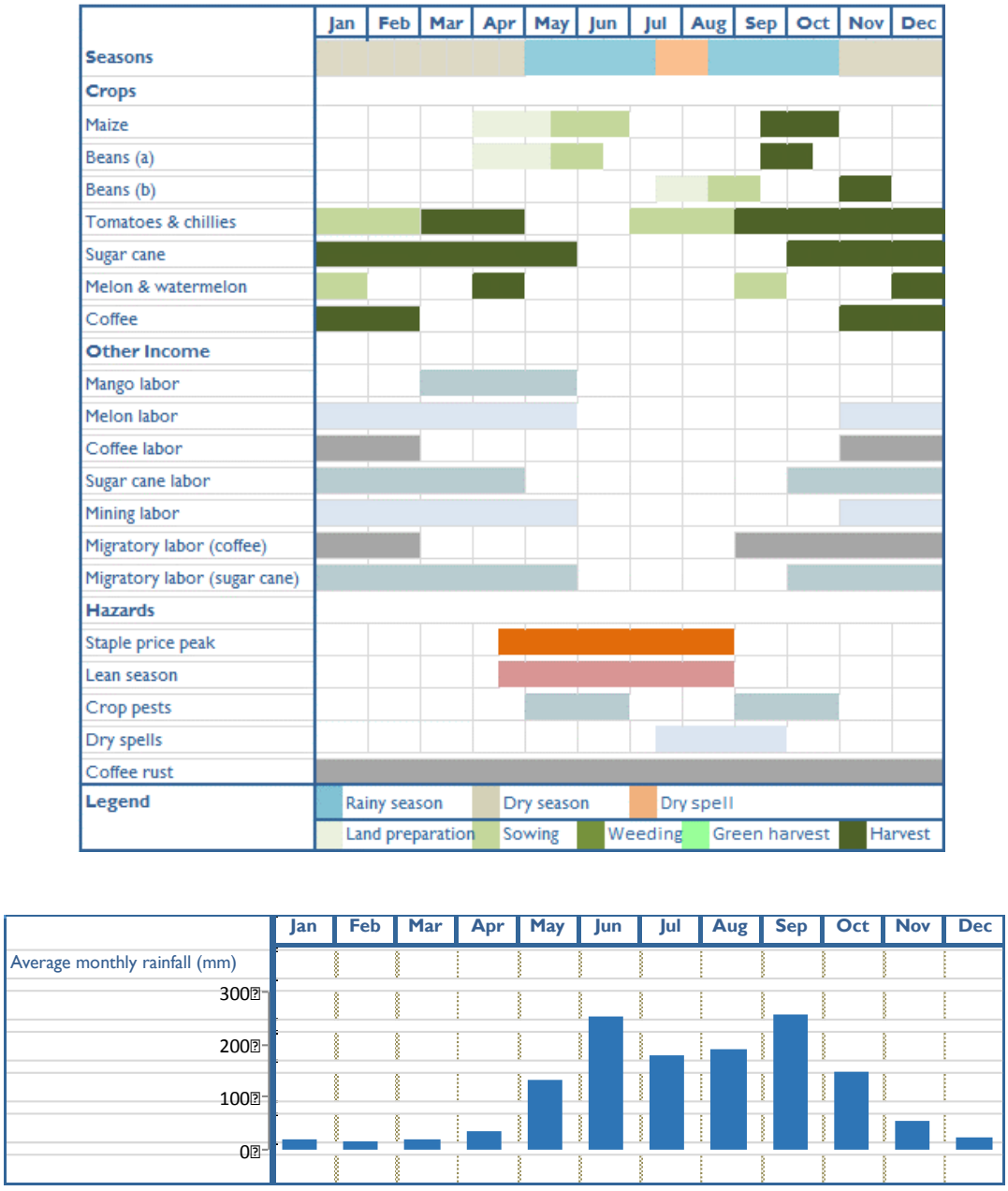
Figure 2: Perception of historical food access with 1 as worst and 5 as best



Source: FEWS NET (no data available for 2011)

Seasonal calendar

Figure 3: Seasonal calendar for GT08



Source: FEWS NET

The local calendar is split between two seasons, the dry season spanning November to April and the rainy season, from May to October. September is the month with the heaviest downpours, intensifying the risk of floods, while a dry spell is common between July and August.

Melons and watermelons, the key cash crops in the livelihood zone and also the most important labour market, are harvested twice during the year; the first harvest is April and the second in December. The production of tomatoes and chilies vary according to each year's weather patterns and the

availability of irrigation systems. The first and key harvest season is between September and December (following the rainy season) and the second harvest is in April. Sugar cane is harvested between October and May and coffee is harvested between November and February. The demand for labor for the coffee harvests prompts migration from people living in the low-lying regions to higher altitudes where coffee is produced. Coffee harvesting labor is an important source of income for many unskilled laborers.

In terms of food crops, maize is harvested from the end of September. Beans have two harvest times: the first season is harvested in mid September, and is mainly destined for seed production by smallholders; while the second harvest (known as *de relevo,* or *relay* harvest) is ready as from November; however, only a minority of households sow again for the second season.

Local activity thrives during the different harvest seasons, all of which fall between the near end of the rainy season and the end of the dry season. However, there is a lull between June and end September when migration outside the zone is more common. This period between mid-April to September is considered to be the 'lean season', when local labor opportunities are few and staple food prices start to rise steadily until the start of the maize harvests nation-wide.

The demand for labor in the mining sector increases during the dry season, which is more amenable to extraction activities. The main resource mined is flagstone (*piedra de laja*) used mainly in construction (in paving, roofing and fencing).

Wealth breakdown

Although there is a marked difference between the four wealth groups in terms of asset holdings and economic status, there is, at the same time, a high degree of interdependence whereby each group relies on the other in some way throughout the year.

The main differences between the groups are asset ownership and access to capital. At the high end of the scale, although the better-off group constitutes only 10% of the population, they own the vast majority of land and capital. Furthermore, it is noted that the size of the poor group is increasing constantly (currently 70% of the population are included in the two bottom wealth groups).

The difference between the poor and the very poor is the quality of their farmland. Typically, this is steep, poor quality soil and lacks suitable irrigation. Very poor households rent the land, while poor households own it. Very poor households survive on subsistence farming; they produce very little and consume it immediately after harvest. Poor households, who exploit somewhat larger areas, can enjoy own staple food crops until March or April. The very poor have very little surplus crops to sell for extra income and all of the income must be generated from selling manual labour - often on a daily basis. This group is the most susceptible to changes in the local demand for labour, international price changes or crop losses. The poor group's land is legalized (i.e. officially owned), of better quality and, furthermore, offers sufficient space for raising pigs and poultry.

Table 1: Determinants of wealth in GT08

Determinants of wealth	Very poor	Poor	Middle	Better-off
Household percentage (%)	45	35	15	10
Household size (#)	7-10	6-7	4-5	3-4
Land holding (ha)				
Land area owned	0	0.1 - 0.3	0.7-12	> 13
Land area cultivated	0.04 - 0.25 (rented)	0.1 - 0.3	0.7-12	> 13
Typical livestock holding (#)				
Cattle	0	0	0	0
Sheep/goats	0	0	0	0
Pigs	0	1-2	0	0
Poultry	1-5	5-15	15-30	0
Other productive assets (#)				
Agricultural tools	Basic tools	Basic tools & pesticide sprayer	Small-scale irrigation systems, silos	Tractor, plow, Machinery. (Ownership of mines).
Vehicles	0	Bicycle	Pick-up truck, vehicles and scooters	Truck/pick-up truck

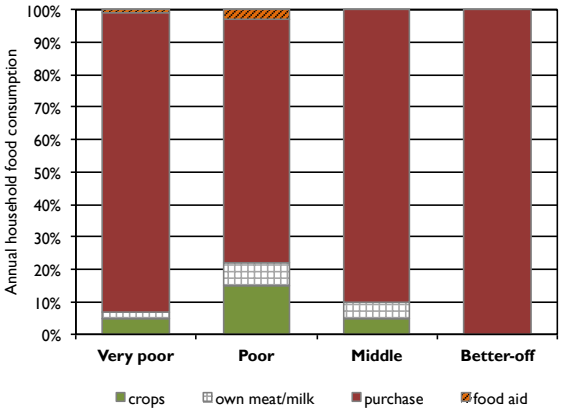
Source: FEWS NET

The difference between the poor and the middle-group is remarkable. The middle-group has substantially more land, access to credit and are already employers of labour in their businesses. Households own up to 12 ha of land, which they can use for planting valuable cash crops such as coffee, sugar cane and peppers. Through their networks and businesses they have access to the established infrastructure to sell their produce.

There is again a substantial jump between the middle-income group and the better off. The better-off group is generally owners of large swathes of land, which they lease to companies for melon growing or forestry, for example. Again, this group has access to credit and generates employment for the various sectors. This group consists of coffee farmers, ranch owners, melon growers, loggers and traders. Not all better-off households are engaged in agri-business, but it is the most well established sector in the zone.

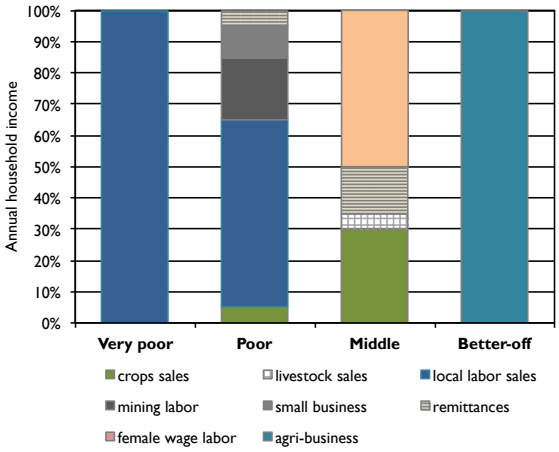
Sources of food and income (estimated weight)[37]

Figure 4: Food sources by wealth group in GT08



Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT08



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food consumed during the year. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

All households depend on the market to secure their access to food throughout the year. Tortillas and beans are the foundation of the diet. The middle group and better off supplement this with larger quantities of (purchased) fresh vegetables, as well as meat and dairy products, therefore achieving a more varied diet.

After the staple crop harvest (starting October), the very poor immediately consume their surplus. The poor who have better and larger plots of land can prolong their reserves until March or April. Middle-income and better-off households are rarely concerned with the growing of staple crops and choose to purchase the majority of their food. Poultry constitutes a small part of the food source - and a small source of income through the sale of poultry in times of need.

In the past five years, the WFP has offered assistance with food supplies during the droughts - but on a very small scale, representing less than 5% of households' annual food needs. The recipients of this aid are mainly very poor and poor households.

The annual income for the very poor wealth group is generated entirely from manual day labour. In rare cases or in times of need this group will sell their own produce but since they do not have sufficient land they cannot do this regularly nor rely on agriculture as a source of livelihoods. The poor group also relies heavily on daily labour. Since this group often has enough land to live off it for part of the year, only around 60% of their income needs to come from daily labour. This group can sell part of their harvest (beans and maize) to generate a little income (roughly 5%). Between November and May seasonal work in the nearby mines is available and this constitutes approximately 20% of their income. The women in the household also bring in money from either selling produce or working in domestic services in the nearby cities. Remittances form a small but important boost to the annual income of the poor.

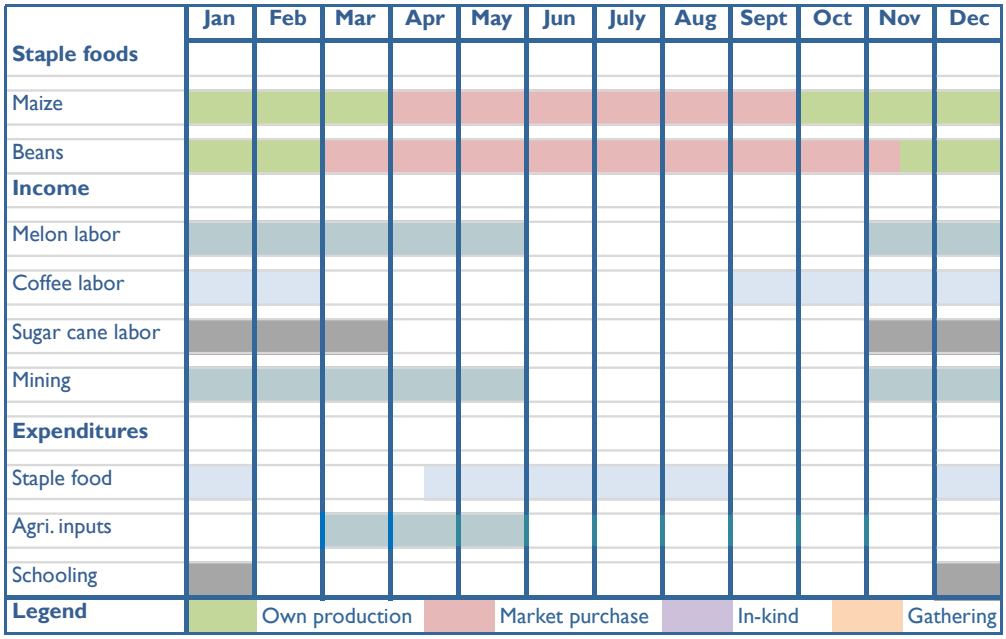
[37] The quantitative information provided in this section is derived from two field interviews, one in Zacapa (in the department of Zacapa) and one in Guastatoya (in the department of El Progreso).

The middle-income wealth group has the most well diversified income sources, not just by category but also by percentage. None of the five income sources for middle-income groups is higher than 30%. Selling agricultural produce is an important income generator. Since the members of this group typically have substantial land surplus to their own needs, their aim is to use the land to generate income. They also have storage facilities meaning that they don't need to sell the produce immediately during the harvest season when the price is lowest, unlike the poorer groups, but can store produce until the price reestablishes itself. The men of the household are often employed in salaried employment in the service sector, in export companies or in offices. This constitutes another 30% of income. Women also generate income via salaried employment in the service industries, such as secretaries or assistants. Remittances still, however, form an important boost to the income of this group – around 15% of total income. The remittances come mainly from the United States.

The better off group generate their income entirely from commercial undertakings. As a result, they do not require salaried employment nor remittances. Income generation is generally linked to, either the sale of agricultural produce, formal business income mostly in the manufacturing sector, the ownership of poultry/livestock farms or forestry activities.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT08



Source: FEWS NET

The poor have their own staple food stocks but these provide limited subsistence; at the most, from harvest until March. The primary daily seasonal work is working in local coffee, melon and sugar cane plantations. The secondary seasonal work is working in mining, also within the livelihood zone. Mining activities peak during the summer months (November to May). As from the second half of April to August are the months of greater spending on food because the harvest has not yet begun. January and September require payments for schools. The preparation of the agricultural campaign also incurs additional costs for the renewal of agricultural tools, land rental payments and/or purchasing seeds.

Hazards and household response

Weather / climate changes – the effects of El Niño and La Niña are visible in this livelihood zone. Both droughts and flooding can adversely affect production. May to July is the most vulnerable period to drought; however, drought has occurred regularly for over three years now. Droughts can wipe out part or the entirety of a crop - especially rain fed crops such as maize and beans.

Crop plagues & diseases – these often occur during drought seasons thus exacerbating the damage from climate fluctuations. For irrigated crops, crop diseases can happen year-round particularly for coffee and fruits. The most notable is coffee rust, which has affected large areas of coffee plantations in Guatemala and beyond. The effects of plagues and diseases on food and cash crops have a direct effect on labor demand and migratory behavior.

Human illness – these are most common between May and June with the advent of rains. The incapacity resulting from illness can have a severe knock-on effect on the household beyond decreased income. Children are often put to work and must miss school. The increased spending on medical treatment can also put serious pressure on the household budget.

Fluctuations in the price of cash crops – grains, vegetables and fruits have seasonal price variations with price reduction and price increases before and after the harvest respectively. Coffee prices, however, follow the world market for futures contracts. It is estimated that drops in price occur approximately every 4 years. This has a negative impact on the income of households.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT08

Very poor/poor	Middle/better off
Migration outside the zone	Purchase staple foods from outside the area (at lower prices)
Internal migration for daily wages	Livestock sales
Livestock sales	
Reduced expenditure on non-basic items/foods	
Appeal to migrants outside the country	

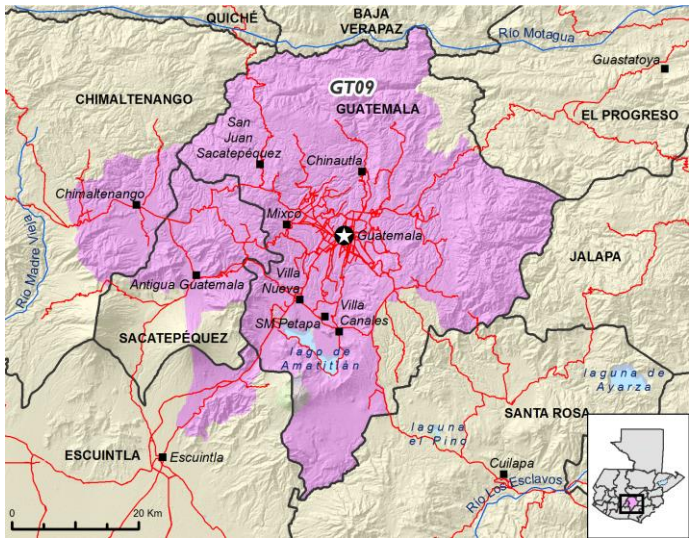
Source: FEWS NET

Industrial, Agri-business Labor, Commerce and Services of the Central Area (Zone GT09)

General livelihood zone description

The "Industrial, Agri-business Labor, Commerce and Services of the Central Area" livelihood zone is located in the center of the country. Although it contains the capital city, all the urban neighborhoods are excluded from the analysis.

Map 1: Livelihood zone location



Source: FEWS NET

The livelihood zone includes the departments of Guatemala, Chimaltenango and Sacatepéquez. However, the zone contains two somewhat different areas differentiated by their distance to the capital city: a peri-urban area, which includes the municipalities of Guatemala that are designated under zone GT09, and an area with slightly more rural characteristics, which includes the municipalities in Sacatepéquez and Chimaltenango. The main difference between these two areas is that the easier level of access to agricultural land outside of the department of Guatemala means most of the businesses implemented there are agri-businesses, while the types of businesses operating in the department of Guatemala include different types of sectors. Additionally, households can access enough land to cultivate small amounts of maize and beans for household consumption, although not all do so. This is not possible closer to the capital city. Nevertheless, the majority of households rely on working for others and crop production is only a small addition to their labor-based livelihoods.

The zone's geography is characterized by very uneven topography, made up of mountains, volcanoes, plateaus, hills and gullies. To the west lies the mountainous area of San Lucas Sacatepéquez and Mixco. The main valley with its canyons and plateaus is in the center and the east is dominated by the Santa Catarina Pinula Mountains. Throughout the urban and demographic evolution of the Valley of Guatemala City, the flat areas of the central highlands have been used for the establishment of residential areas, and industrial and commercial areas. In contrast, the areas of canyons and hillsides have become the location for the establishment of human settlements in precarious conditions and very susceptible to landslides.

While most of the commercial and residential areas are bare of vegetation, the zone does include forested areas (a mixture of *pinabete* (*Abensis guatemalensis*), oak and cypress). The zone also includes a protected natural site, the Cerro Alux, which provides drinking water to the metropolitan area of Guatemala. Three volcanoes (named Agua, Fuego and Acatenango) are located within the zone. Maize and beans are cultivated on their fertile hillsides. Despite the topography, overall, the zone's soil is very fertile and suitable for agriculture. Rainfall levels range between 800 and 1500 mm/year and temperatures vary between 14 and 27 degrees Celsius. However, population density is very high (reaching an average of 1,466 inhabitants/km^2), characteristic of urban areas. Most of the

population is Ladino[38] (a mix of *mestizo* or Hispanicized peoples), as well as kaqchikel and poqomam, although the latter are less numerous.

The basis of the local economy relies on the presence of the major industrial complex in the country. Companies implemented in this zone produce vegetables, cut flowers, textiles and a vast array of manufactured goods for domestic sale and exports. The industrial areas are concentrated in the municipalities of Santo Domingo Xenacoj, Santiago Sacatepéquez, Magdalena Milpas Altas, Santa Lucía Milpas Altas, Chimaltenango, Parramos and El Tejar. The industrial complex offers labor opportunities at different levels of skill to the local population living in the surrounding areas. Poorer households with low education levels are employed as casual laborers on an ad-hoc basis, middle-income households obtain more stable full-time positions, while better-off households are among the managers, administrators and owners of the factories and processing plants. The same is true within the agro-businesses, although the participation of very poor and poor households is higher due to the abundant offer of low-skilled seasonal work. The general pattern of livelihood is marked by the cultivation of basic grains (by households with access to land) and, especially, by industrial activity, such as flower growers, textile or agricultural *maquilas* (or *maquiladora,* the general term for processing factories). The main sources of employment are selling unskilled labor in factories and also agricultural work, such as cleaning and preparation of soil for cultivation and harvesting.

Trade and small-scale businesses are also a way of life in the area, from the informal petty trade practiced by poor households (mostly street sales and small street food stalls) to well established small-scale businesses, such as restaurants, grocery shops, beauty parlors, taxi companies, etc. providing services to workers coming into the zone and to the local population. Additionally, the area has a high demand for various services linked to urban living and industrial settings: transport and currier services, domestic services (for private clients and businesses), security services (again for companies and households) and international call centers.

Much of the zone's economy is dependent on the fluctuations of the international markets, the economic performance of the countries to which it exports to and the demand that they generate. Such dependence can result in a threat to the food security of the local population who depend on labor from exporting industries. Government policies that regulate international operators and export activities also play an important role in the creation (and destruction) of employment for this zone[39]. Climate-related hazards also have an impact in the zone, especially in those areas where agricultural production is more important to household consumption.

Markets

Market access

Market access within the zone is very good, the best in the country, due to a large network of roads in good condition and with good maintenance. The main food markets in the area are those of Antigua Guatemala and San Lucas Sacatepéquez (both retail markets). These are complemented by a large network of local markets. Also, the main markets for agricultural produce are the country's main wholesale market (the *Central de Mayoreo* or CENMA) and the La Terminal market in Guatemala City.

Main produce sold

In general, households sell their labor rather than a specific product. Household agricultural production is low and reserved for household consumption.

[38] Officially recognized as a distinct ethnic group in Guatemala, the Ladino population uses the Spanish language as their maternal language, has specific cultural traits of Hispanic origin mixed with indigenous cultural elements, but generally follow the western style (for example for dressing).

[39] For example, recent changes to labor laws and restrictions to some of the benefits that companies operating in free zones were receiving have led to the closure of a number of commercial operators in 2015 and 2016. http://www.centralamericadata.com/es/search?q1=content_es_le:%22Ley+de+Zonas+Francas%22&q2=mattersInCountry_es_le:%22Guatemala%22 (Last accessed 31 August 2016).

Around half of all manufacturing, textile and agricultural production in this zone are directly exported to Canada, the United States and Central America (especially to El Salvador and Honduras). The other half, which does not comply with international standards, is sold to local and national consumers. Additionally, produce from all around the country (especially vegetables, fruits, maize, beans and rice, meat, fish and milk) is centralized in the area for distribution and onward sale in markets in the capital, around the country and for export. There are also a number of food processing plants within the zone (e.g. flour and bread factories) that supply local and national markets.

Commercial production is not affected by seasonal variations. Production and trade continues year-round independent from changes to the local seasons and weather variations, but closely monitoring and adapting to changes in the levels of supply and demand on the world markets.

Casual labor markets

Local labor – the local labor offerings are relatively stable and varied. Demand in the agri-business is tied to the different agricultural tasks, while demand in other sectors is dependent on international orders and trade policies.

Migratory labor – migration outside the zone in search for labor is not very common as opportunities are plentiful locally, even if remuneration is low and labor conditions minimal. A very small percentage of the population migrates to coffee and sugar cane producing areas (zones GT11 and GT12), to the capital city in search for professional jobs (among the middle and better-off wealth groups) and outside the country, to Mexico and the US.

Staple food supplies

Maize and beans – trade of staple foods is at its most dynamic in this zone, a meeting place for suppliers from all around the country and national and foreign buyers on a daily basis. Household production in small, only poor households exploit land for the production of crops for family consumption.

Credit and remittances

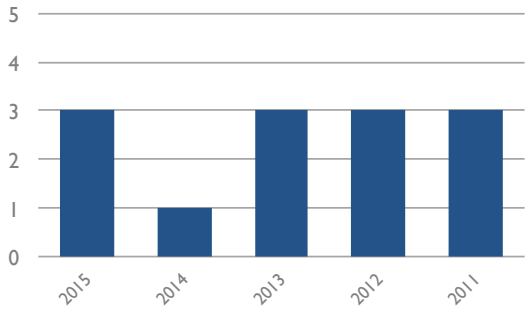
Two types of credit are used in the zone: formal credit from commercial banks and financial institutions, which is available to the middle and upper classes who have the necessary assets to be creditworthy; and informal credit, most common among very poor and poor households and especially female-headed households, because they are not subject to such stringent requirements in order to obtain them. Informal loans incur interest rates that reach 25 percent per month, yet interest must be paid on a daily basis. They are often offered by unofficial brokers and moneylenders.

Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

While the perception of food security and general livelihood security in the last five years has been average, neither very good nor very poor, the year 2014 strikes as a particularly bad year for households living in this zone. In 2014 the zone was affected by a double shock, a period of drought between June and August (affecting food crops), followed by flooding between August and September, which affected homes and transport routes, causing problems and delays for workers trying to access their places of work.

Figure 2: Perception of historical food access with 1 as worst and 5 as best

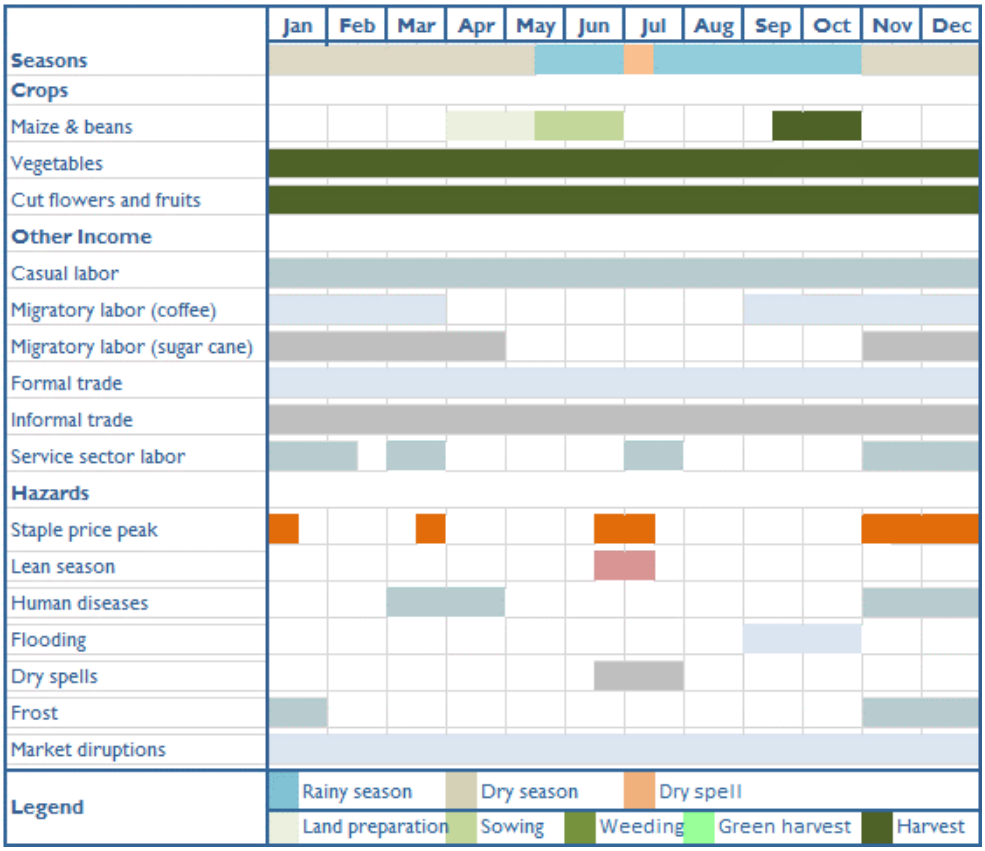


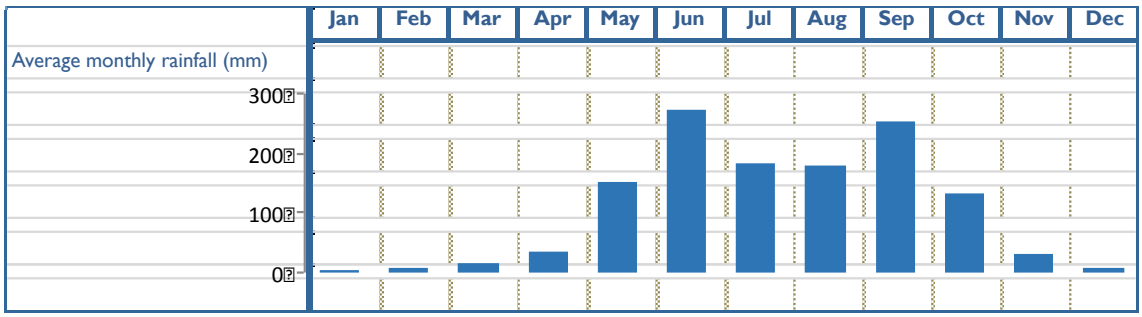
Source: FEWS NET

Other years have been affected by episodes of crop pests, for example part of the 2013 maize harvest was affected, tropical storms, flooding, coffee rust and frost, but the impact of these hazards has not been strong enough to send local livelihoods off track. In fact, local livelihoods are, in general, somewhat sheltered from climate related hazards because a) commercial farming is relatively well equipped technologically and can face periods of changes to the typical weather patterns, and b) labor opportunities exist in a variety of sectors, which can provide alternative sources of income, if the demand for agricultural labor falls. Other important chronic hazards affecting the zone include high rates of delinquency and the existence of gangs, which demand extortion payments from businessmen and tradesmen to operate in the area, as well, as poor living conditions due to the high density of the population (e.g. poor access to drinking water and waste water management).

Seasonal calendar

Figure 3: Seasonal calendar for GT09





Source: FEWS NET

Seasonality does not play a very big role in this livelihood zone, as rain-fed agriculture is not the main source of income for any wealth group. Like in the rest of the country, maize and beans are harvested at the beginning of the dry season, which ends slightly later in this zone, in November rather than October. Only poor households produce food crops. The cash crops produced in the zone, mainly vegetables, fruits and flowers[40], are harvested year-round and, as a result, offer labor opportunities throughout the year too. Casual labor and employment in other sectors (textiles, manufacturing,

[40]Common vegetables include: cabbage, lettuce, spinach, zucchini, carrots, etc. Common fruits include: different types of berries and avocado. Common types of flowers include: roses, gerberas and other ornamental plants.

services, call centers, security services, etc.) do not undergo great seasonal variations. Households living in this zone commonly exploit two types of migratory labor: the coffee harvest in zone GT11 and the sugar cane harvest in GT12. These are available between September and April.

The most common climate-related hazards are flooding (most common between September and October), extended dry spells/drought (most frequent in April and May) and frost, possible between November and January. However, it is market fluctuations that have the largest impact on livelihoods and include a large variety of factors: changes in domestic and international demand, price changes, changes in regulations, laws and subsidies, transport disruptions, etc. all of which have an impact on the demand for labor. Additionally, community level violence also poses a threat to households in many neighborhoods within the zone.

There are three different times during the year when food prices peak: the period leading up to the December and New Year holiday season, the Easter holidays in March/April and the nation wide June/July peak price period, determined by the pre-harvest period for maize. The lean season coincides with this last period, when food prices are high and households with access to their own agricultural production are still waiting for the start of the harvest.

Wealth breakdown

Typical of urban and peri-urban livelihoods, the main determinants of wealth in this livelihood zone are not related to traditional productive assets (land and livestock), but rather to level of education/skills and access to capital to invest in productive activities. Education levels and professional skills determine the type of employment the household can access and the conditions of such employment; from casual labor, very erratic in nature and with few social provisions, to full time employment, with better wage rates and benefits, and more permanent. Access to capital allows middle-income and better-off households to exploit the industrial opportunities of the zone. They have their own business (small or large) providing services to the local community but also to national and international clients (for example call centers) or producing goods for domestic sale and export. Access to land is only a differentiating factor in the more rural pockets of the zone, where it acts a defining characteristic between very poor and poor households. Very poor households only produce a marginal amount of maize and beans, while poor households' crop production can cover household needs for 3 to 4 months.

Table 1: Determinants of wealth in GT09

Determinants of wealth	Very poor	Poor	Middle	Better-off
Household percentage (%)	40	30	20	10
Household size (#)	8-10	6-8	4-6	3-4
Land holding (*ha)*				
Land area cultivated	0	0.7-1	0	0
Typical livestock holding (#)				
All types of livestock	0	0	0	0
Poultry	0	10	0	0
Other productive assets (#)				
		Basic agricultural tools	Business premises / IT tools and access to internet	Businesses/ factories
Vehicles	0	0	Motorbike	Various
Housing	Access by occupation	Rented (average 300 GQT/month)	Rented (average 1000-2000 GQT/month) or owned	Landowners
Main source of income	Casual labor	Casual labor and/or wage labor	Permanent wage labor	Business income and wage labor

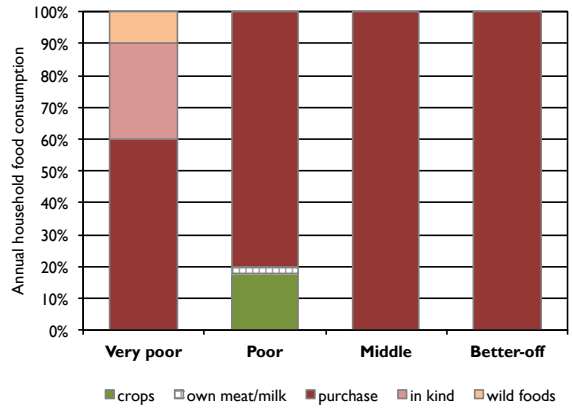
Source: FEWS NET

In general, very poor households generate their income from casual or part-time labor, while poor households aspire to full-time wages even if their labor conditions continue to be precarious. Wage rates are low, especially for seasonal work. Besides working in factories, very poor and poor households also find employment in the service industry. Labor opportunities are available in a variety of sectors: i) transporting, loading and unloading merchandise as it reaches and leaves the factories and the different local markets, and also transporting people (driving taxi, buses or motorcycle taxis), ii) domestic services, working in private homes and in offices, iii) as security guards, in high demand due to the raising feeling of insecurity and street violence in the zone; or iv) as construction labor. Usually, at least two adults are at work per household, usually both male and female adults.

Middle-income households hold positions of responsibility within the different companies, but also work as laborers in the manufacturing and service industries and in construction. Many have set up their own businesses providing services to the local communities: restaurants, beauty parlors, taxi services, etc. Better-off households are well differentiated in terms of their economic status; they are usually the managers, administrators or owners of the industries that generate labor and commercial activity in the zone.

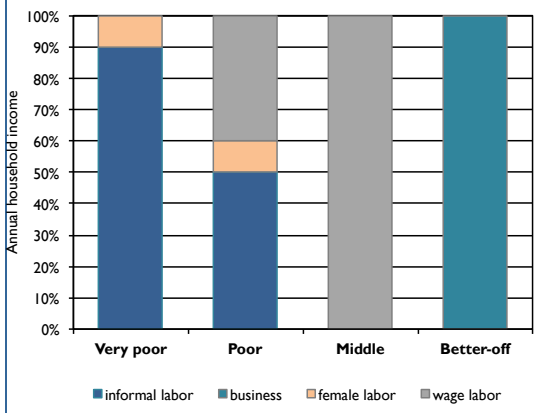
Sources of food and income (estimated weight)[41]

Figure 4: Food sources by wealth group in GT09



Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT09



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food consumed during the year. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

This livelihood zone is partially a peri-urban zone, but also has rural areas, where access to land for cultivation is available. In the rural areas land is mostly dedicated to agricultural production at subsistence levels. In the peri-urban areas, most households do not own land, many do not even own the land where their homes are located, which is often rented or taken by occupation. Better-off households, on the other hand, own land and business premises, but food crop production is not one of their activities. As a result, the market is the major, and sometimes only, source of food for many households. Staple food crop production does, however, play a role in the food security of poor households located in the rural areas, who invest in the subsistence production of maize, beans and vegetables with which to sustain their families for at least a small part of the year (3 to 4 months).

Very poor households do not have the economic capacity to rent land. Instead they often exchange their labor for food (for example in exchange for carrying out domestic or agricultural tasks) and sometimes rely on collecting wild foods (such as *hierba mora* wild leaves) to supplement the daily diet when the day's takings are too low to purchase the ingredients for a full meal. Very poor households have a hand-to-mouth existence, generating sufficient income to barely cover their daily expenses and rely on a variety of small informal loans and purchases on credit.

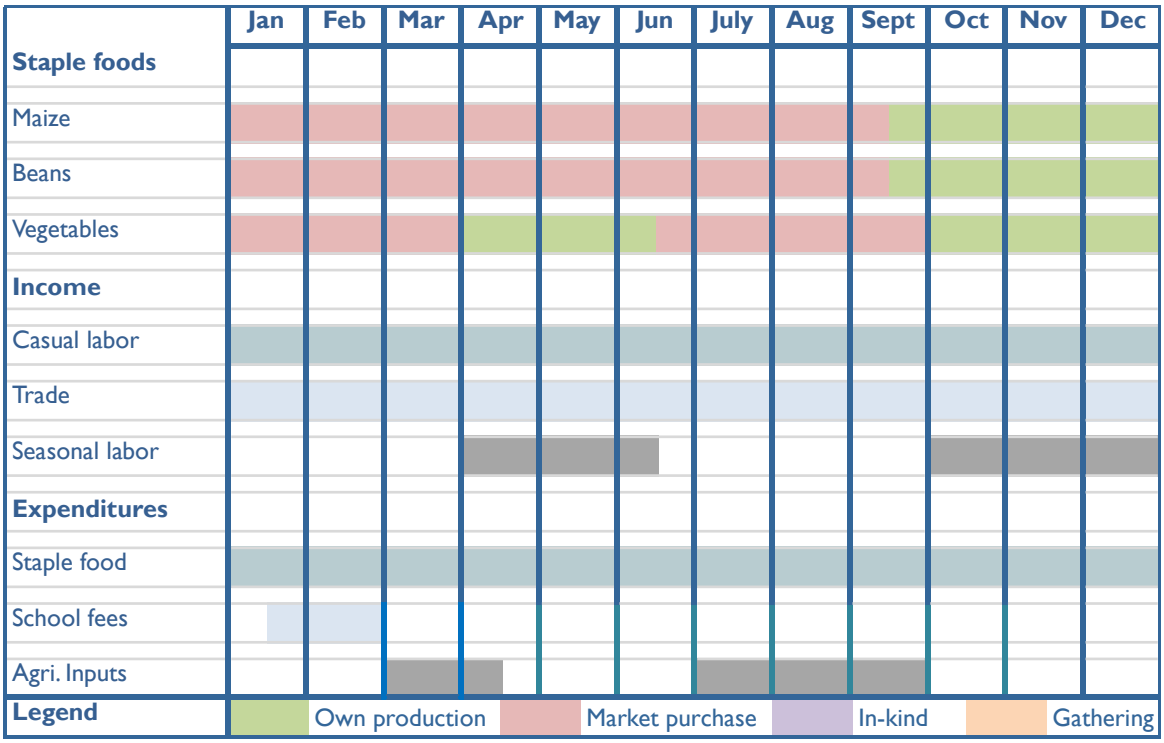
In terms of income sources, educational and financial assets dictate the professional and economic status of each wealth group. Very poor and poor households are mainly employed as manual labor for low-skilled positions, while middle-income households hold positions of more responsibility. While very poor and poor household's employment conditions are very precarious, middle-income households enjoy some degree of stability, and some have their own businesses. Better-off households are business owners or business managers, and typically generate their income from a

[41] The quantitative information provided in this section is derived from one field interview in Villa Nueva (in the department of Guatemala) and a subsequent field trip to confirm additional information.

single, principal source. Women from middle-income and better-off families may also have formal employment or small businesses.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT09



Source: FEWS NET

Poor households are self-sufficient in staple foods for three/four months of the year, from harvest time in September/October until the beginning of the new year. The remaining eight/nine months they purchase staple foods from the local markets. Annual income is generated from two major sources: labor and trade. Local labor in agri-businesses and manufacturing plants, petty trade and labor related to trade activities (e.g. transportation) are available year-round. Migratory labor is more common during the coffee and sugar cane harvest seasons, and less frequent during the rest of the year. Adult household female members also work year-round, most commonly in domestic services and selling prepared foods.

In terms of expenditure, staple foods (maize, rice and beans) are the largest household expenditure. However, the combination of transport costs to and from the place of work and utilities (electricity and water) comes a close second. The poorest households often tap into the electricity networks illegally, but this is less common among poor households. House rental payments are an additional monthly cost for poor households. Expenses related to education and Christmas celebrations are the most significant one-off costs during the year in this urban zone.

Hazards and household response

Price and demand fluctuations in domestic and international markets – these can happen for a number of reasons related to changes in climate and harvest levels on a global scale, to fluctuations in international demand (for example due to economic crises), to new competitors entering the

market, etc. The most immediate effect is the reduction (and sometimes increase) in demand for casual labor, in order to meet the new levels of demand for the agricultural or manufactured products produced in the zone.

Community level violence – the neighborhoods included in this livelihood zone are marginal neighborhoods where unemployment is high and violence has become a common hazard for the local population. Some of the violence is related to organized crime but the most common incidents include fights, assaults and robberies, and extortion.

Modification of laws and government subsidies/fiscal advantages – changes to fiscal laws or other advantages enjoyed by companies operating in the zone which may make their operations more costly can have an indirect impact on labor demand and/or labor conditions for workers.

Flooding, frost, drought, crop pests – climate related hazards affect household level crop production but also large agri-businesses, especially those producing more susceptible crops such as berries.

In order to cope with changes in labor demand, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT09

Very poor/poor	Middle/better-off
Search for alternative local casual labor	Reduction of labor costs/ delay wage payments
Search for community support	Build greenhouses and irrigation systems
Migration in search for work	

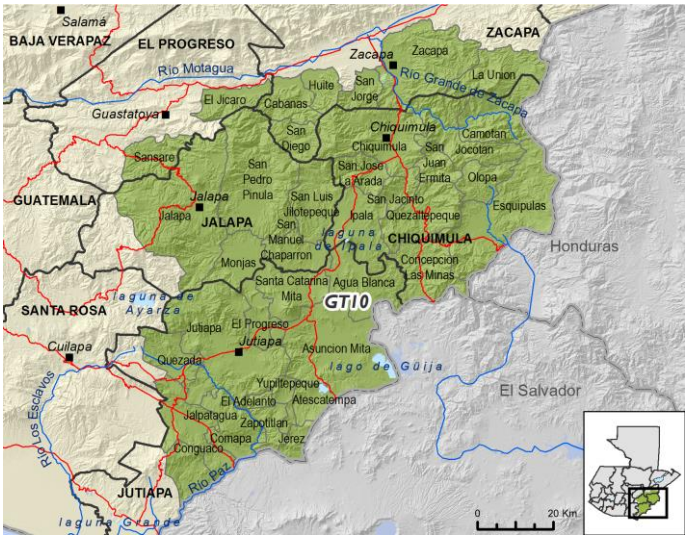
Source: FEWS NET

Eastern Subsistence Food Crops and Agricultural Labor (Coffee, Fruit and Vegetables) (Zone GT10)

General livelihood zone description

The "Eastern Subsistence Food Crops and Agricultural Labour" livelihood zone is situated in the east of Guatemala, bordering Honduras and El Salvador. The zone includes a large section of the departments of Jutiapa and Jalapa, the whole of the department of Chiquimula and a thin band along the south of the departments of El Progreso and Zacapa.

Map 1: Livelihood zone location



Source: FEWS NET

The topography of the area is hilly and rugged, with steep slopes and floodplains. The highest peaks include the Yupiltepeque and Lagunilla mountains and the Suchitán, Chingo, Ixtepeque and Ipala volcanoes. Much of the territory is covered in conifer and broadleaf forests and drier shrub forests are present at lower altitudes. There are large areas of *jaragua* grasslands, a type of perennial grass (*hyparrhenia rufa*) that grows in dense tufts and is used as livestock fodder.

The zone is located within the "dry corridor" of Central America, a vulnerable area to drought and flooding and, therefore, not ideal for agriculture. The zone's ecology is most suitable for the purposes of logging and grazing; however, the local population continues to grow the basic rain-fed food crops, mainly maize and beans, at subsistence levels of production. In fact, the region is one of the first producers of black beans. It is also one of the few zones where sorghum is grown. Sorghum is more resistant than maize to the dry conditions of the zone, but is usually sold as fodder. As a result, it is considered a reserve crop; stored and consumed only in times of need. The average annual rainfall levels vary between 800 and 1500 mm per year. Temperatures are warm, although highland areas are somewhat colder. On average, temperature ranges between a minimum of 16 degrees Celsius and a maximum of 38 degrees Celsius. The population density is 153 people per km^2, most of which is rural (71%).

The local economy relies on growing food crops for family consumption, as well as some production of coffee and vegetables. In general, it is middle-income and better-off households who have achieved a diversification of their agricultural production into coffee and seasonal vegetables and fruits (e.g. oranges, *jocote* and mango), sometimes even replacing food crop production all together as a most profitable income generating activity. Households who can afford to implement irrigation systems achieve the highest production. Poor households, who have limited access to land and only generate limited income from the sale of crops, provide local agricultural labor for wealthier households. Complementary sources of income for poorer households include firewood sales, casual work in domestic services and migration to sugarcane and coffee production areas (zones GT11 and GT12) during harvest seasons. Agri-businesses are not common in this area as they are in neighboring zone GT08, separated by the *Sierra del Merendón* mountain range. There is, however, a small pocket of mineral extraction, which is equally a characteristic of zone GT08. The mines are concentrated in a

number of municipalities within the department of Chiquimula (namely, San José La Arada, Olopa, Concepción Las Minas and Quetzaltepeque).

The proximity to Honduras and El Salvador provides the zone with a strategic advantage for cross-border trade (and smuggling), although the volumes of trade in this region cannot rival the trade volumes witnessed along the Guatemala-Mexico border.

Markets

Market access

The major market for the zone is the central market of Chiquimula, where much of the produce flowing in and out of the livelihood zone is concentrated, followed by the markets of Jutiapa and Asunción Mita. The markets of Ipala, Quetzaltepeque and Jocotán come third. These markets supply a network of smaller local markets throughout the zone with produce transported from the central wholesale market outside Guatemala City.

Market access is good thanks primarily to the good state of the roads and a well functioning network of transport service providers. A network of buses and pick-ups exists for travel inside the zone and to the main markets; however, many poor households cannot afford the cost of transport and travel by foot, covering distances of over 5 km a day to reach the larger towns. The most remote communities in the zone become somewhat isolated during the rainy season, when access by road is complicated, especially along the roads and tracks that link the communities to the main inter-municipal roads. Mountainous areas also have a poorer level of market integration.

Various access points into Honduras can be found along the border, such as Iguazú and Esquipulas, while access into El Salvador exists at San Cristobal, Chinama and Cuidad Pedro de Alvarado.

Main produce sold

Maize – maize is sold at farm gate to intermediaries who transport it to the main municipal markets, and from there to the central wholesale market in Guatemala City. Some farmers sell their produce themselves, directly at the municipal markets. November to December is the main trading season; it is also the season when prices reach the lowest annual levels, as supplies are plentiful.

Beans - beans are traded in a similar way to maize using the same marketing channels. The main trading months are August and November/December.

Sorghum – sorghum is produced for local sale within the municipality, either by the farmers themselves or by local intermediaries. The main trading season is December and January. In normal times, sorghum is sold for fodder, but in difficult times, households will resort to this crop for food.

Coffee – coffee follows the following marketing route: from farm gate to the main municipal market, to the main market in the department, to the collection center and onwards to the port for export. Larger coffee growers can sell directly to collection centers, bypassing a number of intermediaries and, therefore, achieving higher profit margins for their goods. The peak of the harvest falls between November and January.

Milk and dairy products – these are sold locally and also transported to main markets in each department. Local intermediaries also link local farmers to local communities. Dairy co-operatives sell directly to processing plants that distribute their products nationally. Large individual farmers also sell directly to collection centers or processing plants. Milk production is highest between June and December; however, prices are higher outside of this season. Milk prices have been falling recently, to the point that some producers have stop selling milk, as they cannot cover the costs of production.

Seasonal fruits - *jocote* (*spondias purpurea*, a plum-like fruit from the cashew family) and mangoes are traded in April and May. A second season of *jocote* (*jocote de corona*) is ready for harvest in August-October. Oranges are harvested in December. Most of the fruit is sold locally, directly by the farmers to local consumers or via small-scale intermediaries.

Casual labor markets

Local labor:

i) labor for staple crops – labor opportunities are available throughout the zone during the rainy season (rain-fed crops) and also between the months of May and June in those areas with access to irrigation: Chiquimula, Ipala, Agua Blanca, Asunción Mita, San Luis Jilotepeque, San Pedro Pínula, Monjas and Zacapa. Labor rates range between 30 to 60 GQT per day.

ii) coffee labor –labor is available in the month of April, May and August carrying out tasks related to soil improvement and fertilizing. Harvest labor is available between November and March. The main coffee plantations are located in the department of Chiquimula, Zacapa, Jutiapa, Jalapa and Santa Rosa[42]. Labor rates average 30 to 50 GQT per *quintal* harvested (100 kg). On average a worker can earn 75 to 100 GQT per day, depending on his abilities.

iii) labor for vegetable production – opportunities are available year-round in irrigated plantations in a number of municipalities in the departments of Zacapa, Chiquimula, Jutiapa and Jalapa[43]. The most common crops grown are melon/watermelon, tomatoes, bell peppers and tobacco. Average labor rates are higher than in food crop cultivation, but slightly lower than in coffee plantations, ranging between 60 and 75 GQT per day.

Migratory labor – the most common destinations in search for labor opportunities outside the zone are the neighboring coffee production areas in Honduras.

Staple food supplies

Maize and beans – local households' supplies last between 3 to 9 months, depending on their socioeconomic status and their production and storage capacity. They are supplemented with supplies from Petén (zone GT02) and Mexico. This zone is a surplus area for beans, an important national center of production.

Credit and remittances

It is mainly middle-income households and some poor households who receive remittances. The frequency varies, but households commonly receive a monthly sum throughout the year. Most migrants are living in the US. Poor households, however, receive remittances from household members who have migrated to the capital or to the capital cities of the department on a permanent basis.

Nowadays, it has become common to rely on credit among poor and middle-income households, especially between April and September. Poor households use credit to cover the costs of purchasing food and agricultural inputs, and to buy small animals (poultry or pigs), which will provide a future source of food and income. Poor households ask for loans within the community or from moneylenders/business owners operating in the municipality. They pay back their loans in cash, in-kind or by working for the lender. Middle-income households resort to credit to invest in the upgrade of their agricultural tools, systems and techniques. These households sign up for loans with

[42] More specifically, in the municipalities of: La Unión (Zacapa), Atescatempa and Moyuta (Jutiapa), Mataquescuintla and San Carlos Alzatate (Jalapa) and San Rafael Las Flores, Casillas, Nueva Santa Rosa, Cuilapa, Barberena and Santa Rosa de Lima (Santa Rosa) and Esquipulas, Olopa, Quetzaltepeque and Concepción Las Minas municipalities (Chiquimula). The relevant department is included between parentheses.

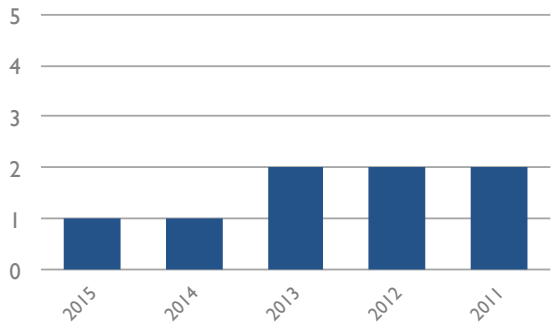
[43] In the department of Zacapa (municipalities of Zacapa, Teculután, Usumatlán, Río Hondo, Huité, Cabañas and San Jorge) in melon, watermelon, tomato, bell pepper and tobacco plantations. In the department of Chiquimula (municipalities of Chiquimula, Ipala and Camotán municipalities) in tomato, bell pepper and onion plantations. In the department of Jutiapa (municipalities of Agua Blanca, Asunción Mita, El Progreso, Jutiapa and Santa Catarina Mita) tomato, bell pepper, onion and watermelon plantations. In the department of Jalapa (municipality of Monjas) in tomato, bell pepper, onion and sweet corn plantations

commercial banks and co-operatives. The interest on commercial loans varies between 16% and 25%, annually.

Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

Figure 2: Perception of historical food access with 1 as worst and 5 as best



Source: FEWS NET

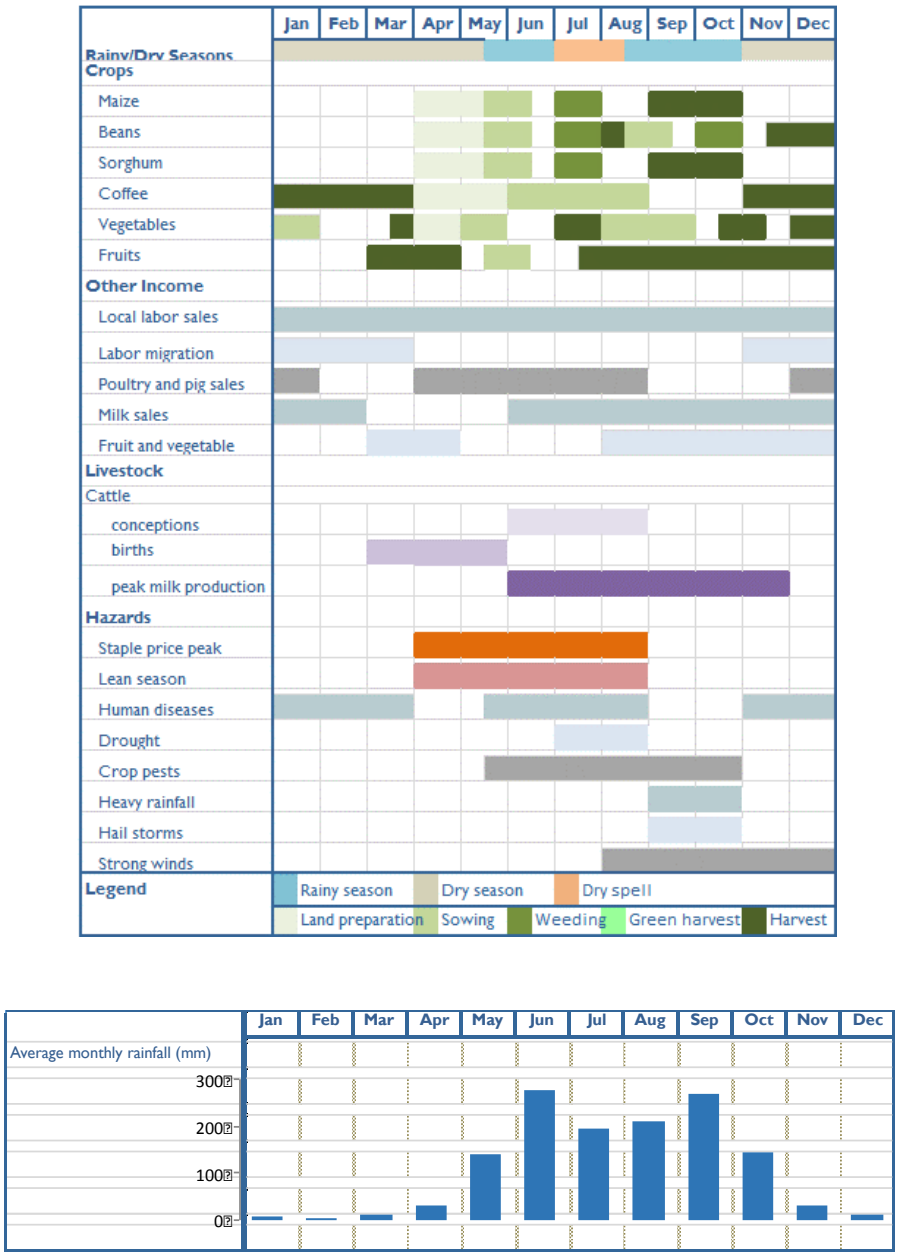
The communities' perception of food security and general livelihood security in the last five years has been poor (below average), and very poor (critical) for the last two years, 2014 and 2015. This is consistent with the situation across most of the "dry corridor" in Central America.

The hazards responsible for the poor seasons are related to the El Niño and La Niña weather conditions. 2011 received over 50% more rainfall than average along the Guatemalan section of the "dry corridor", leading to important flooding and crop losses. Conversely, the three years between 2012 and 2015 were affected by drought (longer than average intervals of lack of rain between the months of July and August). Additionally, many coffee plantations were affected by coffee rust, damaging the production further. In the year 2014 losses of 70% to 90% of maize and bean harvests were reported. However, it is the cumulative effects of successive droughts that have led to the critical situation suffered by households in the last two years. In 2015, the reported crop losses for maize reached percentages of 95% to 100%.

Although 2013 did not receive much external assistance, government agencies and international NGOs (for example ACF International and Save the Children) did offer external support during the height of the lean season (between March/April to September/October) in 2012, 2014 and 2015. Government programs (*Plan Oportunidad*) included direct food distributions, food for work and food for cash, seed distributions, but it was only active in 2015.

Seasonal calendar

Figure 3: Seasonal calendar for GT10



Source: FEWS NET

Seasonality determines local livelihoods. The rainy season normally falls between May and October, with a period of dry spell (*canícula*) between early July and the third week in August. The heaviest rain falls in September and October. The dry season coincides with the cold months of December-February and continues until April. March to May are the months when water scarcity is felt most strongly.

Maize and beans are typically inter-cropped, although maize is always the dominant crop. The rain fed agricultural season's activities begin with preparation of land (April to May). The common sequence of agricultural tasks is: slash and burn, fumigation and weed control, and mechanical or ox-drawn plowing, followed by staggered sowing as from mid-May to mid-June. It is common to allow sections

of land to lie fallow. Maize is grown over a single season, although some households sow a second season (*postrera*) in order to grow grains for seed and livestock feed. Sorghum follows the same seasonality as maize. The main harvest is between September and October and the second falls between November and December. Beans have two crops per year. The first bean harvest produces 30% of the annual production and the second season the remaining 70%. The majority of very poor and poor farmers do not have post-harvest storage facilities (e.g. silos for conservation), which recurrently causes food crop losses.

The periods of increased economic activity are August to January, during the bean sowing seasons and maize harvest as well as the coffee harvest (especially November and December). The period between April and July offers fewer labor opportunities. The most vulnerable months are March to May, when the shortage of water and pastures are most evident and the vulnerability to fires increase. Also the prolonging of the dry *canícula* period is common in July and August, badly affecting crops. The opposite, excessive rainfall leading to flooding and landslides, can occur straight after, between September and October. November and December are sometimes affected by strong winds, which can cause damage to both crops that have not yet been harvested and homes.

The lean season falls between April and August when the prices of staple foods rise, causing a reduction in the purchasing power of poor and very poor households. Additionally, the fall in the price of coffee and vegetables, between November and March, also leads to a fall in wages.

Wealth breakdown

Typical of purely agricultural zones, access to land, agricultural tools and inputs and capital to invest in agricultural expansion are the main local determinants of wealth. Very poor households are defined as those households who are landless and do not have sufficient financial capital to rent land nor sufficient social capital to negotiate sharecropping agreements. They have few animals, very basic agricultural tools and a low level of education; in fact, many of the women are illiterate. Poor households manage to secure access to agricultural land, usually by renting it. Middle-households have the capital to invest in the improvement and diversification of their agricultural production, while better-off households have succeeded in making good profits from agriculture or have diversified into other sectors besides agriculture.

Table 1: Determinants of wealth in GT10

Determinants of wealth	Very poor	Poor	Middle	Better-off
Household percentage (%)	25	50	20	5
Household size (#)	6-10	6-8	4-6	4-5
Land holding (*ha)*				
Land area cultivated	0	0.3 - 0.5 ha (rented)	0.7 - 3.5 ha	>3.5 ha
Typical livestock holding (#)				
Cattle	0	0	5-10	0
Pigs	0	0	3-4	0
Poultry	0	6-8	10-15	0
Other productive assets (#)				
Agricultural tools and equipment	Basic agricultural tools (machete and *cuma knife*, *hoe, chuzo* spike,)	Basic tools, fumigation pump, silo	Basic tools, fumigation pump, silo, irrigation system	Basic tools, fumigation pump, silo, irrigation system
Vehicles	0	0	Motorbike and pick-up truck	Various

Source: FEWS NET

The interaction - and interdependence - between the two lower and upper wealth groups is most visible in relation to the key local activity, agricultural production. Wealthier local household rent their land to poor households and hire them as casual labor at key periods of the agricultural calendar. Equally, they purchase food crops once the main harvests have begun, which they stock in order to sell when prices increase later in the year.

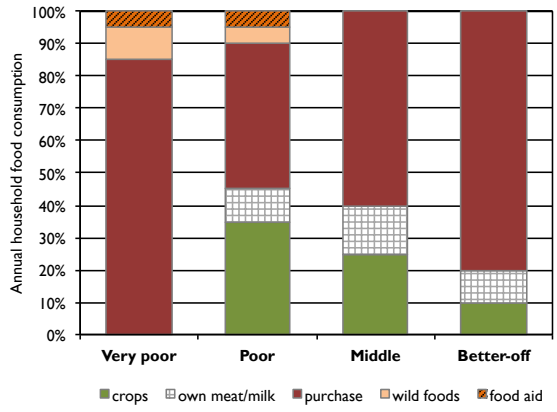
Very poor households, with no land and unable to rent it, rely on agricultural labor, the sale of natural resources found locally (wood, firewood or some wild fruits), the sale of handicrafts and temporary migration in search of labor in coffee and sugarcane plantations outside the zone and in mining sites. Poor households have sufficient surplus income to rent land, as a result they have an additional source of income to very poor households: the sale of crops.

Middle-income households derive their income from agriculture alone (growing maize, beans, coffee, fruits and vegetables). They exploit their own land and some have installed irrigation systems to improve maize and vegetable production. They own silos for the conservation of grain. Often, household or family members have migrated to the US and the remittances they sent provide the necessary investment of capital to slowly continue expanding their farms.

Better-off households are involved in a number of sectors, depending on individual opportunities and the family's inheritance. They are involved in cash crop farming, commerce, service provision and cattle ranching. Household members are full-time employees in the local towns.

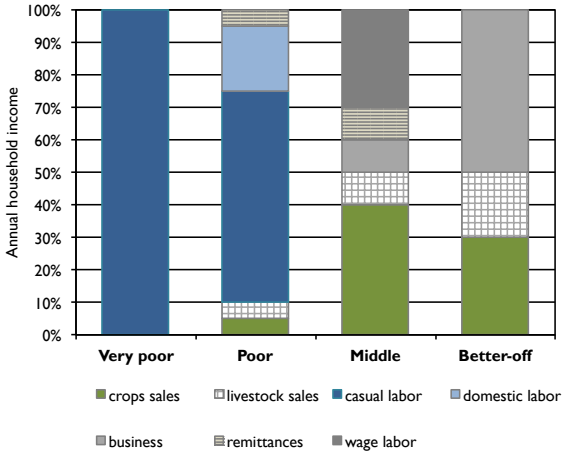
Sources of food and income (estimated weight)[44]

Figure 4: Food sources by wealth group in GT10



Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT10



Source: FEWS NET

Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food consumed during the year. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

Access to food is determined by access to market products; the market supplies between 45% and 85% of the total food consumed by a household during the year. Own crops and milk or meat from own livestock (poultry, pigs and cattle) provide a considerable amount of food for poor and middle-income families, but less so for better-off households. The contribution of meat from their own animals to very poor households is negligible yet not completely absent, as are own crops. Very poor and poor households top up their food purchases by collecting wild foods (especially wild leaves and

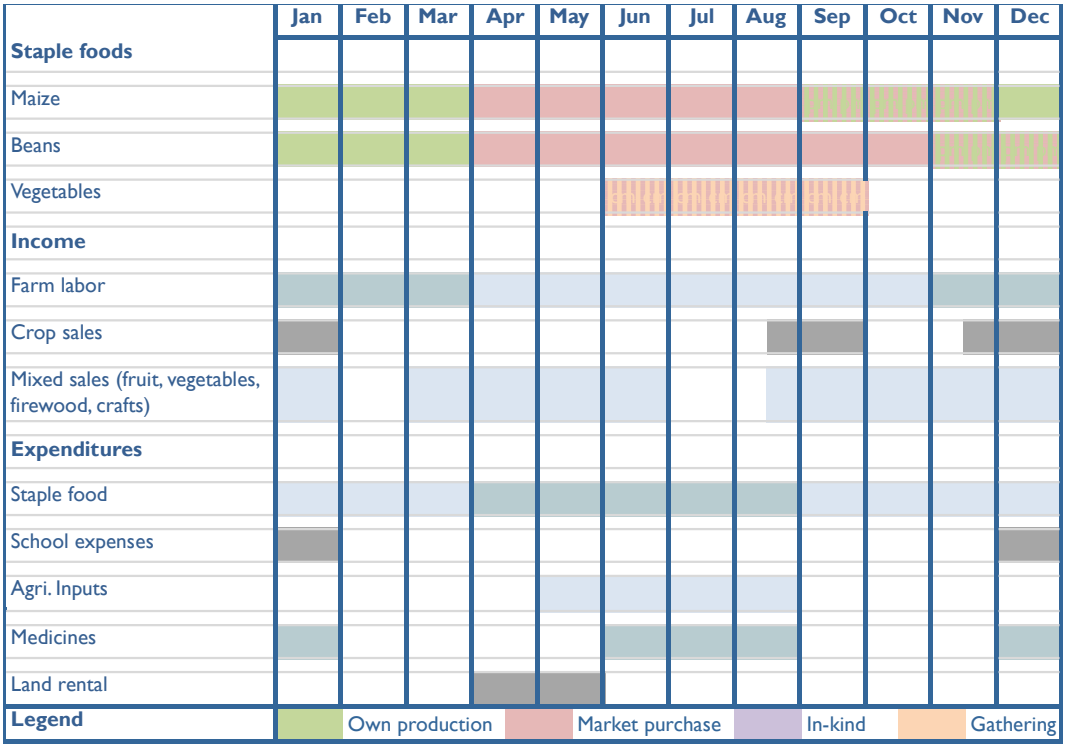
[44] The quantitative information provided in this section is derived from four field interviews, one in each of the capital cities of the departments of Jalapa, Chiquimula, Jutiapa and Zacapa.

herbs) and food aid, which has been distributed by the Government of Guatemala and different NGOs in this livelihoods zone for the past five years.

With regards to income sources, very poor households are entirely dependent on offering their labor, mostly within the local area on a seasonal and ad-hoc basis, while poor households have a more diversified portfolio of income sources. As well as generating income from casual labor, they derive a little income from crop sales during the harvest season, the women provide income from petty trade or causal labor; they receive remittances from household members living outside the zone or even outside the country and they can sell some animals when extra cash is required. Middle-income households also enjoy diversified income sources, but place their emphasis on exploiting the production of cash crops, as much as possible. Wage labor (skilled employment, often permanent not seasonal) and remittances provide a steady monthly income and a source of capital for primary activities. Better-off households are engaged in a number of activities: agriculture, livestock rearing and businesses. While some better-off households specialize in one of these areas, others diversify their portfolio among the three types of activities.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT10



Source: FEWS NET

Poor households are self-sufficient in beans and maize for three months of the year, from harvest time in October (including the consumption of green maize) until well into the new year. The remaining months they purchase staple foods from the local markets. Additionally, they have their own harvest of vegetables during the rainy season. Annual income is generated from three major sources: local agricultural labor in rain-fed crop cultivation, and coffee and fruit plantations, crop sales of maize, beans, fruits and vegetables, and the sale of firewood, crafts, prepared foods and other small items. Adult household female members contribute to the household income working in domestic services,

as well as leading the petty trade activities. Remittances provide some additional financial support at different intervals during the year.

In terms of expenditure, the main categories are staple foods, land rental and agricultural inputs, school expenses and medicines. The purchase of staple foods peaks during the lean season, the months prior to the maize harvest, a time period when the price of food increases. Land rental is paid at the beginning of the agricultural season, when seeds and other agricultural inputs also need to be purchased. School expenses peak at the start of the school year when parents must buy the new school supplies for their children. Medical fees and medicines tend to increase during the rainy season.

Hazards and household response

Drought – this livelihood zone is located in the "dry corridor" of Central America and, as a result, delayed rainfall patterns and drought are the most recurrent and damaging hazard in the area. The disruption to the established patterns of rain can have different degrees of intensity and impact, depending on time of the year. The late start of the rainy season beyond mid-May, for example, can mean the first sowing of maize and beans is lost and re-sowing is necessary (with the added cost this entails). The uneven distribution of rain between May and October compounded by the lengthening of the dry spell in July and August can have an effect on the development of the plants and affect yields. The main effects of these hazards are crop losses, reduction in demand for labor, increase in the price of food, depletion of water reserves for animals and humans, and increased malnutrition.

Excessive rain – above average rainfall can be caused by tropical events (depressions, hurricanes or storms). These hazards are most common during the months of October and November, at the end of the rainy season. The main effects of these hazards are flooding of saturated soil, overflowing of rivers and landslides, and the resulting crop losses, increase in the price of staple foods, the fall in the demand for labor and increased malnutrition. The abundance of water can contaminate drinking supplies leading to diarrhea and other illness.

Crop pests – crop pests most common between May and November, and mostly affect rain-fed cereals.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT10

Very poor/poor	Middle/better-off
Reduce surplus expenses	Reduction of labor costs/ delay wage payments
Increase poultry sales	Increase livestock sales
Seasonal migration (coffee and sugarcane plantations)	Resort to loans
Search for community support	
Consumption of wild foods	
Gathering and selling firewood and recycled materials	
Purchase on credit (agricultural inputs and food)	

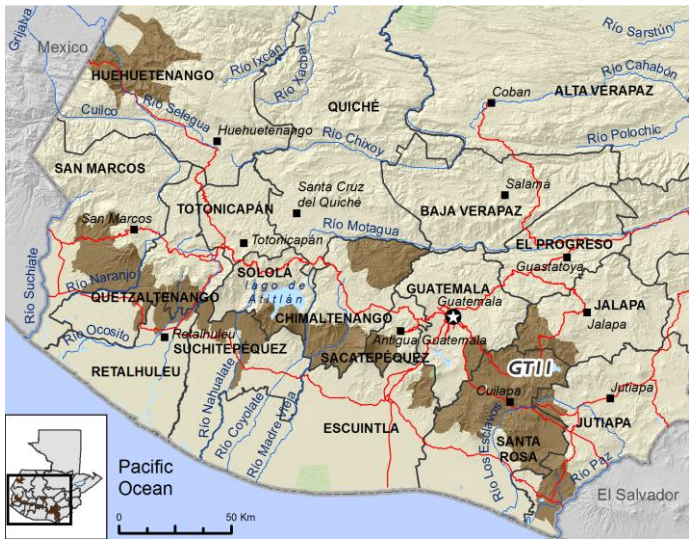
Source: FEWS NET

Coffee Production (Zone GT11)

General livelihood zone description

The "Coffee production" livelihood zone is located in two distinct geographic areas. The first is located in the south of Guatemala and covers a thin strip of volcanic and mountainous terrain (1300 to 2000 masl) stretching from the Mexican border to the border with El Salvador. This area has rich, fertile soils and includes the key coffee-growing areas located by lake Atitlán, as well as small transversal sections of the departments of San Marcos, Quetzaltenango, Retalheu, Suchitepéquez, Escuintla, Chimaltenango, Sacatepéquez, Santa Rosa and Jutiapa, from west to east. The second area is located in the highlands of Huehuetenango, which have peaks of up to 2000 masl. Here the atmosphere is dry and arid meaning that the soil is protected from frost.

Map 1: Livelihood zone location



Source: FEWS NET

The topography ranges from flat and undulating ground, gently sloping to steep volcanoes. In fact, most of the volcanoes in the country are included within this livelihood zone. Soils are mainly volcanic (expect in Huehuetenango where limestone dominates), which together with the large amount of natural irrigation, makes them very fertile and ideal for growing both perennial and annual crops. The Tehuantepec plain delimits the area located in Huehuetenango. Here rivers are fewer than in the piedmont (*bocacosta*). The vegetation consists of coniferous forests, broadleaf forests and mixed forest. Coffee plantations are intercropped with fruit trees. Water reserves allow for power generation and fishing takes place along the lakeshore of lake Atitlán. The zone has a strong potential for the sale of natural products thanks to its high biodiversity of fauna and flora. Average rainfall levels range between 1000 and 4000 mm/per year depending on the altitude, and average temperatures range between 12 and 20 degrees Celsius.

The zone's economy was previously entirely based on coffee production, but has since diversified into other crops to make the region less prone to shocks on the international coffee market and outbursts of coffee rust. Increasingly, medium and large coffee farms are also being used as tourist attractions, as well as coffee production.

Most of the population is involved in agricultural activities, particularly related to coffee. Since coffee can be harvested at different times according to the altitude, this zone sees a lot of internal migration. There is also a high degree of immigration into zone GT11 from other zones within Guatemala. Additionally, households produce rain fed staple crops and since the need for diversification has become more acute they have started to grow citrus fruits, avocados, bananas and other rain fed crops.

There are various threats that affect the zone ranging from international market prices to local weather disruptions. All threats have a direct and heavy impact on the poorest groups who make up close to 80% of the zone's population. The infrastructure is lacking maintenance and the local population often lacks the educational foundation to improve their circumstances, since they are permanently engaged in unskilled manual labour. Although the zone has a lot of economic potential (including hydro-electric power, tourism, biodiversity) the population remains vulnerable to food insecurity. The population density in this zone is of 265 inhabitants /km^2.

Markets

Market access

This zone has, on the whole, good market access with asphalt and dirt track roads, as well as the required modes of transportation to supply the various destinations and support the coffee sector. In some areas (particularly where the terrain becomes rugged) the market access has worsened due to lack of maintenance. Pack animals are being used to carry produce from the farms to the main roads. The main markets within the area are those of Mazatenango, Escuintla and Coatepeque, in the area of *bocacosta*, and those of Todos Santos and La Democracia, in Huehuetenango.

Main produce sold

The zone was previously completely reliant on coffee production. Since the international coffee market crises, when the price dropped the zone has needed to diversify its produce. The zone now produces grains, vegetables, citrus and rubber alongside coffee, which continues to dominate the zone's produce.

Coffee – there are three different routes for the sale of coffee:

i) Suitable for small-scale and medium-sized producers (the most numerous), the route starts at the producer, coffee beans are sold to a local transporter who sells them to an intermediary at the main collection centers (Coatepeque, Antigua Guatemala, Amatitlán) where it is processed and classified (*beneficio* process) and dried under the sun or in mechanical driers (now transformed into parchment coffee - *café pergamino*). From here they are sold to the export agent and the broker and ultimately to the final client.

ii) Large producers sell their produce unshelled (*café oro*) directly to brokers and on to the final client

iii) Cooperatives and coffee-growers' associations sell clean green coffee (*café pergamino*) by the weight or unshelled beans already packed for direct sale to the brokers.
Coffee beans are transported by pick-up truck and larger trucks from the plantations to the collection centers and to the seaports (Quetzal Port for export towards Asia and the US Pacific coast; and Puerto Barrios for export to Europe and the US Eastern coast). Prices are fixed in advance, according to the global futures contracts market.

Casual labor markets

Local labor – the local labor offerings are relatively stable and varied. Demand in the agri-business is tied to the different agricultural tasks, while demand in other sectors is dependent on international orders. The largest markets for employment (both temporary and permanent) are coffee, rubber and fruit plantations inside the zone. Unskilled laborers migrate across the zone in search of daily labor; usually the displacement involves entire families. Since coffee is grown at different heights, there are various harvest periods throughout the year. Laborers can migrate to different areas according to harvest times and seek work. After the Guatemalan harvests, some households migrate to Mexico for the coffee harvest there, which starts later than the Guatemalan harvest.

Labor opportunities outside agriculture, in construction and security services, are available in the capital city throughout the year. It is mostly the middle-income groups that profit from these opportunities. A small percentage of the population migrates to outside the country, to Mexico (to work in papaya-producing farms), Canada (with temporary working visas) and the US.

Staple food supplies

Maize and beans – Maize is grown along with beans mainly by poor households, who reserve them exclusively for consumption. Poor and middle-income groups produce both to cover their food needs and for sale. Very poor households only produce sufficient maize to cover family consumption. Maize supplies come from Mexico (informal markets) and from Petén via the Northern Transversal Strip

(*Franja Transversal del Norte)* towards Huehuetenango. Beans sold in San Marcos and Huehuetenango mostly come from Mexico, however, in areas located closer to the center of the country bean supplies come from Oriente, via the central wholesale market in Guatemala City and a number of local markets.

Credit and remittances

The extremely poor have no access to credit; in some cases, the poor have access to the informal loans from coffee intermediaries (*coyotes*) who offer them an advance for their harvest with a maximum of 50 GTQ/quintal (100 kg) and with high interest rates. Cooperatives have access to credit and trust banks. The middle-income and better-off socioeconomic groups have access to formal credit with banks. Formal credits are exclusive for those who have assets for collateral.

The poor and middle groups receive remittances year-round, and especially for the holidays at the end of the year, the Independence Day celebrations (September 15) and the beginning of the year, when school related expenses increase. Increasingly, youth and even children as young and 7 to 9 years old are migrating.

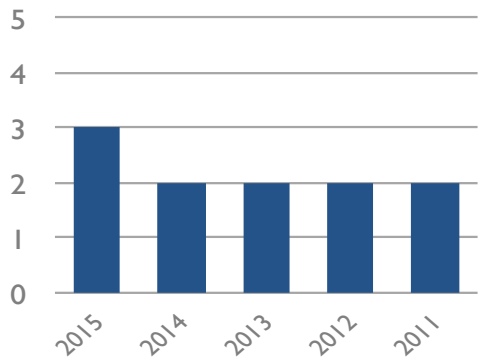
Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

The communities' perception of food security and general livelihood security over the last five years as been below average to average

2013 was a relatively insecure year for this zone as a result of a peak in the coffee rust infestation. Since coffee rust is a fungus, it typically develops during the rainy seasons. Problems affecting coffee production have a direct knock-on effect on the food security of poor and very poor households, since they derive the largest percentage of their income from unskilled work in coffee plantations. They must also buy their food from income. They are, therefore, highly vulnerable to market and environmental hazards affecting coffee. The other constant threat is the fluctuations in the international selling price, which have an effect on the final wage paid to laborers. The payment of the minimum wage is usually not respected, leading to low income levels, often below the cost of the basic food basket.

Figure 2: Perception of historical food access with 1 as worst and 5 as best



Source: FEWS NET

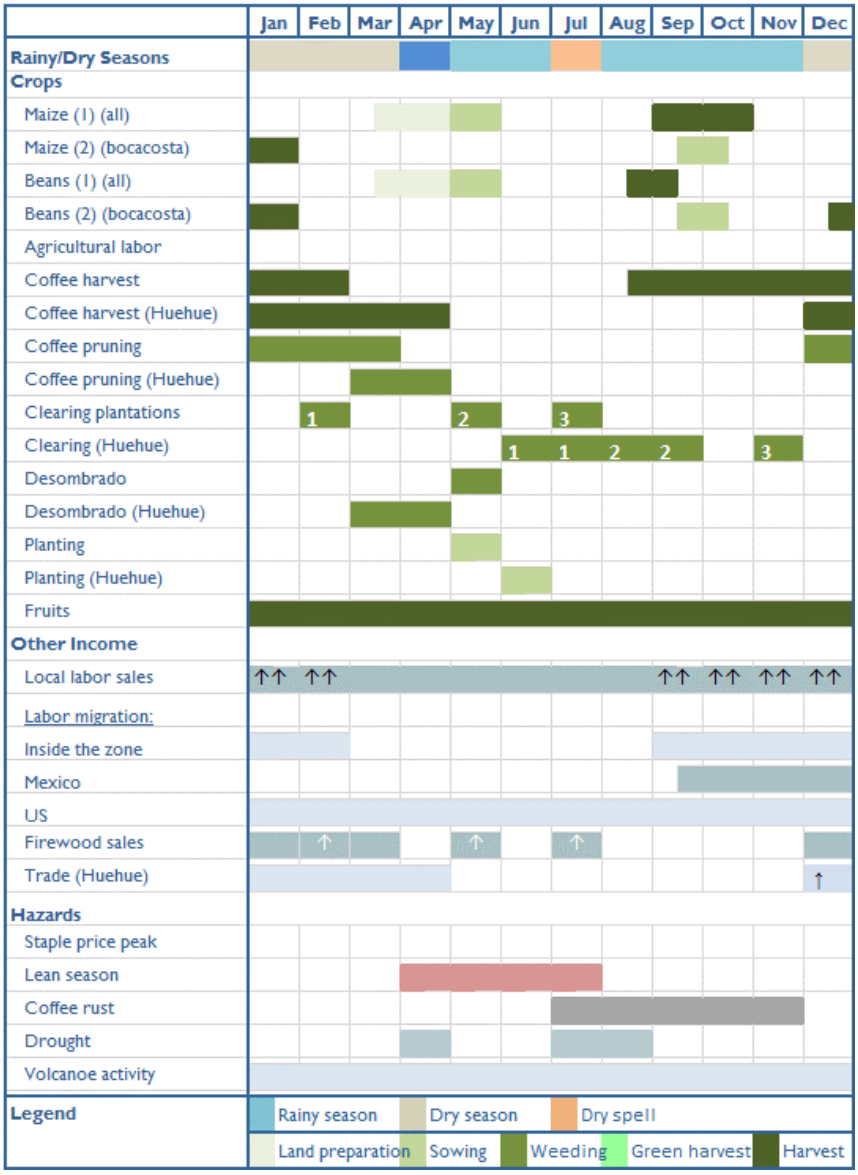
In the past three years, ANACAFE (*Asociación Nacional del Café* – national coffee association) has stepped in to help coffee growers within this zone by granting them credits secured on the borrowers' farmland. These are large-scale financial programmes managed by ANACAFE and Guatemala's rural development bank (Banrural; *Banco de Desarrollo Rural*) and offer interest rates of 3% to 8% for middle and large-scale producers, and 2% to 7% for microcredits for small-scale producers[45].

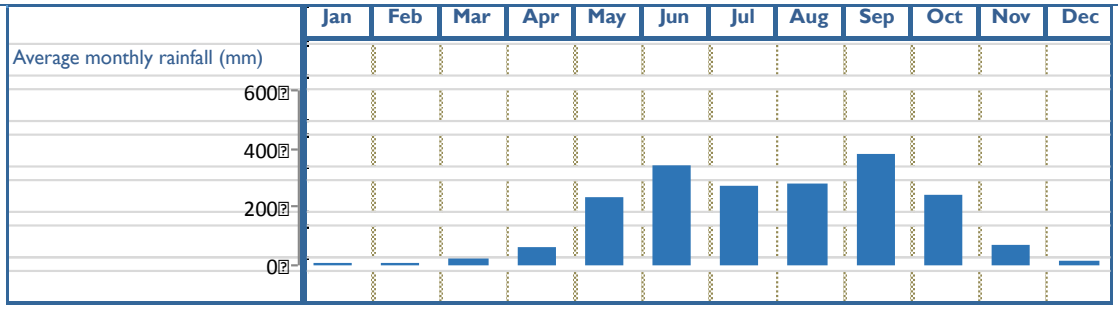
Other strategies, led by households themselves, have been: migration to other zones, increased informal and formal loans, crop diversification and abandonment of coffee cultivation on small farms.

Seasonal calendar

[45] http://reliefweb.int/report/guatemala/caficultores-ya-pueden-solicitar-fideicomiso (last accessed 20 September 2016)

Figure 3: Seasonal calendar for GT11





Source: FEWS NET

The seasonal calendar for crops presents two sets of information, one for the Huehuetenango highlands and one for the *bocacosta* volcanic mountain range, as the timing of coffee and rain fed crops varies slightly.

Maize and beans constitute a small percentage of crops compared to other regions. Maize and beans are usually grown over two cycles per year in the *bocacosta* region, while the Huehuetenango region reports only one productive cycle (May-December). The first sowing starts in May and the harvest takes place in September. The second sowing is carried out in late September and harvested in January.

For citrus and other fruits that are grown within coffee plantations, harvest seasons occur during March, April, August and September. Avocado production is most common in the upper parts of the municipalities of Sololá.

The most labor-intensive activity in the zone is the coffee harvest, which peaks between September to February. The coffee harvest absorbs much of the local labor capacity and attracts immigration from other livelihood zones. In a span of six months, this constitutes the main source of income for the poor and almost exclusively for the very poor. Harvest time begins with the lowest lying regions of *bocacosta* in mid-August and continues progressively at higher altitudes up to Huehuetenango (the highest altitude) when the harvest begins in December and runs until the end of April. Some activities associated with this production, e.g. the production and sale of honey, also peak at these times, coinciding with flowering times.

Rubber has been replacing coffee in marginal areas of *bocacosta*. Rubber is grown year-round and has started to attract labor migration too, although the amount of labor this crop requires is significantly lower. Livestock is another activity that has begun to replace coffee with the consequent deforestation necessary to turn some areas into pastureland.

April to August are the months of lowest economic activity. The coffee harvest seasons are over and the general maintenance of coffee plantations require fewer laborers. It is the season for land preparation and planting maize and beans. Seasonal food shortages start in April/May and will continue to mid-August. Overall, it is a time of economic slowdown when the availability of employment is considerably lower.

Wealth breakdown

Wealth is determined according to the following factors: access to land and agricultural tools and equipment (which, in turn, determine economic activity), level of education and amount of remittances. Access to external financial capital is also a factor that differentiates the three top groups.

Table 1: Determinants of wealth in GT11

Determinants of wealth	Very poor	Poor	Lower middle	Upper middle	Better-off
Household percentage (%)	27	55	11	5	2
Household size (#)	8-12	6-8	4-6	4-6	4-6
Land holding (*ha)*					
Land area cultivated	0-0.8 rented	0.04-0.8	3-4	5-22	23-430
Typical livestock holding (#)					
Cattle	0	0	5-8	0	> 500
Pigs		1	2-4	2-4	
Equines			1	1	5-10 horses incl. 3-5 pedigree
Poultry	0-5	5-10	8-10	0	0
Other productive assets (#)					
Tools and equipment	Basic agricultural tools	Basic tools, pump fumigation /spraying, pulping machine	Spraying equipment, drying yard, pulping machine, artisanal processing machine (*beneficio*)	Pulping machine, drying yard, wet or dry processing facilities (*beneficio*)	Modern wet or dry processing facilities (beneficio), own technical assistance, farm management personnel
Vehicles	0	Bicycle motorbike	Pick-up truck	Pick-up truck/truck	Various

Source: FEWS NET

The extremely poor, who have no land (at most a small holding, which is rented) and must generate their income from manual labour - often including the entire family. Due to the low education levels (and restriction to it at an early age for work), they are unable to escape their economic standing. They must migrate to the coffee and fruit production areas throughout the year to work during the main season (cleaning and harvesting). They also work in rain fed crop farms. Those who manage to acquire small plots of land cultivate some maize and beans for household consumption. Women are engaged in household activities and play an important role preparing coffee seedlings, grafting and grain selection, both during the harvesting and sorting phases.

The poor group, who have a small amount of land, are able to cultivate food crops thus freeing up some capital to purchase other supplies. They also sell some of their produce. Their major source of income are agricultural wages, followed by the remittances from relatives in the United States, an additional source of income which helps them keep out of extreme poverty. Poor households are small-scale coffee producers; therefore, the sale of coffee only comes third as a source of income. Selling fruits and coffee by-products, such as wood resulting from pruning also generate income.

The lower middle-income group is made up of medium-scale coffee producers, including those who are associated in cooperatives or grower associations, yet their main source of income is remittances, followed by coffee sales. Coffee intermediaries are part of this socioeconomic group too, but their sole activity is trade. This group exploits more land than poor households; they produce maize (and beans in Huehuetenango) and have their own supplies for three to four months. The sales of fruits are next in importance after coffee. They also sell firewood and wood. Migration to the US and the subsequent remittances ensures this group can keep their social standing. The greater incidence of migration in this group is related to better education levels and the ability to secure salaried jobs in cities and abroad.

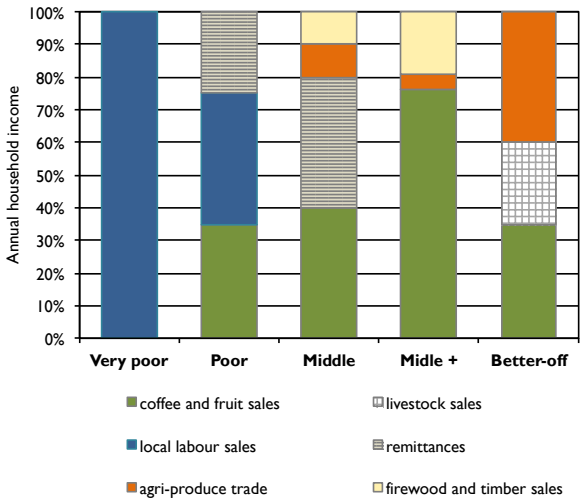
The two better-off groups (upper middle-income and better-off households) own vast tracts of land which they exploit to grow coffee and other cash crops (generating large amounts of employment) and which they can also rent out. They also have good access to capital to further expand their activities. Given the amount of capital they can access, many better-off households own plantations (rubber, African palm or sugarcane) and cattle farms, usually located outside this livelihood zone. These last two activities, cattle farming and cash crop exports, represent a higher proportion of their income compared to the sale of coffee. Some households also produce certified wood. Coffee exporters are included in the better-off category.

Sources of food and income (estimated weight)[46]

Figure 4: Food sources by wealth group in GT11

Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT11



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food consumed during the year. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

Although coffee production is the main feature of this area, its importance as a source of income has been greatly reduced in recent years, due to the number of crises that have affected this sector (coffee rust and low prices), especially for poor and middle-income groups who have not been able to benefit as much from ANACAFE support. These coffee sector crises have forced producers to diversify their sources of income. As a result, coffee growers have started to grow fruit inside their coffee plantations, they sell the wood products that result from clearing plantations and pruning, in an effort to exploit the options that their farmland can offer. The green crop sales bars in figure 5 include the sale of fruits as well as coffee, as indicated by the legend. While the orange bars (labeled “agricultural produce trade”) refer to the trade of coffee purchased from other smaller coffee farmers, common among the middle-income groups, and to the production and sale of cash crops such as rubber, oil palm or sugarcane, common among better-off households, who sometimes own tracts of land outside the livelihood zone dedicated to this purpose.

[46] The quantitative information provided in this section is derived from five field interviews in: Huehuetenango (department of Huehuetenango), San Marcos (department of San Marcos), Chimaltenango (department of Chimaltenango) and Barberena (department of El Progreso).

Very poor households derive the entirety of their income from manual labour. They have no potential to generate income from other sources and their reliance on manual labour makes them vulnerable to a fall in the demand for labor and also to market price variations, especially for food, which rise during times of food shortage. They are thus vulnerable to food insecurity. Those who can afford to rent some land are able to generate around 15% of their total food needs from their own production. The extreme poor supplement their diet by foraging (15% of their food), fishing and eating eggs from their own hens.

The sources of food for poor households are similar to those of very poor households. The vast majority is able to grow food on their own smallholdings and can rely on this food for two to three months of the year. Otherwise they source their food from markets and since they have more income, they can afford to buy a wider range of food products. They also complement their diet with wild foods. Poor households rely on three source of income, which are similar in weight: crop sales (mainly coffee and some fruits), manual labor in coffee plantations and remittances.

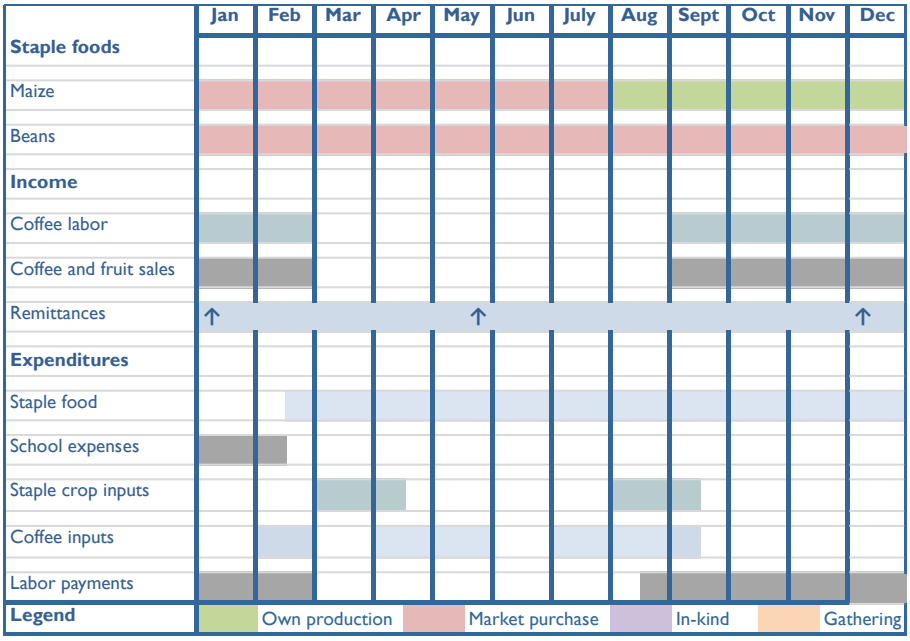
Remittances make up 40% of the annual income of the lower middle group and therefore are as important as crop sales to the household budget. Remittances are received throughout the year (every two or three months) and are usually spent on food supplies. The lower-middle and upper-middle groups generate a small percent of income from the sale of wood from their land. Lower-middle households collect firewood after the cleaning and pruning in their coffee plantations. Upper middle-income households often exploit a section of their farmland for the production of timber. In terms of food sources, lower middle-income households have their own stocks of maize and beans for about three to four months (similar to poor households) and supplement their stocks with market purchases. They are the only group to commonly own livestock and, as a result, the only group to access meat and meat from their own production.

Commercial interests are mainly in the hands of the better off (comprising only 2% of the population) and constituting 40% of their annual income. The better-off group also sells cattle and other livestock to generate another 20% of their income. The remainder of their income is generated from the sale of coffee (roughly one third of their annual takings). Upper-middle income households are not able to diversify their production as much as better-off households, but make a good living from the sale of coffee and fruits grown on their plantations. They are also engaged in coffee trading, acting as intermediaries between smaller farmers and exporters. Both of these wealth groups are dependent on market purchases for their entire food supplies, as the economic interest of producing food crops is low.

Female labor is much appreciated in the coffee industry for the delicate nature of their work. They are in charge of pruning and grafting, they are preferred over men for harvesting (together with children) and lead all selection and packaging tasks (i.e. filling sacks). Nevertheless, women are paid on average half of what men are paid. Where craftwork is common, it is mostly women's work, for example weaving tissue is exclusively female.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT11



Source: FEWS NET

Poor households are self-sufficient in maize for about four months of the year, from harvest time in August/September until the beginning of the new year. Households located in the Huehuetenango area also produce beans. The remaining months they purchase staple foods from the local markets.

Annual income is generated from three major sources: labor in different coffee plantations inside the zone, which peaks during the harvest season, coffee and fruit sales during the harvest season and remittances, which do not follow a strong seasonality but tend to peak before the Christmas period and the start of the school year and during the lean season as households await the start of the maize harvest. Remittances also increase for the celebration of independence in September.

In terms of expenditure, staple foods and agricultural inputs including labor are the major expenses. Staple food must be purchased once own stocks run out. Agricultural inputs are necessary for the rain fed crops cycles, especially before the sowing of maize in March/April and in August/September, while maintenance of coffee require more spending during pruning, cleaning and seeding/reseeding phases. Poor households rely on family labor for most of the agricultural tasks, but hire a small number of laborers for the coffee harvest.

Hazards and household response

Price and demand fluctuations in domestic and international markets (approx. every three years) – these can happen for a number of reasons related to changes in climate and harvest levels on a global scale, to fluctuations in international demand (for example due to economic crises), to new competitors entering the market, etc. The most immediate effect is the reduction (and sometimes increase) in demand for casual labor in order to meet the new levels of demand for the types of crops produced in the zone.

Coffee rust and other pests and diseases - these adversely affect coffee production and, in the case of small-scale farmers, can wipe out an entire harvest. The coffee rust, in particular, has happened every year since 2012 and usually occurs in the rainy season.

Prolonged rains – prolonged rains lead to floods that cause crop losses. When rains persist for more than three days during the month of May they saturate the soil and cause crop losses. This affects all socioeconomic groups: the poor and extremely poor, because their jobs are put at risk; and middle and better off groups, as they forgo revenue.

Transition to other crops - this has been a threat because it replaces coffee plantations with a monoculture crop, which usually depletes the soil of nutrients.

Droughts – droughts affect the poor and extreme poor who have no way of irrigating the land to survive the drought. A month without rain after budding of coffee flowers is also a bad sign. Dry spells/droughts commonly between April and August.

Violence and theft – violence of theft is more predominant during harvest time. This affects all groups and affects profit margins. The poor groups aim to find different transportation routes whereas better-off groups can seek better transportation methods.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT11

Very poor/poor	Middle/better-off
Search for alternative casual labor	Reduction of labor costs/ wage payments
Search for community support (credit and loans)	Sale of livestock
Migration (father or older children)	

Source: FEWS NET

Southern Agricultural Industry Labor and Food Crops and Milk (Zone GT12)

General livelihood zone description

The "Southern Agricultural Industry labor, food crops and milk" livelihood zone is located in the south of the country, adjacent to the Pacific. The zone lies between the coffee production livelihood zone (GT11) and the Pacific fishing zone (GT13), stretching from the Mexican border to the border with El Salvador. The zone includes the southern municipalities of the departments of San Marcos and Quetzaltenango in the east and Jutiapa in the west, as well as most of the departments of Suchitepéquez, Escuintla and Santa Rosa.

Map 1: Livelihood zone location

Source: FEWS NET

As a transition zone between the mountainous interior and the ocean, the topography is a mixture of large plains and rolling hills. A number of rivers flow through the zone on their way to the sea (the Ocosito, Nil, Samala, Sis, Coyolate, Naranjo, Suchiate, Meza and Ocos rivers), which provide the hydric resources necessary for irrigated agriculture. The vegetation is largely made up of grasslands and intermittent pockets of forest, small in dimension but important as sources for timber. Rainfall levels range between 1000 and 1500 mm/year and the climate is hot; temperatures range between 28 and 32 degrees Celsius on average. The population density in this zone is of approximately 189 inhabitants /km^2.

The zone is famous for its sugarcane plantations, which attract seasonal laborers from across the country during the harvest and processing season (*la zafra*). Sugarcane has been grown in this region since colonial times, in large haciendas called *ingenios azucareros*, which are now owned by private companies[47]. Other important cash crops cultivated in this zone include bananas and plantains, palm oil and rubber, as well as some tropical fruits (pineapples, mango and papaya), all of which require artificial irrigation under the local climatic conditions and are mainly directed at export markets. Rubber, for the production of rubber and latex for export, has also become an attractive cash crop, which is slowly replacing other crops and now includes processing factories within the zone.

Local livelihoods are essentially based on the sale of labor in the plantations located in the zone, and especially in sugarcane plantations, which require the largest amount of manual labor on a seasonal basis. Labor opportunities are also available in palm oil, banana and rubber plantations; these are available year-round. Households produce some food crops for own consumption, but household production is entirely reliant on the season's rainfall patterns, as most households do not have access to irrigation. Livestock also has a role in local livelihoods, both for poorer households who find employment in dairy farms and for better-off households who are the owners of the dairy farms. Dairy farming is particularly important in the area of Santa Rosa, where a considerable number of wealthy households have established cattle ranches. Dairy products are mostly marketed within the department of Santa Rosa for local consumption.

In recent years, many local landowners have been seduced by opportunities to rent their land to commercial sugarcane producers. The change in land use from food crops to commercial sugarcane

[47] The major *ingenios azucareros* are El Pilar (San Andrés Villa Seca, Retalhuleu), Tulula (Cuyotenango, Suchitepéquez), Palo Gordo (San Antonio, Suchitepéquez), Madre Tierra (Santa Lucía, Escuintla), La Unión (Santa Lucía, Escuintla), Los Tarros (Santa Lucía, Escuintla) and Pantaleón (Santa Lucía, Escuintla).

production has had implications on two fronts. On one hand, it represents increased demand for labor, especially during the harvest, which can benefit poor households and especially very poor households, whose income is derived entirely from agricultural labor. On the other hand, the additional pressure on the already limited farmland has further decreased the production of food crops for self-sufficiency, and will reduce it even more as land rental prices increase, leaving only marginal land for food production. This context increases the dependency on imported foods from Mexico and other departments in Guatemala, which very often translate into higher prices for the final consumers. Additionally, there are environmental problems linked to large-scale monoculture plantations. For example, the availability of drinking water has fallen due to the pollution of a number of underground sources and the over-exploitation and illegal detour of water reserves used for irrigation.

Markets

Market access

Market access within the zone is good, especially between the main town of each municipality and the surrounding communities. The road infrastructure in the zone is in good condition and is under constant expansion due to demand generated by the presence of the agro-industries. In turn, this provides good market access for the local population. Communities located far away from the main municipal town suffer from worse road access, especially during the rainy season when transport along the dirt tracks connecting communities to the main roads becomes difficult.

The most important markets are located in the main town of each department (Escuintla, Suchitepequez and Retalhuleu). These markets are the main collection points for food and other goods to be distributed inside the livelihood zone, although most commodities come from other livelihood zones and also from Mexico. The central wholesale market in Guatemala City (CENMA) plays a key role in the supply network towards the livelihood zone and so do the main highland markets (Quetzaltenango). Most transactions are carried out through intermediaries, except those products that are marketed directly through well-established international export markets abroad (sugarcane, tropical fruits and rubber).

The fact that many food and non-food items must be imported from Mexico or elsewhere in Guatemala means variations in the price of fuel soon impact the prices of commodities sold locally. Seasonal price variations in the areas of production are also felt locally. Such is the case of maize imported from Mexico or from Petén, for example, whose price increases from May to July especially.

Main produce sold

Sugarcane – A small fraction of the sugar produced is transported to the central wholesale market (CENMA) in Guatemala City, for domestic use. . Large-scale intermediaries and export companies purchase produce directly from the plantations and the processing plants (*ingenios*), and transport it by freight trucks to export points at the main Atlantic and Pacific seaports (Puerto Barrios, Puerto Quetzal, San José and Champerico). Prices fluctuate according to international markets.

African palm oil, banana and plantains – the marketing channels for these products are the same as for sugar, and price fluctuations also depend on the global price variations, rather than on seasonal patterns.

Rubber – its production has increased in the past years, particularly in the western area of this zone (Escuintla, Suchitepéquez, Retalhuleu, Quetzaltenango and San Marcos), where it supplanted very low coffee production areas and uneven terrains that were not suitable for sugarcane or cattle. It is produced mainly for the Latin-American market, mostly as raw material, in the form of solid rubber and liquid (latex), particularly exported to Mexico, Costa Rica, Colombia, among other countries.

Maize – Although there are some small farmers that produce maize for their own consumption, there are some particular areas that are considered surplus areas. In the past, this zone relied more on the large scale production of maize, but given the expansion of other monoculture plantations, the surplus

areas have been limited to Tiquisate and Nueva Concepción in Escuintla, La Máquina in Suchitepéquez, Chiquimulilla in Santa Rosa, Las Palmas and Caballo Blanco in Retalhuleu. The production in these areas is still important for the national market supply, and has an impact on prices at the national level. Maize is marketed in local markets and the ones within this livelihood zone, but also at CENMA, from which it is transported to markets in Guatemala City and other zones, either directly or through intermediaries. Prices fall between August and December, when the harvest occurs, and rise between January and July.

Sesame – Sesame is produced in Escuintla, Suchitepéquez and Retalhuleu, on the same land as maize, but following the first harvest season, from September to December. It is marketed through intermediaries that take the freshly harvested sesame to the processing plants, from where it is exported to the international market. The international market defines price fluctuations.

Watermelon, melon and pineapple – a number of plantations growing watermelon, melon and pineapple are found in the zone, however, these products are much less important that sugar cane and palm oil.

Cattle – dairy cattle is sold at the local markets and transported to the central wholesale market outside Guatemala City from where it is transported to more distant regional markets. Local farmers purchase calves after the calving season and fatten them for sale later in the year.

Casual labor markets

Local labor – the local labor offerings in plantations located within the zone are the main source of income for the majority of rural households. Labor opportunities are available year-round, although demand increases between October and May, the season for sugarcane harvest, which is the most labor-intensive cash crop.

Staple food supplies

Maize and beans – supplies of maize originate in the productive coastal areas of Tiquisate, Nueva Concepción, Escuintla, Santa Lucia, Democracia, Siquinala, Gomera, Masagua, Santa Domingo, Mazatenango, San José La Maquina, Retalhuleu and Ocos (all located within the livelihood zone). Bean supplies are transported from the central wholesale market in Guatemala City or directly from Escuintla, Santa Rosa, Suchitepéquez, Retalhuleu, Jutiapa, and San Marcos. However, staple food production is not a priority in this livelihood zone and, as a result, the zone is a net importer of staple crops. The variation in commodity prices occurs in the months of March through to August. The increase is due to the lack of supplies within the area. However, the ease of obtaining of Mexico avoids prices rising too high.

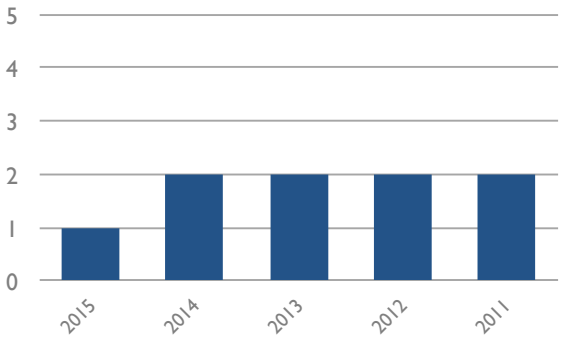
Credit and remittances

Access to credit is only the privilege of middle-income and better-off households, who can provide the necessary guarantees to access commercial loans. Poorer households can access loans from informal moneylenders who charge higher interest rates. The purchase of inputs is often secured by selling a portion of the future harvest in advance. Remittances are not common in this livelihood zones as there a few push-factors promoting migration. The existence of large agri-businesses in the zone provides a more or less constant supply of labor opportunities for the local population.

Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

Figure 2: Perception of historical food access with 1 as worst and 5 as best



Source: FEWS NET

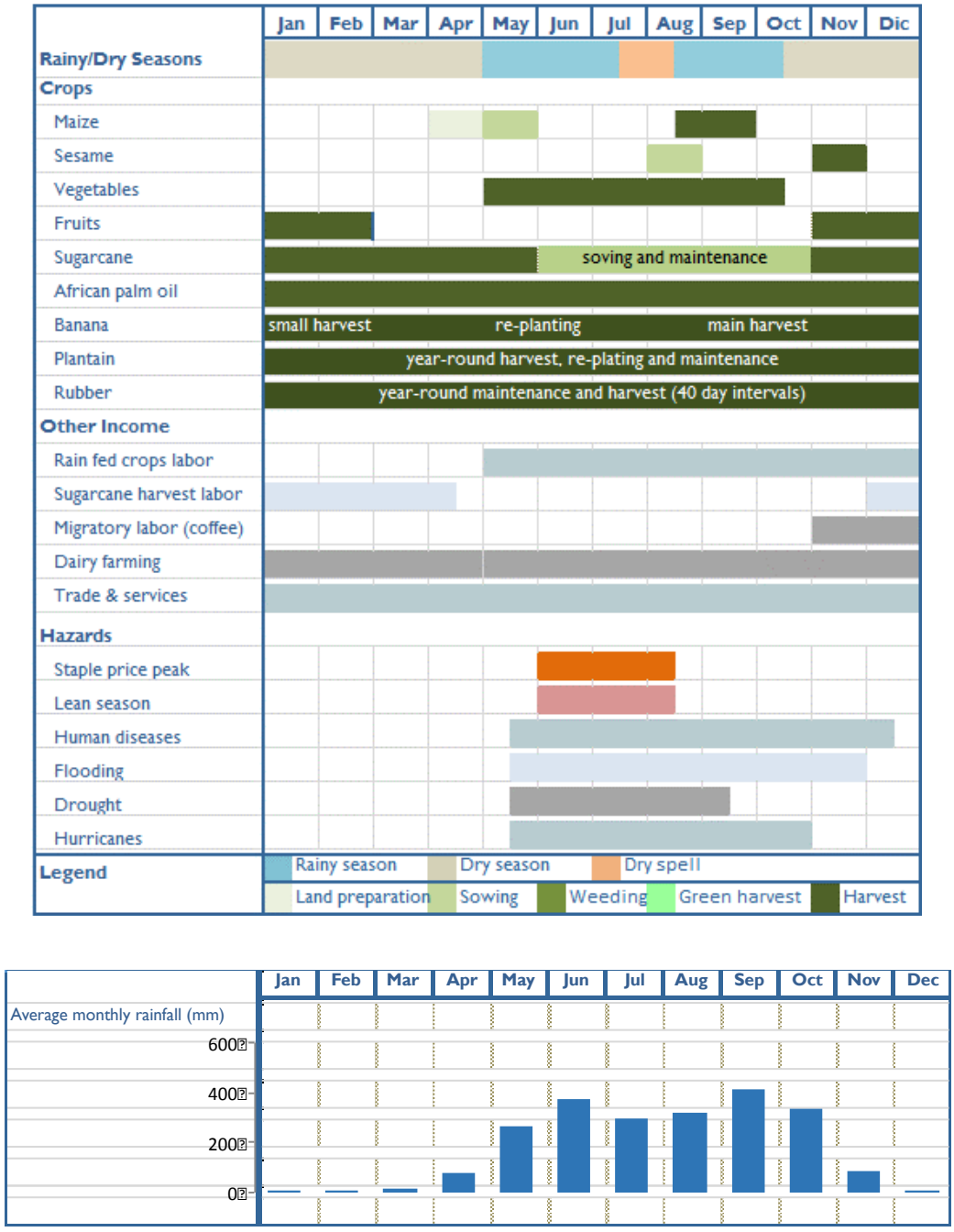
The communities' perception of food security and general livelihood security in the last five years has been well below average and reached a critical situation during 2015. For three consecutive years (2013 to 2015) the zone suffered from recurring drought, which greatly impacted agricultural production and, as a result, the demand for agricultural labor, key for the livelihoods of the majority of the population. Food crops were directly affected by the lack of rain, while cash crops (mostly produced with irrigation systems) also suffered due to the high temperature levels, resulting in a loss of demand for labor. Expecting a continuation of the poor rainy seasons many households decided to forgo sowing maize and concentrated their efforts elsewhere. Laborers migrated to urban centers within the zone to search for work, and also further afield to work as agricultural labor in other livelihood zones where demand had not been affected in the same way.

The opposite hazard, torrential rains and flooding, affected the zone in 2011 and 2012. Both years were hit by tropical events causing important damage from the strong winds and the subsequent flooding of farmland and residential areas. The zone was hit by "storm E-12" (so called for being the 12th tropical cyclone to hit during the 2011 hurricane season in the Pacific).

External assistance programs have been in place in the zone over the past 10 years, particularly for households affected by climate-related events. Food aid has been the most common form of external assistance, although since 2009, social programs such as conditional cash transfers and interest free loans for farming have also been introduced. The extent of the coverage of external support programs is limited.

Seasonal calendar

Figure 3: Seasonal calendar for GT12



Source: FEWS NET

Two seasons determine the local calendar, although in recent years the length of the dry season has been prolonged unpredictably. The rainy season begins in late May, with moderate to heavy rainfall. Between July and August, a dry spell usually sets in affecting large areas of the zone, especially those areas that lie closer to the ocean and zone GT13. By late September to early October, rain intensifies

again and normally lasts until mid-October or early November. The dry season typically starts in mid-November and ends in mid-May, when the temperature can reach up to 38 degrees Celsius.

Typically, maize is sown at the beginning of the first rains in May. The harvest is obtained between August and September. Sesame is an important crop for poor households as it represents their only cash crop and is sold to generate the necessary cash for the purchase of inputs and/or renting land for the maize season the following year. Sesame is planted and harvested during the second half of the year; often the same plot used for the maize crop. Many households also produce vegetables and fruits. Each variety is harvested at different times of the year, although most fruits (mango, papaya, pineapple and citrus) are harvested in the dry season, while vegetables are harvested drying the rainy season.

In terms of cash crops, banana/plantain, rubber and palm oil do not have a time-specific harvest and production continues year-round. Sugarcane, however, is ready for harvest between November and May, which marks a particularly busy six months during which demand for labor is high, so high that it outstrips local supply and attracts migrant labor for the four corners of the country. Demand for labor also increases between August and September at the peak of the rain fed crop harvests.

The period with the lowest demand for labor and, therefore, a critical time for households who depend on local labor as their main, and sometimes only source of income falls between May and August (the period between the end of the sugarcane harvest and the beginning of the maize harvest). Opportunities are still available in other cash crop plantations, but the overall demand for labor is generally low. July to October is also a period of heightened vulnerability as households are at risk of losing their crops, either due to the lack of rain or to heavy rain and flooding soon after sowing.

Seasonal labor movements within the area are very common and mainly contained to work within the agro-export sector. As mentioned above, during the *zafra* (cutting and processing cane) laborers from inside and outside the zone flock to the sugarcane producing areas. Outward migration of local laborers towards zone GT11 takes place between October and November (two months of peak coffee harvest before the start of the local sugarcane harvest). Occasional seasonal migration to Mexico also takes place. Labor opportunities in construction and masonry have flourished, attracting large numbers of people to the capital city, on a seasonal but also on a permanent basis.

Wealth breakdown

The differences between the four socioeconomic groups identified in the zone are mainly defined by access to land and land tenure, ownership of the means of production, the feasibility of accessing loans and the ability to buy and sell of labor.

Table 1: Determinants of wealth in GT12

Determinants of wealth	Very poor	Poor	Middle	Better-off
Household percentage (%)	45	30	15	10
Household size (#)	8-10	5-8	4-6	2-4
Land holding (*ha)*				
Land area cultivated	0	0.25-0.5 rented	0.5-1 + 0.5 rented	1-2 + 7-10 rented (excluding land for cattle)
Typical livestock holding (#)				
Cattle	0	0	2-3	50-100
Equids	0	0	2-3 mules	5-10 horses
Pigs	0	1-2	10-15	0
Poultry	0	15-25	15-30	0
Other productive assets (#)				
Agricultural tools	Machete, lime, mattock	Mattock, pickaxe, pump spray, shovels, *covas*	Mattock, pickaxe, pump spray, shovels, *covas*	Plus irrigation systems, crop dusters
Vehicles	0	0	Pick-up trucks	Various

Source: FEWS NET

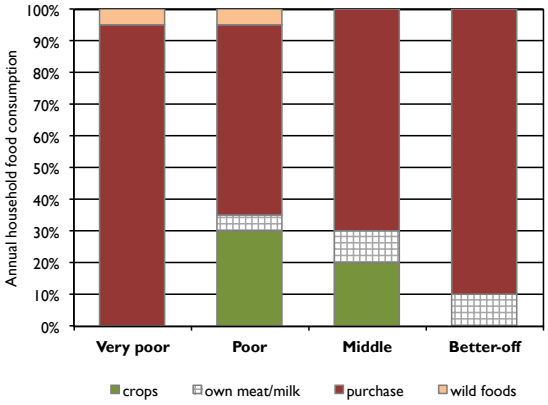
Access to land is scarce in this livelihood zone and all households rent larger amounts of land than that which they own themselves. As a result, access to farmland depends more on having the necessary capital to rent land at what are relatively expensive prices, rather than inheritance. Access to farmland, however small, marks the difference between very poor and poor households. The first are laborers, while the latter have slightly diversified livelihoods and a small source of food and income which they control – if weather conditions permit, which has not been the case for a number of years and has, in fact, translated into the abandoning of farms until the seasons improve. Although access to land is also a distinguishing feature between middle-income and better-off households, the major difference lies in the barriers to the diversification of crop production towards profitable cash crops. While all households cultivate maize, sesame, vegetables and some fruits, it is only better-off households who cultivate sugarcane, rubber or palm oil. These are perennial crops that require a certain amount of time to establish before producing any yields. Additionally, better-off households have been able to profit from the rental or sale of sections of their land to sugar processing mills.

Livestock is also an important productive asset in the area. The topography and vegetation are ideal for cattle ranching, however only a few families own large cattle herds. Poor households cannot support livestock keeping; poor households own a small number of pigs and a small flock of hens and ducks, however, very poor households own no animals at all. Middle-income households have invested some of their benefits into acquiring a small number of cattle (on average 2-3 cows per household), while better-off households have capitalized on this economic activity to the point that it generates half of their annual income, as much as agriculture does. However, in recent times, the price of milk has fallen, reducing margins and questioning the viability of this activity.

The heavy dependence on the sale of labor in the agricultural export sector represents and important risk for poor households since it is their main source of income. Although local demand is for labor is currently high, the situation could change if every year more land is used to grow perennial crops that require very little labor for maintenance.

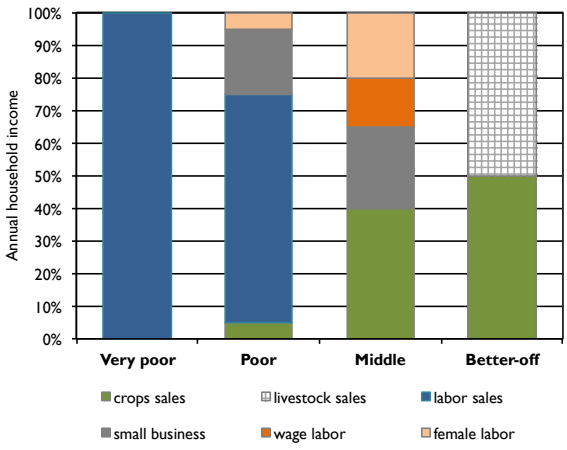
Sources of food and income (estimated weight)[48]

Figure 4: Food sources by wealth group in GT12



Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT12



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food consumed during the year. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

Food purchases are the main source of food for all groups in the zone, and especially for the very poor who depend exclusively on working for others for their livelihood. This condition makes them particularly vulnerable to changes in the price of staple foods and changes in demand for labor. Poor households produce their own staple crops, which last an average of three months. Middle-income households own larger farms and, therefore, produce larger quantities of crops. However, better market integration and owning the own means of transport allows them to sell more of their produce than poor households do, and to replace the food forgone with market purchases at better prices. Better-off household focus on cash crop production alone and, as a result, own crops does not figure as a relevant source of food for them. Middle and better-off households enjoy access to milk and meat from their own herds, while poor households' "own milk/meat" contribution refers to smaller animals, poultry and pigs. To top-up the family's diet during the most difficult periods of the year, very poor and poor households resort to collecting wild leaves and fruits.

With regards to the common sources of income for each group, agricultural wages represent by far the largest income generating activity for the poorest households, as they own no land and have few assets to develop other economic activities. Poor households sell a small amount of their crops (especially sesame) in order to purchase food and to buy agricultural inputs for the next season. Agricultural production is more important for the middle-income and better-off households, generating around half of their annual revenue. The limited access to land and the difficult climate conditions make the expansion of agricultural production a challenging, even risky business.

The label "small business" in the income graph refers to petty trade activities (small-scale sales) mostly carried out in urban centers. The rural population travel to urban centers to purchase different types

[48] The quantitative information provided in this section is derived from five field interviews, in Relhuleu, Escuintla and Chiquimulilla (department of Santa Rosa), Pasaco (department of Jutiapa) and Pajapita (department of San Marcos).

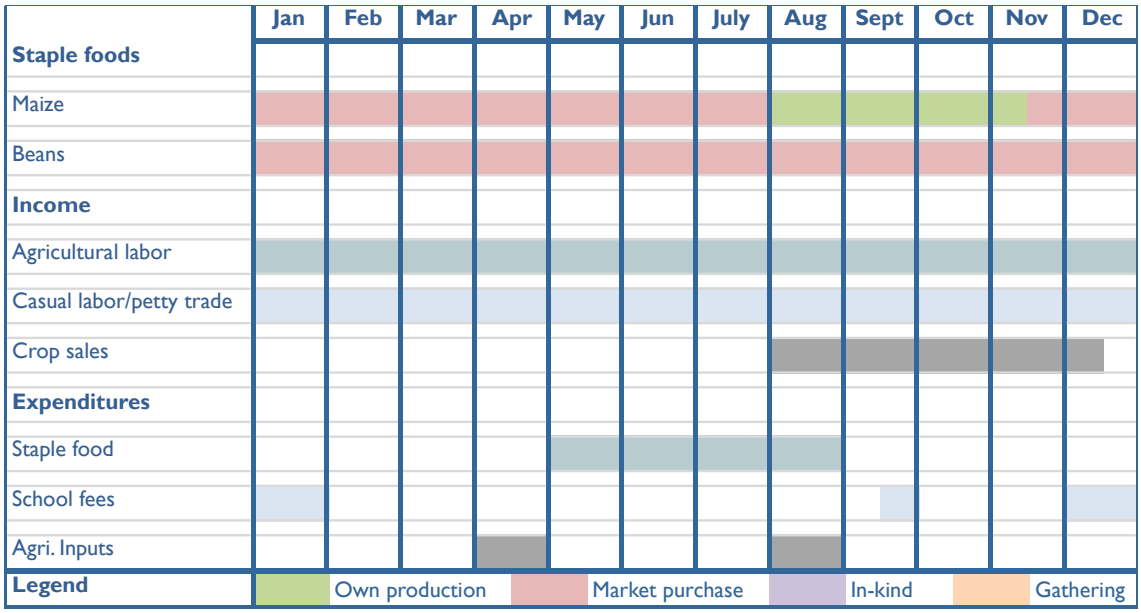
of household goods and small items, which they sell for a small profit. This type of commerce is informal and un-regulated.

Dairy farming provides is an activity reserved for wealthy households, many of which have acquired large herds of up to 100 cattle. Middle-income households also own cattle but only a means of savings and accessing milk and meat for the household. Better-off households generate up to half of their annual income from the sale of live animals, meat and milk.

The female contribution to the household budget has increased recently as a result of heightened household needs, following the recurrent poor agricultural seasons. Many women from poor households are engaged in domestic services or sell food and small household goods. Women from middle-income households have full time employment in the services industry (for example as secretaries and office assistants) or may have their own small businesses such as small restaurants, beauty salons, clothes stalls, etc.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT12



Source: FEWS NET

Poor households are self-sufficient in staple foods for only three months of the year following the annual, rain fed harvest (August/September). Beans are not produced in this zone; therefore, they need to be purchased. The main income source is agricultural labor, either sowing and harvesting rain fed crops (maize and sesame) or working in larger cash crop farms and plantations. Households may also find work in dairy farms, overseeing the animals, although overall this sector provides fewer labor opportunities than agriculture does. Casual labor outside of agriculture and petty trade supplement the income generated as agricultural laborers throughout the year, depending on each household's opportunities.

In terms of expenditure, staple foods are the largest household expenditure, especially during the lean seasons before the maize harvest is ready. Expenses related to farming increase at the start of each season, rental agreements must be renewed and seeds purchased, if the previous seasons seeds are damaged or non-existent. Agricultural tools may also need replacing. Education expenses are

concentrated in December and January, as households must purchase the necessary kit for the new school year.

Hazards and household response

Drought - drought has affected this livelihood zone recurrently for the last three years. This hazard has greatly impacted agricultural production, even large-scale cash crop production and, as a result, the local demand for agricultural labor has fallen considerably. Expecting a poor rainy season many households decided to forgo sowing and concentrated their efforts elsewhere. Laborers migrated to urban centers within the zone to search for work and further afield, to work as agricultural labor in other livelihood zones where demand had not been affected in the same way. Small-scale producers in rural communities remain the most vulnerable to drought given their lack of access to irrigation, its effects on the loss of livelihoods, leading to the decapitalization of household economies and impoverishment, and promoting migration to over-populated urban centers. Delays in expected rainfall can take place at any time during the rainy season, but it is July that is the most vulnerable month to drought, when sowing has already taken place and the *canícula* or dry spell usually occurs.

Flooding – instances of very heavy rainfall and flooding in this livelihood are commonly the result of hurricanes and storms originating in the Pacific**.** They are most common between September and November (hurricane season), but they can occur as from the beginning of the rainy season in June. Flooding due to the overflow of rivers can take place during the rainy seasons, especially if the amount of rainfall further up-river has been considerable.

Crop pests and diseases – year-round affecting rain fed crops production but also plantations, although the intensive farm management and more advanced agricultural techniques used in plantations reduce the exposure to crop diseases.

Price and demand fluctuations in domestic and international markets – these can happen for a number of reasons related to changes in climate and harvest levels on a global scale, to fluctuations in international demand (for example, due to economic crises), to new competitors entering the market, etc. The most immediate effect is the reduction in demand for casual labor in order to meet the new levels of demand for the agricultural products produced in the zone.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT12

Very poor/poor	Middle/better-off
Poultry and pig sales	Reduction of surplus costs (for example, labor costs)
Search for community support	Use savings
Purchase food on credit	
Intensify labor inside the zone (in plantations)	
Request external assistance	
Migration outside the zone in search for agricultural labor opportunities	

Source: FEWS NET

Pacific Ocean Artisanal Fishing, Trade and Services (Zone GT13)

General livelihood zone description

The "Pacific Ocean artisanal fishing, trade and services" livelihood zone stretches along the southern coast of Guatemala, from the Mexican border to the border with El Salvador. It represents a thin strip, roughly 3 to 5 km in width and includes the fishing communities situated along the coast. From east to west, the zone traverses the departments of San Marcos, Retalhuleu, Suchitepéquez, Escuintla, Santa Rosa and Jutiapa.

Map 1: Livelihood zone location

Source: FEWS NET

The majority of the territory consists of flat land and undulating terrains. While most of the soil is sandy, small pockets of fertile land exist for the production of sugarcane, banana and maize. Annual rainfall levels are low, ranging from 500 to 650 mm/per year. The zone's climate is hot and humid, with average temperatures ranging between 32 to 37 degrees Celsius (89-98 degrees Fahrenheit). The vegetation is a mixture of broadleaf vegetation, grasses, mangroves and palm trees. A number of rivers that flow into the Pacific Ocean are included in the zone: Samalá, Naranjo, Ococito, Sis, Nahualate, Coyolate, Achiguate, Balls, Old Mother and Siguacán rivers. River estuaries fulfill the role of 'nurseries of the sea' providing vital nesting and feeding habitats for many aquatic plants and animals. Most fish and shellfish complete at least part of their life cycles in estuaries, therefore these are good fishing areas, especially for fishermen with few resources who cannot venture far out to sea. Additionally, river estuaries provide the necessary conditions for mangrove ecosystems; a natural environment for shrimp larvae and the source of a buoying local shrimp industry.

This zone's population density is of approximately 132 inhabitants /km^2, and its economy is characterized by small-scale artisanal fishing for household consumption and trade, and small-scale agriculture: maize, sesame, papaya, banana, African palm and coconuts; all of which are suited to the sandy soil conditions. Despite the coastal location of the zone, fishing is only an artisanal activity, using few modern techniques or equipment. As a result, it is not a high-growth industry, but it is an important means of life for the local population. All households depend on fishing as a source of food and income and many also on fishing labor, as the main source of income. Labor opportunities are available working for other fishermen out at sea or working in shrimp and tilapia farms located inland.

Crop production is not oriented towards sales, but reserved mainly for household consumption. In fact, the importance of agriculture has declined over recent years, because affluent landowners have begun to lease their land for growing sugarcane. As a result, the production of maize as a source of income has decreased, reducing the availability of stocks in the zone and is forcing poor and middle-income groups to grow staple crops for their own consumption (at subsistence levels) and avoid relying on maize imports.

The tourist sector provides opportunities for labor and trade, including an additional market for fish. Local households work in hotels, restaurants and other tourist services, while those who own powerboats often rent them for use providing boat trips during the tourist season. Tourism peaks between March and June.

Both fishing and agriculture are constantly threatened by natural phenomena such as droughts, floods and red tide. These hazards have a direct impact on the livelihoods of the majority of the population within the zone, forcing people to migrate in search of alternative opportunities for income generation. Between the months of January to April, migration towards the sugarcane production areas in zone GT12 is common. Laborers also migrate to nearby urban centers (e.g. Jutiapa, Santa Rosa, Escuintla, Mazatenango and San Marcos) to work in the construction sector and as domestic employees.

Migration to nearby areas (zone GT12), to the capital city and abroad (Mexico and the US) represents a common coping strategy. In recent years, the area has been very vulnerable to flooding (known as *llenas*) due to the overflowing of rivers, caused by excessive rainfall upriver. When this has occurred, the most affected have been the poor and middle-income wealth groups, who have lost their productive assets. Gathering and selling firewood and hunting for wild animals on the beach and mangroves (e.g. iguanas, parrots, turtle eggs) are further activities some households turn to in times of need, although some of these animals are now endangered.

In previous years, the production and commercialization of salt was common in this livelihood zone. However, due to an increase in river pollution, which is affecting the quality of the seawater, and the expansion of sugarcane plantations on lowlands close to the sea, this activity is slowly disappearing. While before it was a main economic activity, salt extraction has become a coping strategy, an option to generate additional income in times of need.

Markets

Market access

The main markets supplying the area are located in the capitals cities of each department: Jutiapa, Santa Rosa, Suchitepéquez, Escuintla, Retalhuleu, Quetzaltenango and San Marcos, as well as the smaller markets of Chiquimulilla and Coatepeque. For fish and shellfish, the main market destination is the capital city. Local intermediaries who generally belong to the affluent wealth groups dominate marketing channels inside the zone. Small local markets are crucial for poor households, as access to major markets further inland is difficult.

The state of the road network is good and overland transport is complemented by water transport. However, market access is difficult for poor households, who do not have their own means of transport and cannot afford the high cost of local transport. As a result, the vast majority of fish trade takes place at the landing site, where intermediaries congregate and purchase fish directly from the fishermen or from female fish vendors.

Main produce sold

Fish and seafood – fish and seafood are sold at the main markets in the region by intermediaries and from there to the rest of the country, Guatemala City being the most important consumer center. Sales peak between April and September when demand is at its highest, but decrease between January and March when sea temperatures increases, fish stocks decrease and the local tourist season is over. Most fishermen lack cold storage facilities and, as a result, prices depend directly on the availability of immediate demand. Fishermen do not have sufficient resources to transport their catch to markets in urban centers where it would fetch a higher price; instead it is the intermediaries who benefit from these higher margins.

Casual labor markets

Local fishing labor – available year-round and paid in a combination of cash and in kind. Labor opportunities are also available in shrimp and tilapia farms.

Agricultural labor – banana, plantain, papaya, sugarcane and rubber plantations offer labor opportunities year-round. When fishing stocks decline or if fishing labour is not available due to rough

sea conditions, poor households can rely on working in the plantations located inside the zone or nearby.

Migratory labor – temporary migration to neighboring zone GT12 and to urban areas is common among poor households, as a way of coping with the seasonal lull in the demand for local labor in fishing and agriculture.

Staple food supplies

Maize and beans – The zone is a net importer of staple foods. Beans are brought in from zones GT02 and GT10, and also from Mexico. Sugar, rice, oil and other commodities are brought from the capital and fresh vegetables from zone GT06. The only food crop grown for local consumption and small amounts of sale is maize. Local stocks are supplemented with produce from the main departmental cities (in GT12), Petén (GT02) and Mexico.

Credit and remittances

Informal loans are common among very poor and poor wealth groups, who regularly rely on them despite the high monthly interest rates. They use loans to buy agricultural inputs and repayment is commonly either in-kind (part of their harvest) or in cash, as soon as the harvest has been sold. In-kind loans are also common among fishermen; poor households borrow equipment from middle-income households and pay a proportion of the daily catch in return.

Remittances do not represent a common source of income in this zone. Some poor households have been able to finance migration and receive remittances; the same is the case for middle-income families. However, remittances are irregular and commonly used to improve housing conditions or to establish a new economic activity, such as a small business.

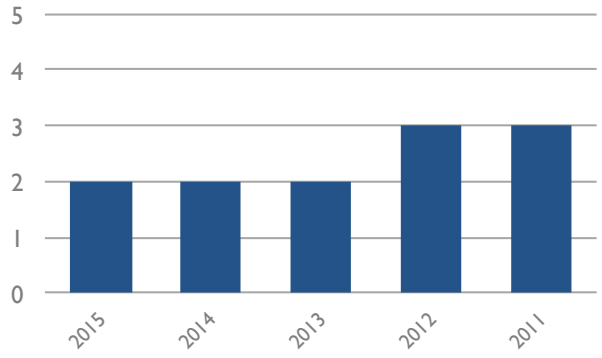
Perception of historical food access

Figure 2 shows how the local population interviewed have perceived food security levels and livelihood security during the last five years, awarding a score of 1-5 to each year, with a score of 3 being an average or 'normal' year.

The communities' perception of food security and general livelihood security in the last five years has been average to below average, especially since 2013.

The years 2011 and 2012 were good years in terms of labor opportunities and the outcome of rain fed harvests. 2013 suffered tropical storms and many fishing days were lost due to the rough sea conditions, which kept fishermen grounded. Many households migrated to neighboring zones or to the capital city in order to replace the income lost from fishing. In 2014 local fishermen reported an increase in the water temperatures, due to the high temperatures overall. An increase in the temperature of the surface water discourages fish from swimming close to the coast and means fishing must take place at larger distances from the shoreline. The severity of the situation triggered the delivery of food aid in the zone. The Ministry of Agriculture and Livestock (*Ministerio de Agricultura y Ganadería - MAGA*) set up food for work programs (*alimentos por acción).* More recently, in 2015, the zone was affected by severe floods that reached households in up to half of the zone's area (in Escuintla, Suchitepéquez, and Santa Rosa departments). Some households migrated to neighboring zones until the situation improved. Once again, the government implemented emergency relief in the affected areas.

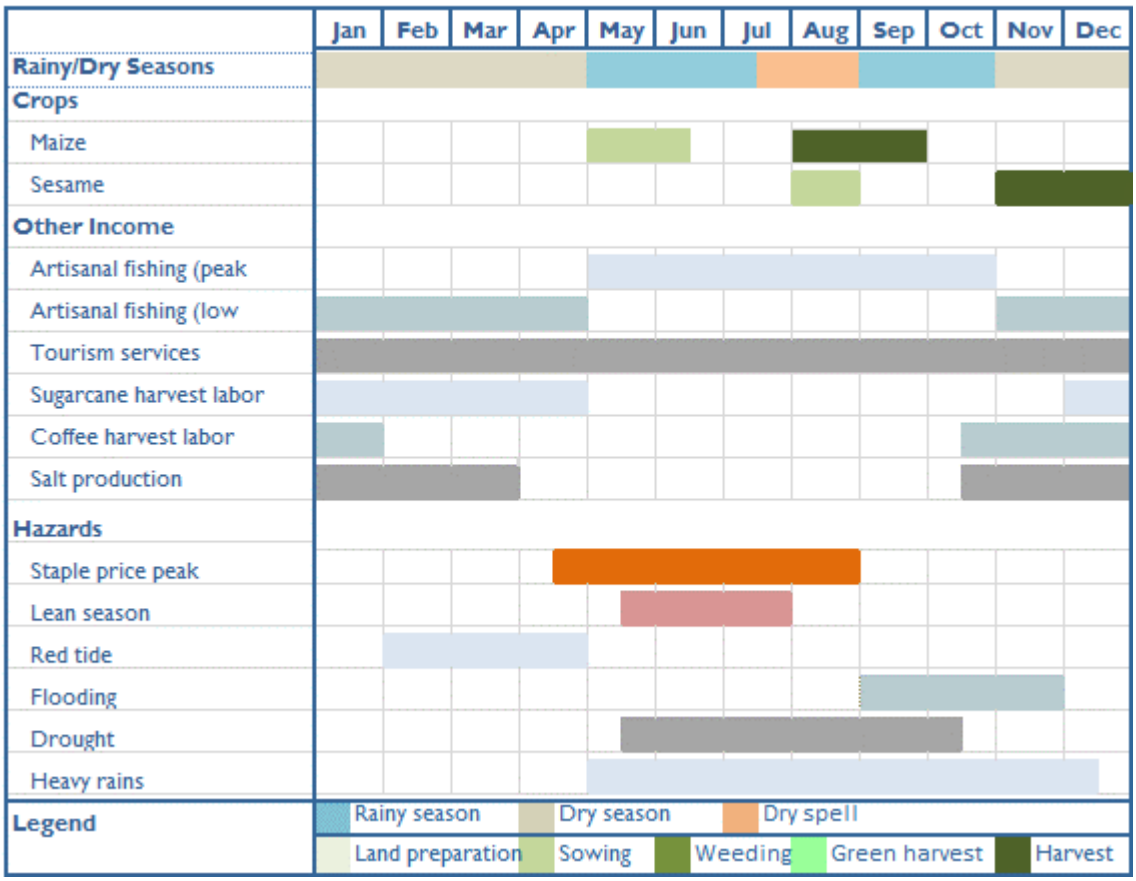
Figure 2: Perception of historical food access with 1 as worst and 5 as best

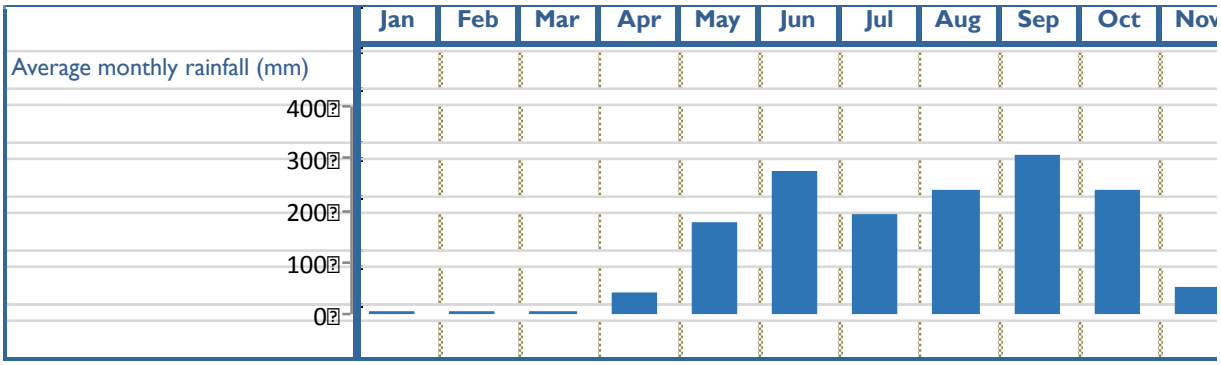


Source: FEWS NET

Seasonal calendar

Figure 3: Seasonal calendar for GT13





Source: FEWS NET

The dry season starts in November and ends in April, it is followed by the wet season from May to October. Average temperatures can reach 35 to 40 degrees Celsius in the dry season, but seldom fall much below 30 degrees the rest of the year.

While fishing takes place year round, it is the rainy season that is the most important for fishing. During this season the river dischargers higher quantities of water into the ocean. Fresh water is rich in nutrients, which attract fish closer to the shore. The consumer demand for fish also increases during

this time, especially between March and June, as this is the peak tourist season. Tilapia and shrimp farms are present in the zone and are an important source of labor for communities situated in close proximity. Tilapia production peaks between the months of August to November, outside the months of reproduction.

Maize is typically only sown once during the year, as soon as the rainy season starts. Maize production is generally geared towards household consumption. In the second sowing season, the land previously used for the cultivation maize is now used for growing sesame. The production of banana, papaya, coconut and plantains is constant year-round, but peaks between December and April, following the rainy season.

The prices of basic foods increase from April, peaking between June and July. For this reason, they are classified as the most difficult months. Additionally, the lack of work, due to the seasonal cycle of productive activities, encourages the temporary migration of the poor group during the months of January to April, months when fishing is reduced and tourism falls. The most common destinations are zone GT12, for the sugarcane harvest, and to urban centers, including Guatemala City, in search for labor opportunities in the construction sector and domestic services.

Several natural phenomena affect livelihoods in the zone. Floods commonly occur in the months of September and October due to excessive rains and the overflowing of rivers. Occasionally, poor and middle-income groups lose their productive assets. The overflow of rivers is common during the rainy season. There are a number of events that can lead to flooding: flash floods in the local area, heavy rainfall further upstream and tropical storms. Red tide occurs between the months of February to April, due to changes in ocean temperature; however, it is not a yearly occurrence. Rough sea conditions due to rain and strong winds prevent fishermen from going out to sea. Many of the boats used in the livelihood zone cannot withstand rough seas. Fishermen report a steady increase in seawater temperature. This implies that, for a regular fishing, they need to sail further away from the coast to deeper waters, further than they normally would (over 40 km).

Table 1: Determinants of wealth in GT13

Determinants of wealth	Very poor	Poor	Middle
Household percentage (%)	60	30	10
Household size (#)	6-7	5-6	4
Land holding *(ha)*			
Land area cultivated	> 0.70 (rented)	> 0.7x (rented)	> 0.7 0.08
Typical livestock holding (#)			
Cattle	0	0	0
Goats	0	0	1
Pigs	1	1-2	4-5
Poultry	0	1-3	5-10
Other productive assets			
Tools and equipment	Cast nets, hooks	Cast nets, hooks, canoes, and coolers.	Powerboats, modern fishing equipment
Vehicles	0	Bicycles	Motorbikes

Source: FEWS NET

Wealth breakdown

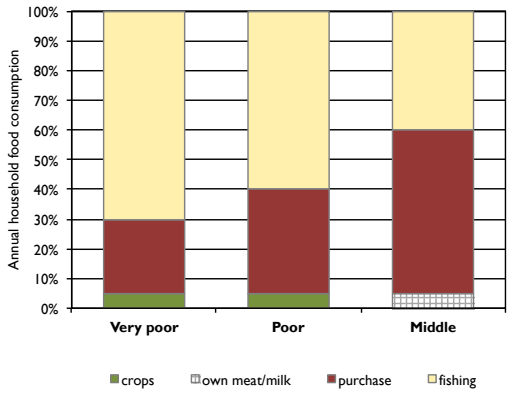
Three socioeconomic groups are distinguished in this zone, poor, middle-income and better-off households, which differ from each other in relation to their productive assets (especially fishing equipment) and to a lesser extent land tenure. The poor and very poor are fishermen who sell their labor to earn an income and supplement the income generated from their own fishing. The very poor are fishermen with very few resources. They are engaged in artisanal fishing with cast nets and fishing rods, but their livelihood depends more substantially on fishing labor. When there is no fishing labor available, they search for unskilled labor in the surrounding area but do not usually migrate. Poor households are relatively similar, the main difference lies in the fact that they have access to fishing boats, either borrowed or rented, which reduces their need to work for others, and they own coolers that are key to preserving fish/seafood for longer time periods, in order to travel longer distances to markets, where they can negotiate a better price. They may also own

their own canoes used for fishing in the estuaries. During the low season, male members of the family migrate to the capital or surrounding areas to work.

The last group, the more affluent one, is engaged in similar activities but with some degree of modernization (motorized boats and larger, better quality cast nets) allowing them to obtain higher production volumes. Middle-income households generally do not go out fishing themselves, but rent their equipment to other fishermen and provide employment on their boats. They are, therefore, mainly occupied with the sale of fish.

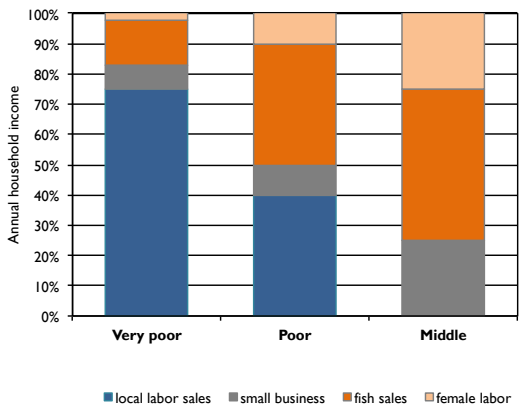
Sources of food and income (estimated weight)[49]

Figure 4: Food sources by wealth group in GT13



Source: FEWS NET

Figure 5: Cash income sources by wealth group in GT13



Source: FEWS NET

Figure 4, above left, presents the sources of food commonly accessed by households in each wealth group throughout the year and their estimated relative weight in terms of approximate quantities of food consumed during the year. Figure 5, above right, presents the different typical sources of income for each wealth group and their relative importance to the annual household budget. Both sets of data were collected using the proportional pilling quantification technique, common in rapid rural appraisals.

Not surprisingly, fishing provides a substantial source of food for all wealth groups. For very poor and poor households most of the fish consumed represent in-kind payments for their labor for larger fishermen. Middle-income households receive the catch, sell some of it and consume the rest. Only poor and very poor produce some maize for their own consumption, most households have incorporated this activity to their livelihoods in view of the recent decline in fish stocks, due to sea increasing sea pollution related to the sugarcane harvest. Middle-income households include animal products in their diet from their own stocks (eggs, chicken, pork meat and, occasionally, goat meat).

With regards to income sources, very poor households only earn a small amount per year from the sale of fish, as they only own rudimentary fishing equipment. They rely on working for others or leasing their equipment in return for a percentage of their daily catch (included under 'local labor sales' in the graph above). As a result, the amount of fish they have for sale is limited. Poor and middle-income households represent well-established fishermen and the sale of fish provides half of their annual

[49] The quantitative information provided in this section is derived from four field interviews, in Pajapita (department of San Marcos), Champerico (department of Retalhuleu), Escuintla (department of Escuintla) and Chiquimulilla (department of Santa Rosa).

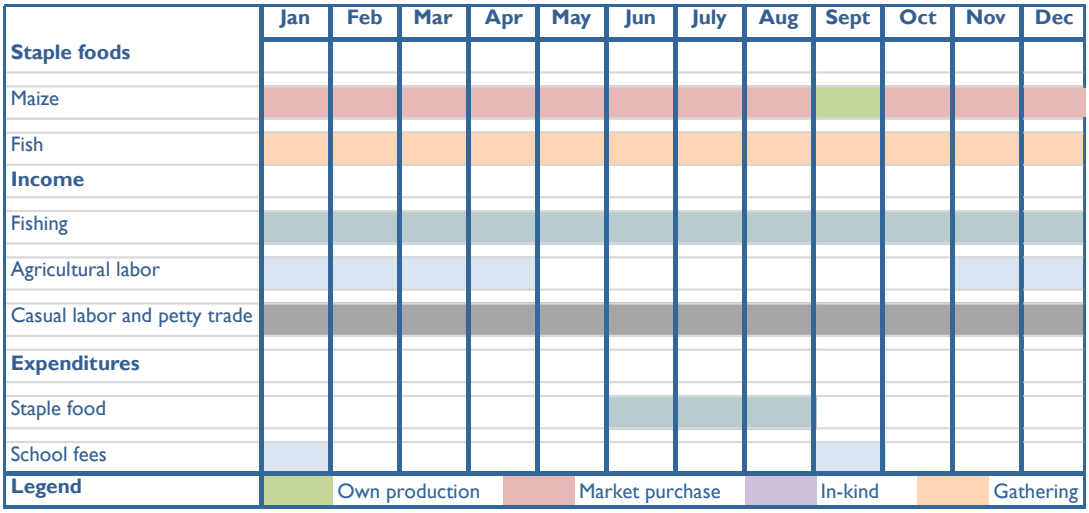
income. However, the decline in the quality of the water in rivers and estuaries is having an affect on their activities too.

Fishing income is supplemented by sale local labor sales in other sectors, agricultural plantations or the tourism and construction sectors. Poor households also depend on local labor sales to supplement their income, despite the higher earnings from fishing. It is the middle-income who benefit the most for the zone's tourist attraction. Because they own powerboats they can provide boat ride services, they have also set up small restaurants and even hotels directed at the tourist industry.

Women's financial contribution to the household budget is visible in the selling of fish to local consumers, selling handicrafts and other small items to local consumers and tourists and, in the case of middle-income households, wage labor in the tourism and service sector.

Calendar of major sources of food and income for poor households

Figure 6: Main components of the food access calendar for poor households in GT13



Source: FEWS NET

The weight of agriculture in this zone is minimal, it provides only one month of food provisions for poor households during the harvest season. The remaining months they purchase staple foods from the local markets. Fishing provides a constant source of animal protein, either from fish caught directly or as in-kind payments when working for other fishermen. Annual income is generated from four major sources: fish sales and fish labor, seasonal agricultural labor, year-round casual labor in a variety of sectors (tourism, construction and services), and the petty trade of a variety of products, including crafts or prepared foods. Adult household female members also work year-round; they are normally in charge of fish sales and other types of petty trade, and also work in the service sector.

In terms of expenditure, the purchase of staple foods is the largest household expenditure through the year. Expenses related to land rental and agricultural inputs increase before the land preparation and sowing seasons. School expenses also represent significant costs for the household, especially at the beginning of the school year.

Hazards and household response

Flooding - when the rainy season continues for longer than expected, the soil becomes waterlogged which can lead to floods that cause crop losses.

Over-exploitation of resources - the fauna and flora of the zone are being destroyed because many wild species are hunted for sale by the poorest socioeconomic groups, without sustainable management.

Drought - variations in the duration of the *canícula* dry spell causes crop losses due to the lack of rain. Drought can also have an impact on the demand for labor in the zone and in neighboring zones where local laborers migrate to. Lack of rainfall also has an effect on fishing, as it reduces the volumes of water in rivers and estuaries.

Extension of sugarcane exploitations – the change in soil uses favoring sugarcane production is a constant threat to local livelihoods, due to the environmental impact of this type of crop. The creation of large sugarcane plantations, which require irrigation, has led to the diversion of rivers and drying up of artisanal wells used by the local population, the destruction of much flora and fauna following the use of pesticides and maturing agents, which end up in the rivers, seas and underground water reserves. The use of pesticides has even led to skin problems for plantation workers and people living in close proximity to the plantations.

Red tide – red tide is a phenomenon caused by periods of excessive blooming of algae during which algae become so numerous that they discolor coastal waters (hence the name "red tide"). The causes of red time include warm ocean surface temperatures, low salinity, high nutrient content, calm seas or rain. Water pollution may also be an aggravating cause. The algae can spread or be carried long distances by winds, currents, storms, or even ships. While the algae are not directly toxic to fish, the toxins can concentrate in the algae-eating fish to levels that are harmful to humans. As a result, the sale of certain types of fish (e.g. most mollusks) is banned during episodes of red tide.

Human diseases – illnesses such as dengue and malaria, prevalent during the wet seasons when the demand for fish labor is highest, affect the working capacity of the fishermen and, therefore, the household's income.

In order to cope with changes in weather patterns, price hikes and other hazards, households resort to certain strategies. Listed below are the common strategies used by households in this livelihood zone during bad years, following a particularly bad season. Different strategies are available for households in different wealth groups.

Table 2: Coping strategies in response to shocks in GT13

Very poor/poor	Middle
Intensify fishing labor	Rely on savings
Fish in fishing grounds located further from the coast	
Request informal loans	
Migration to Guatemala City	
Intensify sugarcane harvest labor	

Source: FEWS NET

Annex 1. List of participants

List of participants to National Livelihood Zoning update workshop, held in Guatemala City from February 1 to 4, 2016.

Name	Organisation
Mario Chocooj	ANACAFE
Adlai Meneses	ASAZGUA/CENGICAÑA
Rudy Vásquez	MAGA - Gestión de Riesgos
Nery Pérez	MAGA DIPLAN
Ricardo Miyares	SEGEPLAN
Gustavo García	FAO
Glenda Lee	Terra Global Capital
Gunther Lottmann	Terra Global Capital
Josefina Tamayo	Programa Mundial de Alimentos
Rodrigo Mancilla	BANGUAT
José Luis López	INE - ENA
Humberto Tejada	Experto en Granos básicos
Jaime Carrera	IARNA
Gilda Walter	FEWS NET
Gabriela Juarez	
Lorena Aguilar	
Edgar Escobar	
Mario Rodriguez	
Adriana Moreno	Consultora Responsable FEWS NET

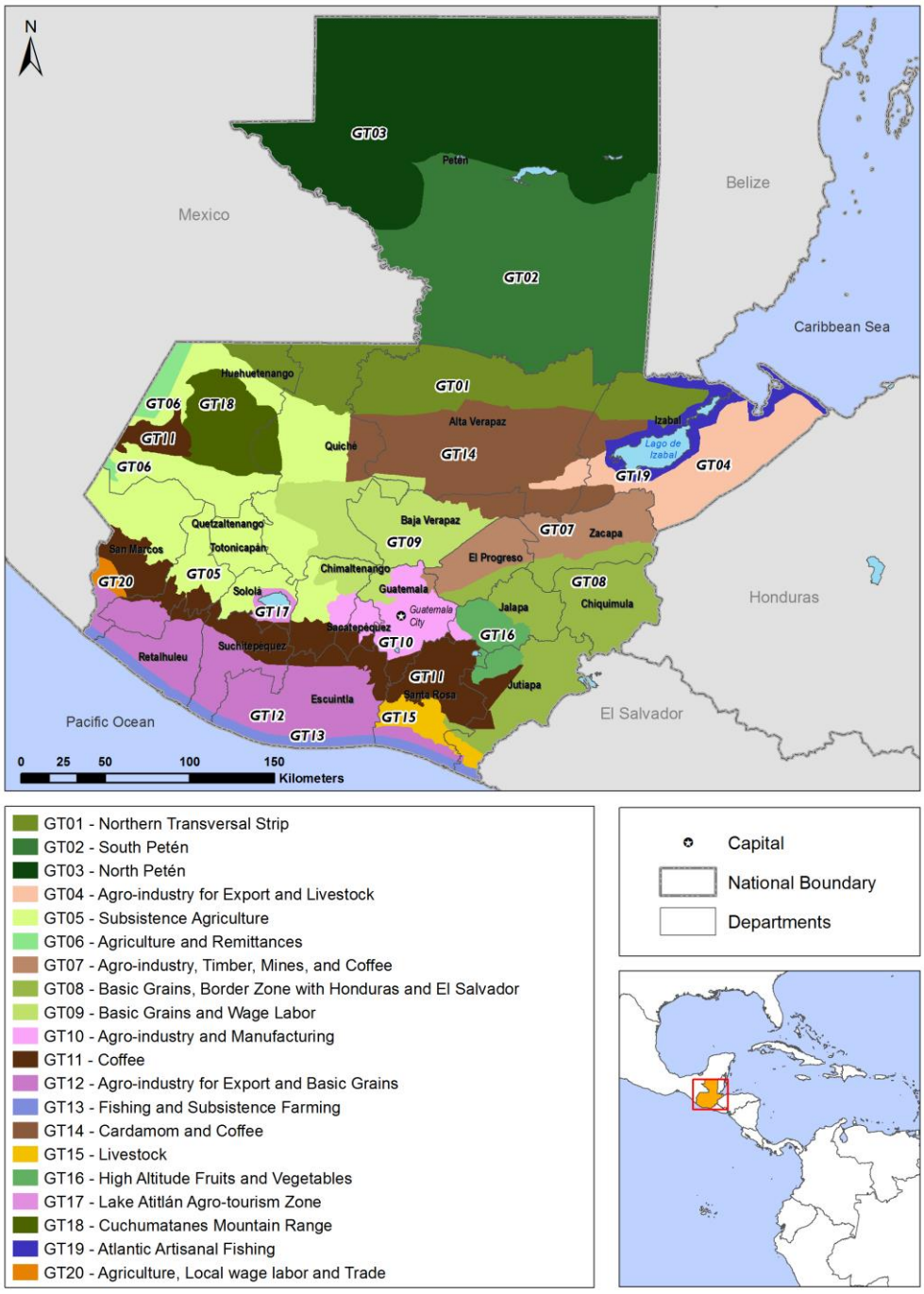
List of participants as data collectors during the field work, from July 18 to 29, 2016

Name	Organisation
Luisa Samayoa	FAO
Gustavo Velásquez	FAO
Gustavo Batres	COOPI
Vernon Pérez	COOPI
Rubelio Méndez	COOPI
Ana Gómez	PMA
José María Monroy	PMA

Alfredo Hernández	SESAN
Hersy Eusebio Reyes	SESAN
Nestor Emilio García	SESAN
Erick Estuardo Barilla	SESAN
Fernando Portillo	ACF
Rudy De León	ACF
Edgar Escobar	FEWS NET
Ana González	FEWS NET
Erika Ruano	FEWS NET
Gabriela Juárez	FEWS NET
Gilda Walter	FEWS NET
Adriana Moreno	Consultora Responsable FEWS NET

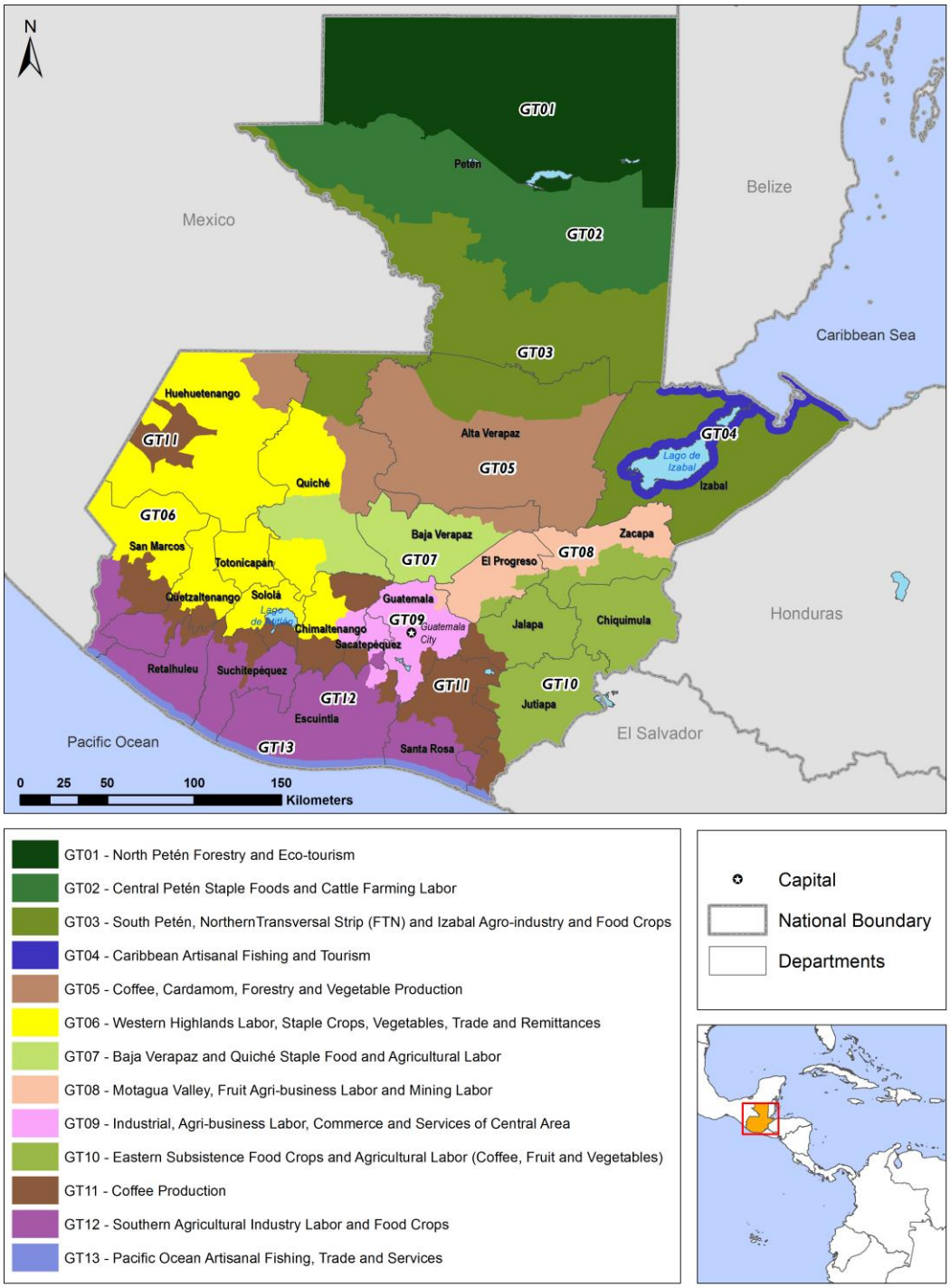
Annex 2. Major changes to livelihood zone boundaries since 2010 mapping

Map 1: 2010 Livelihood zone map for Guatemala (updated since 2005 original map)



Source: FEWS NET

Map 2: 2016 Updated livelihood zone map for Guatemala



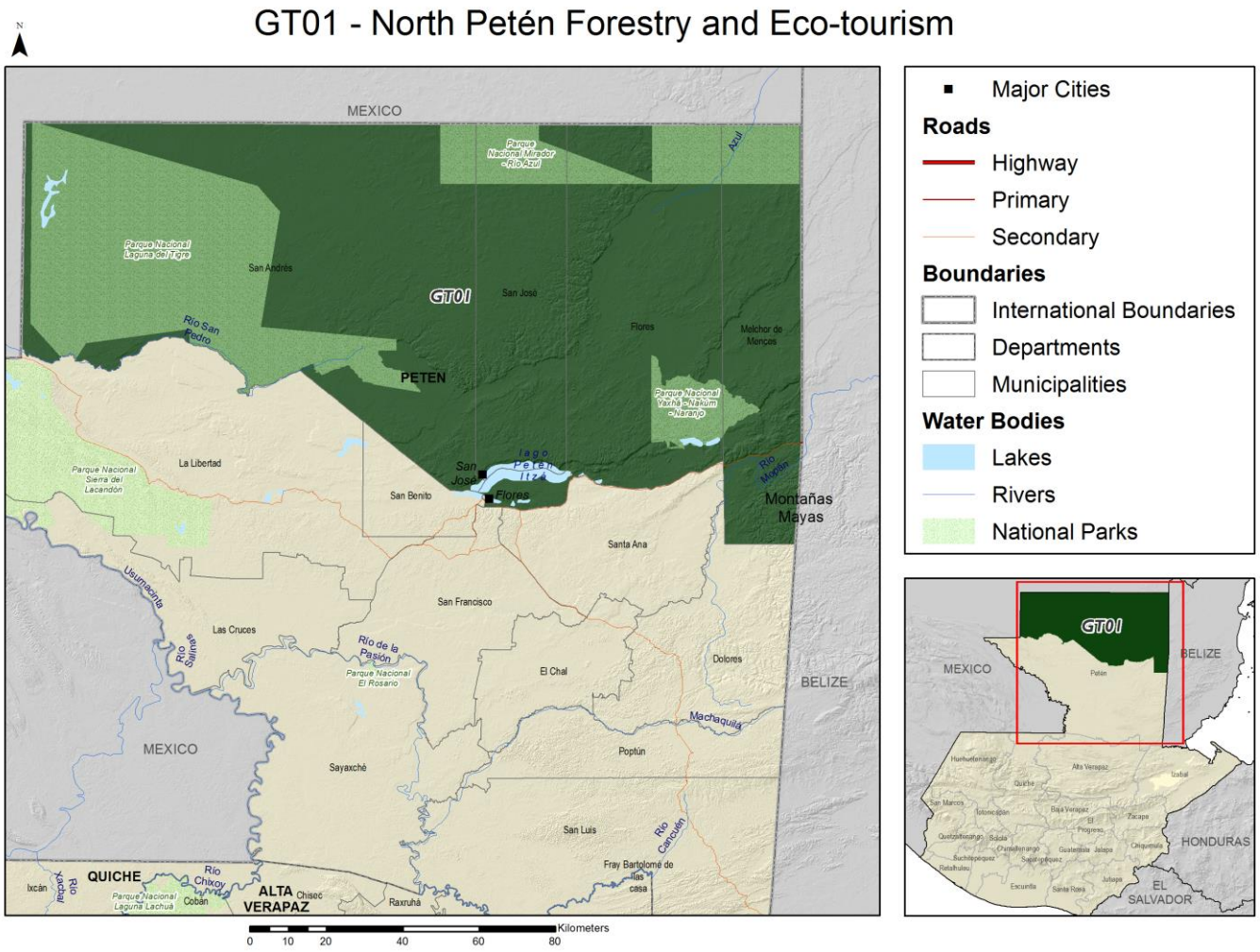
Source: FEWS NET

Old livelihood zones (in Spanish)	Updated livelihood zones (in English)	Changes and justification
Zone 1: Northern Transversal Strip + Zone 4: Agro-industry ofr Export and Livestock	GT03. South Petén, FTN and Izabal agro-industry and food crops	The boundaries of the zone changed with the merging f the original zones 1 and 4, which share the same livelihood. The production of basic grains in zone 1 has stopped being the most important economic activity, which has now been replaced by selling labor in African palm plantations due to the exponential growth of the export agro plantations.
Zone 2: South Petén	GT02. Central Petén staple foods and cattle farming labor	The boundaries of the zone changed, they are now smaller. The importance of livestock rearing for meat as increase, however the zone still remains a major producer of staple grains.
Zone 3: North Petén	GT01. North Petén forestry and eco-tourism	The boundaries of the zone changed, they are now larger. The zone's title now includes two new activities: ecotourism and logging.
Zone 5: Subsistence Agriculture + Zone 6: Agriculture and Remittances + Zone 18: Cuchumatanes Mountain Range	GT06. Western highlands labor, staple crops, vegetables, trade and remittances	The boundaries of the zone changed with the merging of the original zones 5 and 6, which share the same livelihood patterns. The zone's title was updated to highlight the main sources of livelihood: labor, staple grain production, vegetable production, remittances and trade (both formal and informal) due to the close proximity of the border with Mexico. Fruit production is also important but was not included in the tittle, as it would become too long. The validation fieldwork confirmed the importance of formal and informal cross-border trade, including smuggling from Mexico. Better-off households engaged in legitimate commercial activities, while the other socioeconomic groups, especially middle-income and poor groups, are engaged in informal trade, linked to the smuggling of consumer goods across the Mexican border. Another important change concerns the highlands of Huehuetenango, known as the *Serrania de los Cuchumatanes* (zone 18 in the previous profile). This area now joins the GT06 livelihood zone, despite its unique features as a potato production and sheep breeding area, because the size of this community is very small (located in the highlands of three municipalities, and especially the municipality of Chiantla). Another special feature is the production of poppy seeds after potato cultivation, focused on the Mexican border in San Marcos and Huehuetenango departments.
Zone 7: Agro-Industry, Timber, Mines and Coffee	GT08. Motagua Valley, fruit agri-business and mining labor	The boundaries of the zone changed and the zone's title updated to highlight the importance of fruit growing, a key activity in the area led by large-scale commercial growers.
Zone 8: Basic Grains, Border Zone with Honduras and El Salvador	GT10. Eastern subsistence food crops and agricultural labor (coffee, fruit and vegetables)	The boundaries of the zone changed, they are now larger, and the zone's title was updated to highlight the main economic activities.
Zone 9: Basic Grains and Wage Labor	GT07. Baja Verapaz and Quiché staple food and agricultural labor	The boundaries of the zone changed to exclude the municipality of San Juan Sacatepéquez, now part of zone GT10. The zone's title was updated to describe the main characteristics better.

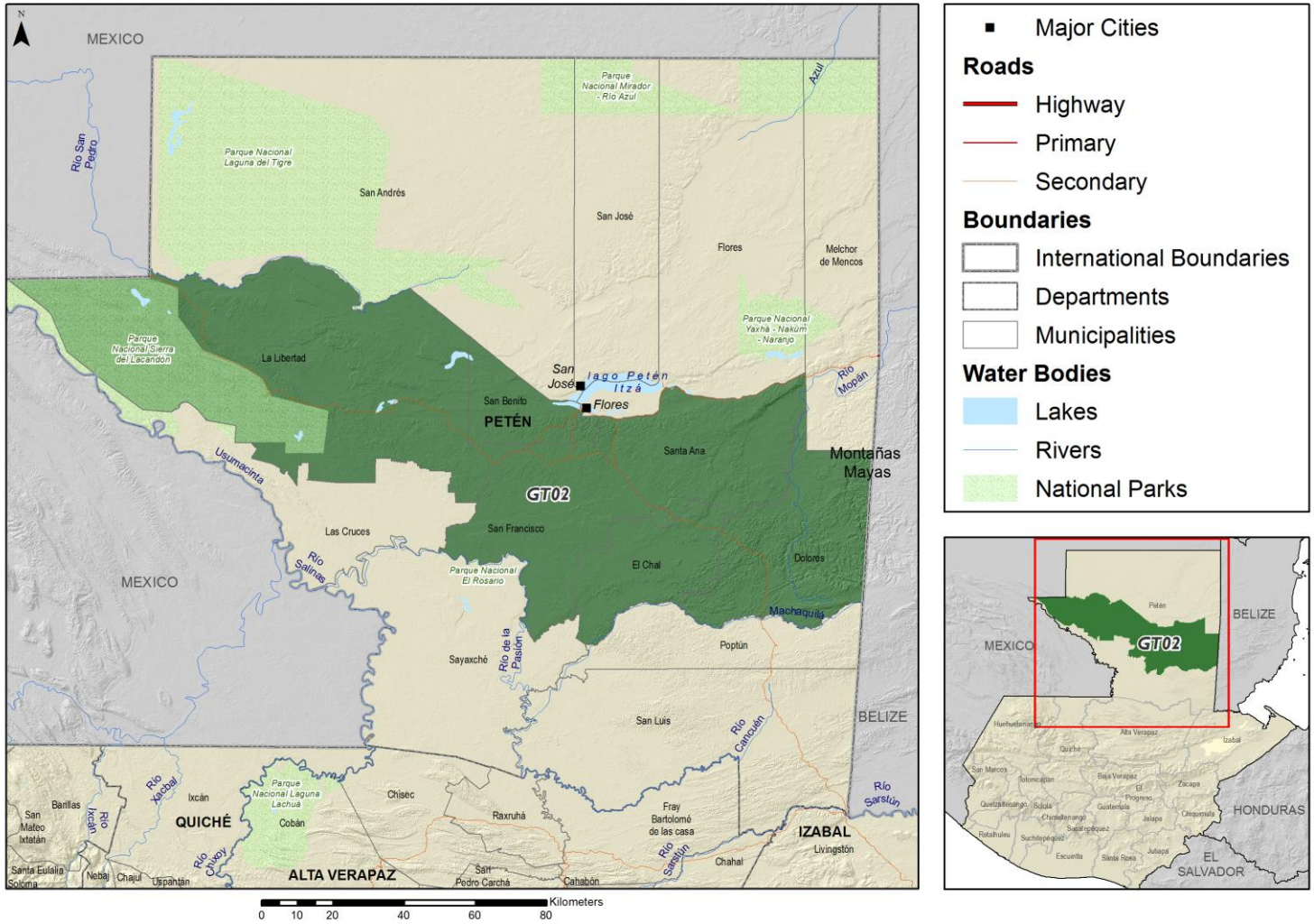
Zone 10: Agro-Industry and Manufacturing	GT09. Industrial, agri-business labor, commerce and services of Central Area	The boundaries of the zone changed to include the municipality of San Juan Sacatepéquez (formerly part of the old zone 9), as well as the municipalities located south-western department of Chimaltenango (formerly part of zone 5) . The zone's title was updated to better describe the main characteristics of the local economy. The rapid urbanization and the growth of the industrial sector in the area slightly modified the main sources of livelihood for the local population, now encompassing labor opportunities in agro-industrial activities, commerce and the related service industry (security, cleaning, call-centers, restaurants, etc).
Zone 11: Coffee	GT11. Coffee production	The revision of the boundaries of the area became necessary as a result of the devastating effects of coffee rust on crop harvests and the fluctuations in producer prices, which at certain periods have fallen below production costs. The zone's geographical coverage has been reduced considerably. Additionally, the old zone 17, around lake Atitlan, has been incorporated into zone GT11 because in some municipalities in the south of department local livelihoods depend on coffee production and not on tourism, which was the main economic activity of the former zone 17. Only a minority of households are directly involved in the tourism sector as a major source of livelihoods.
Zone 12: Agro-Industry for Export and Basic Grains + Zone 15: Livestock	GT12. Southern agri-business labor, food crops and milk	Two former livelihood zones, numbers 12 and 15, have been joined since the majority of the population living in this region shares the same way of life. Dairy farming is an activity that is combined with agribusiness, but only typical for middle-income and better-off socioeconomic groups and accommodated in the area. Although the zone's title still retains the reference to the production of basic grains, its importance has diminished considerably. The agribusiness led cash crop production has replaced local food crop production. Today, staple food imports from Mexico have largely replaced the maize produced in this area, which used to represent a large proportion of supplies to the highland markets.
Zone 13: Fishing and Subsistence Farming	GT13. Pacific Ocean artisanal fishing, trade and services	The zone's title was updated to better describe the main characteristics of the local economy.
Zone 14: Cardamom and Coffee	Zone GT05. Coffee, cardamom, forestry and vegetable production	The boundaries of the zone changed to include Barillas. The zone's title was updated to better describe the main characteristics of the local economy. Cardamom production has been declining as a result of low prices; coffee, however, has recovered, especially among medium-sized growers. The field validation exercise confirmed the existence of many renovated coffee plantations, the extension of the zone to Barillas, and the importance of coffee as a first productive activity in the area, displacing cardamom. Forestry activities, understood as conservation and reforestation, have taken on greater importance in the area, thanks to forest incentives provided by the State (PINPEP – for small farmers; PINFOR - for larger-scale farmers).
Zone 15: Livestock	n/a	This former zone disappears and is included under the new GT12 livelihood zone. The reason behind this change is that cattle rearing is only practiced by affluent households and, because it doesn't require large amounts of labor, it does not generate a considerable amount of employment nor a source of livelihoods for a large part of the population.

Zone 16: High Altitude Fruits and Vegetables	n/a	This former zone disappears and is included under the new GT09 livelihood zone. The livelihoods of the majority of the population living in this area are dependent on the sale of labor for the production of such crops (vegetables and crops) not on production.
Zone 17: Lake Atitlán Agro-Tourism Zone	n/a	This former zone disappears and the southern municipalities are included under the new GT11 livelihood zone, since tourism activities do not constitute the livelihood of the majority of the population. The livelihoods of the majority of the population living in this area are dependent on coffee production and supplement their income with informal trade. The municipalities located in the north of the former zone 17 are now included in the new GT06 livelihood zone, since there, livelihood are based on the production of basic grains for subsistence and trade, not coffee. The tourism-related activities are concentrated in a small group of population, located in areas very close to the lake.
Zone 18: Cuchumatanes Mountain Range	n/a	This former zone disappears and is included under the new GT06 livelihood zone, because the livelihoods of the majority of the population are more closely related to the sale of agricultural labor, and only a small percentage of the population of the upper parts of this area rely on potato cultivation and breeding sheep. Given the small size of the area, a separate livelihood zone is not justified.
Zone 19: Atlantic Artisanal Fishing	GT04. Caribbean artisanal fishing and tourism	The zone's title was updated to better describe the main characteristics of the local economy, include two relevant activities: labor and services in the tourism sector and in the Port Santo Tomas de Castilla. The width of the strip was reduced slightly, up to 2 km in length.
Zone 20: Agriculture, Local Wage Labor and Trade		This former zone disappears and is included under the new GT12 livelihood zone, due to the important growth of agro-industrial producers, which has generated an increase in the demand for labor and drawn a large proportion of the population to work as casual laborers.

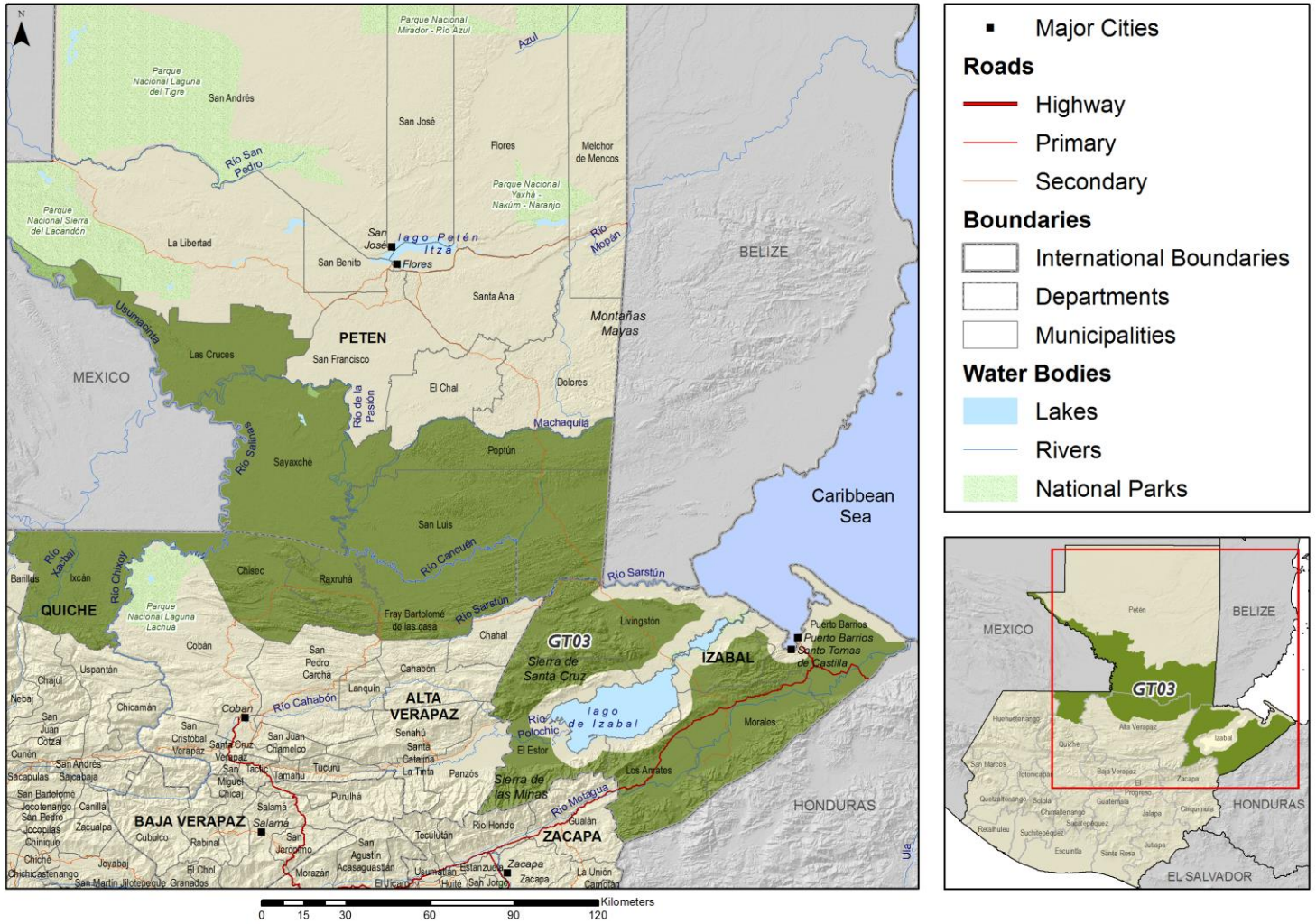
Annex 3. Detailed Maps of Livelihood Zones



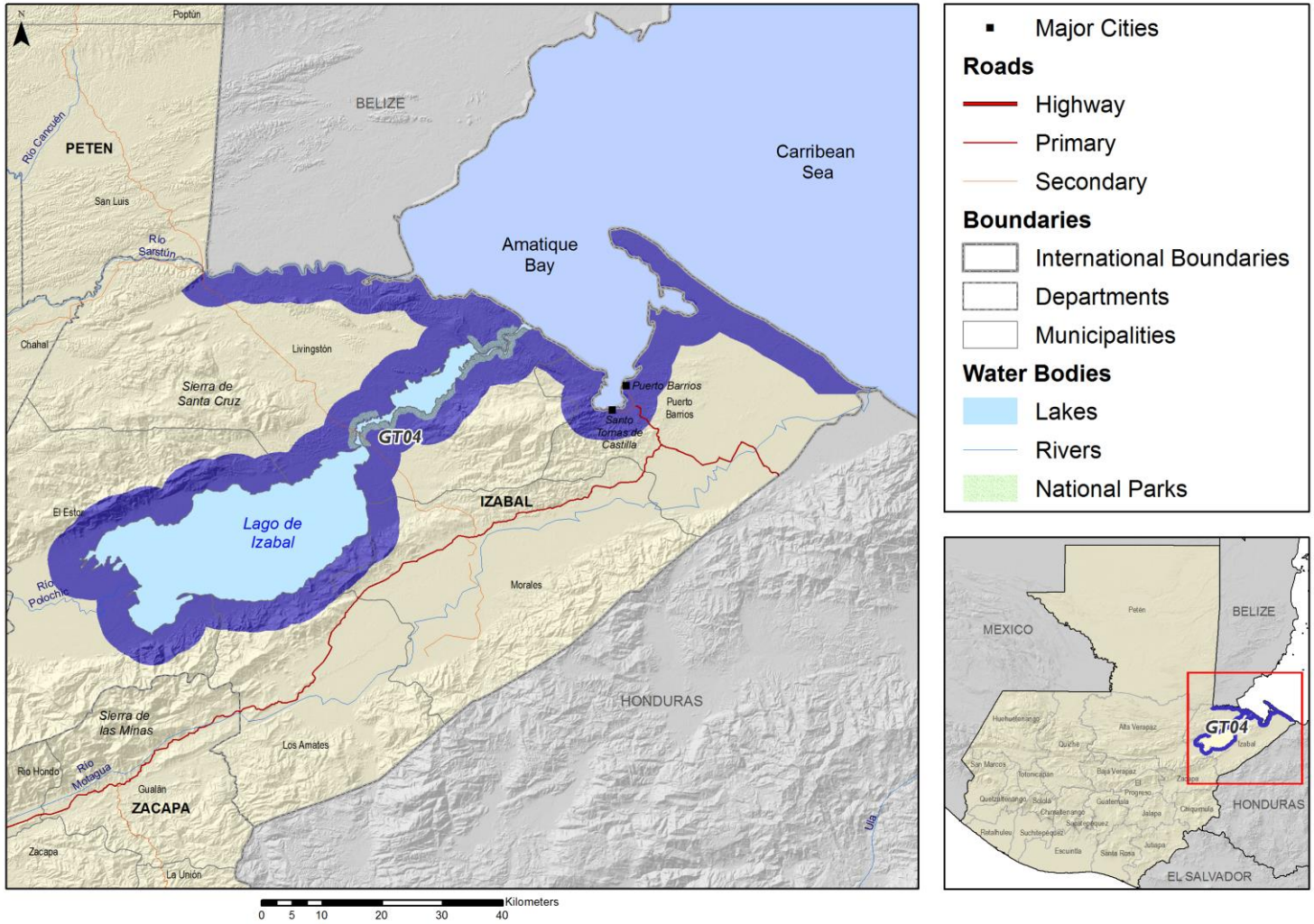
GT02 - Central Petén Staple Foods and Cattle Farming Labor



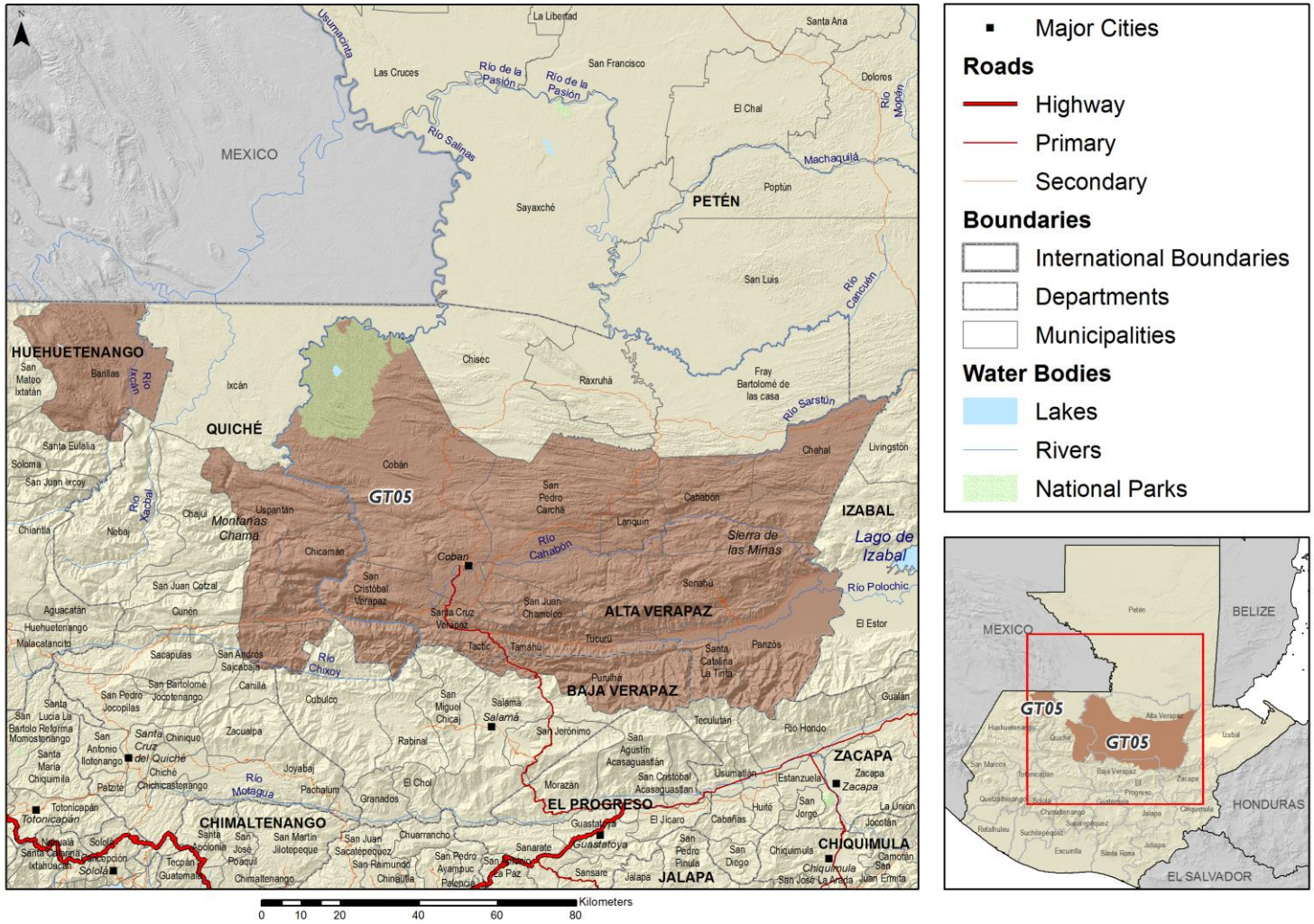
GT03 - South Petén, NorthernTransversal Strip (FTN) and Izabal Agro-industry and Food Crops



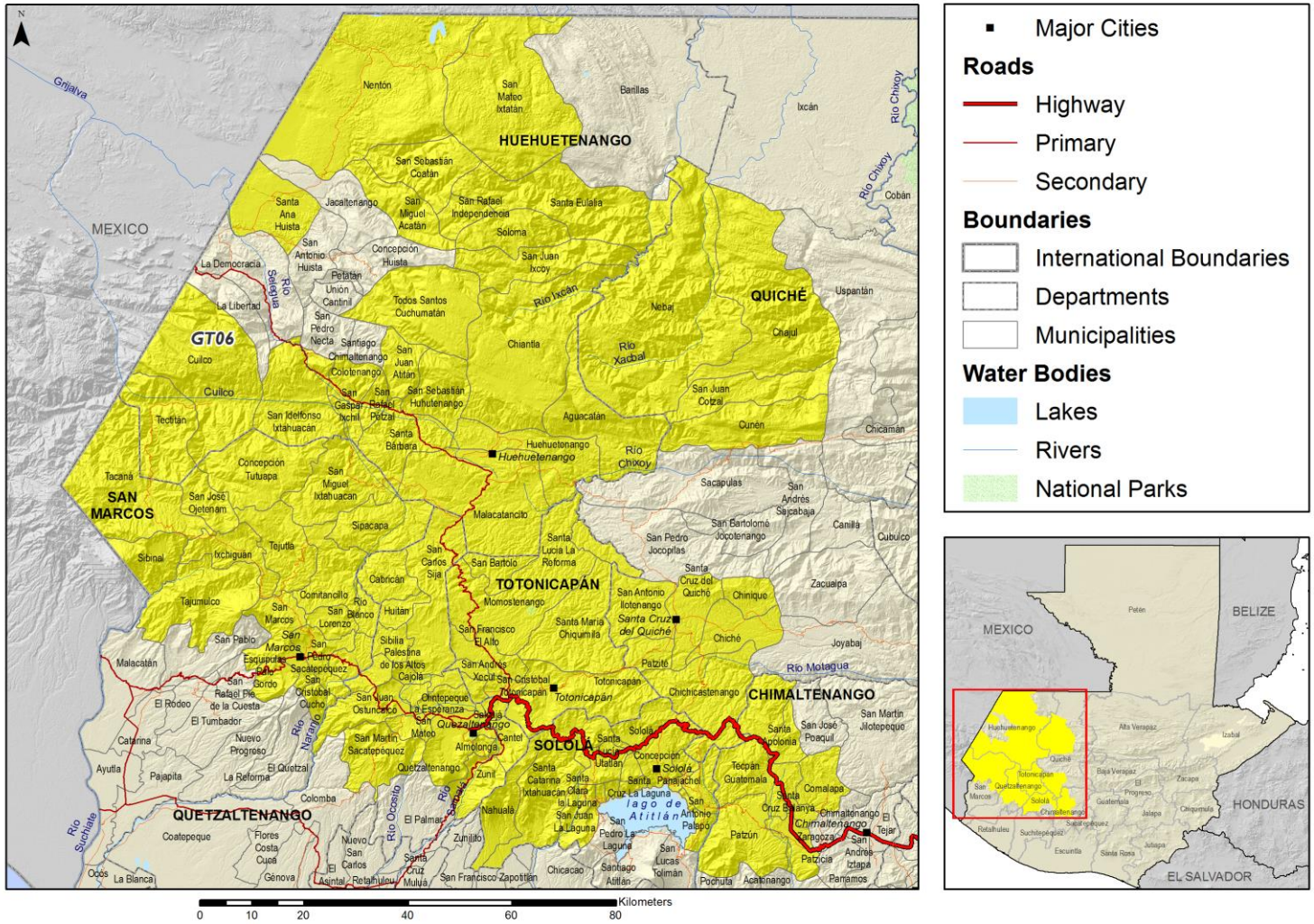
GT04 - Caribbean Artisanal Fishing and Tourism



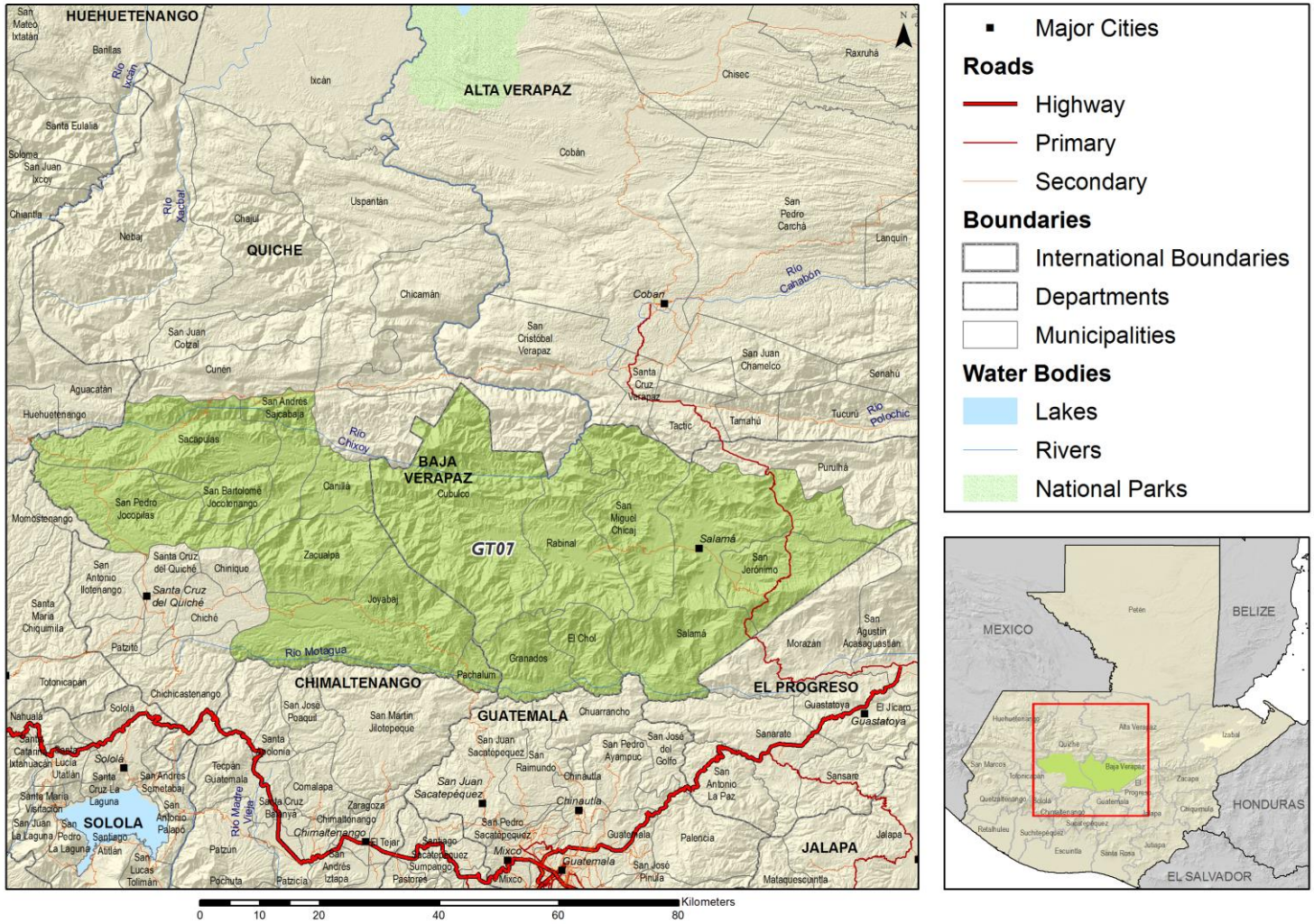
GT05 - Coffee, Cardamom, Forestry and Vegetable Production



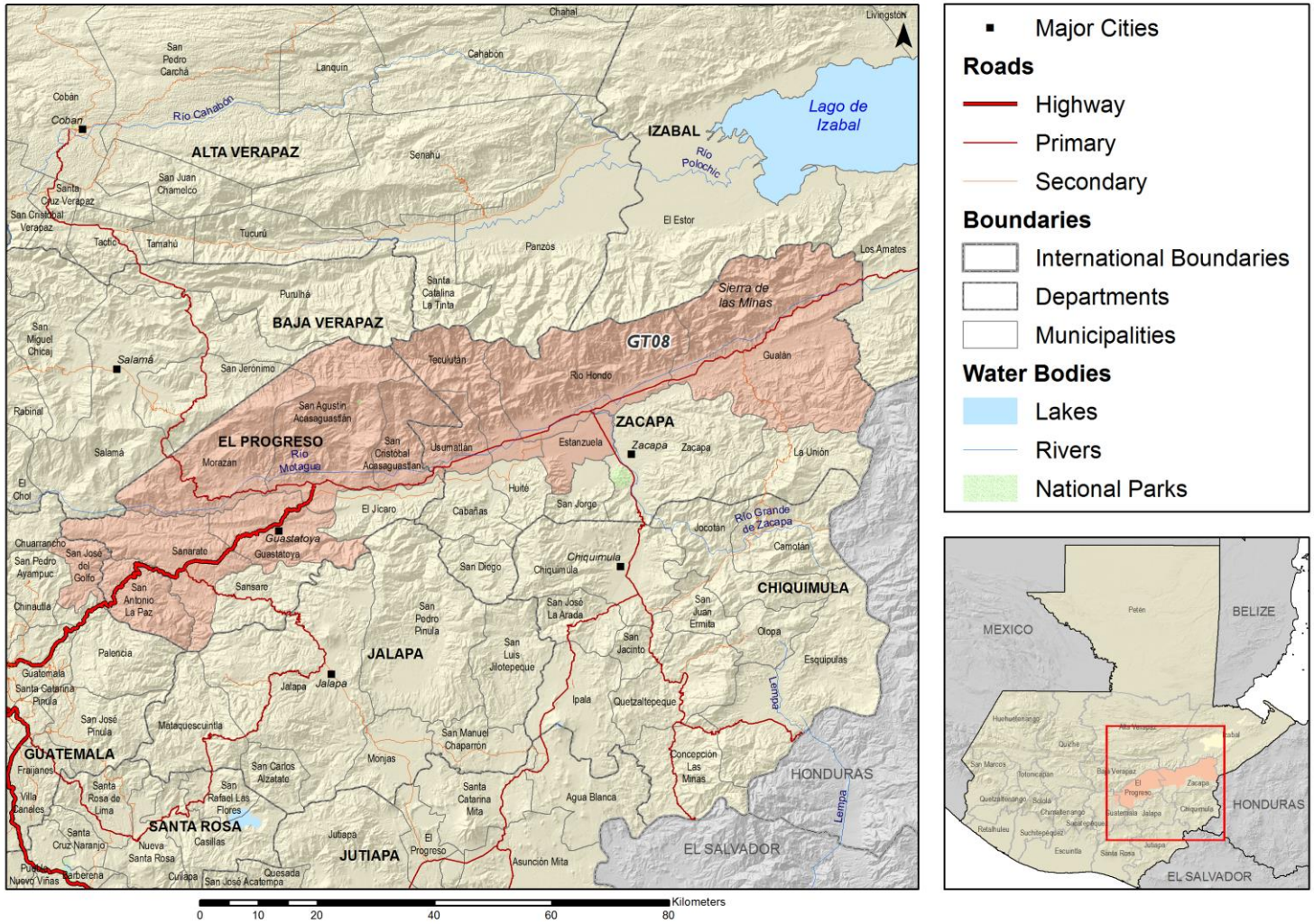
GT06 - Western Highlands Labor, Staple Crops, Vegetables, Trade and Remittances



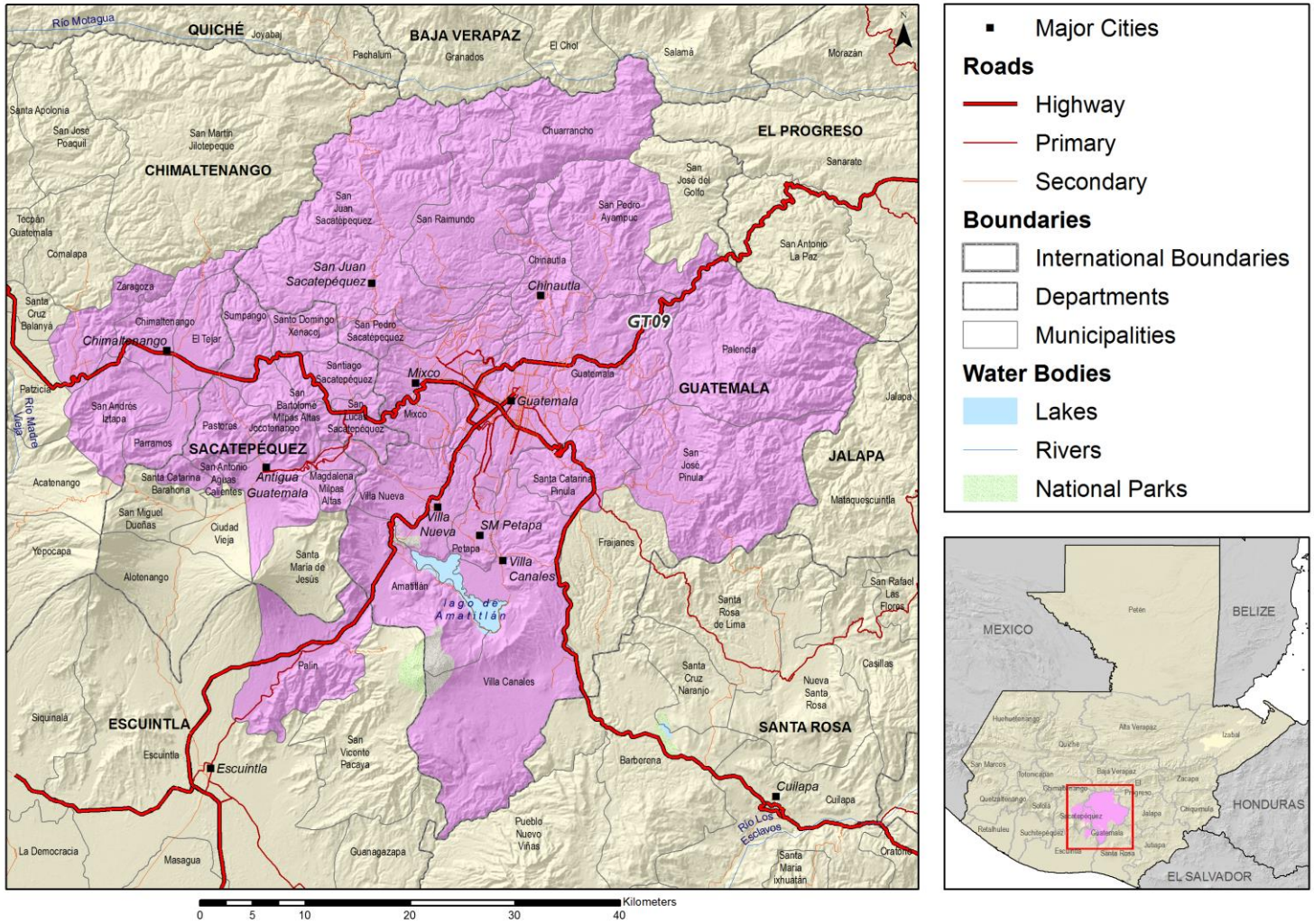
GT07 - Baja Verapaz and Quiché Staple Food and Agricultural Labor



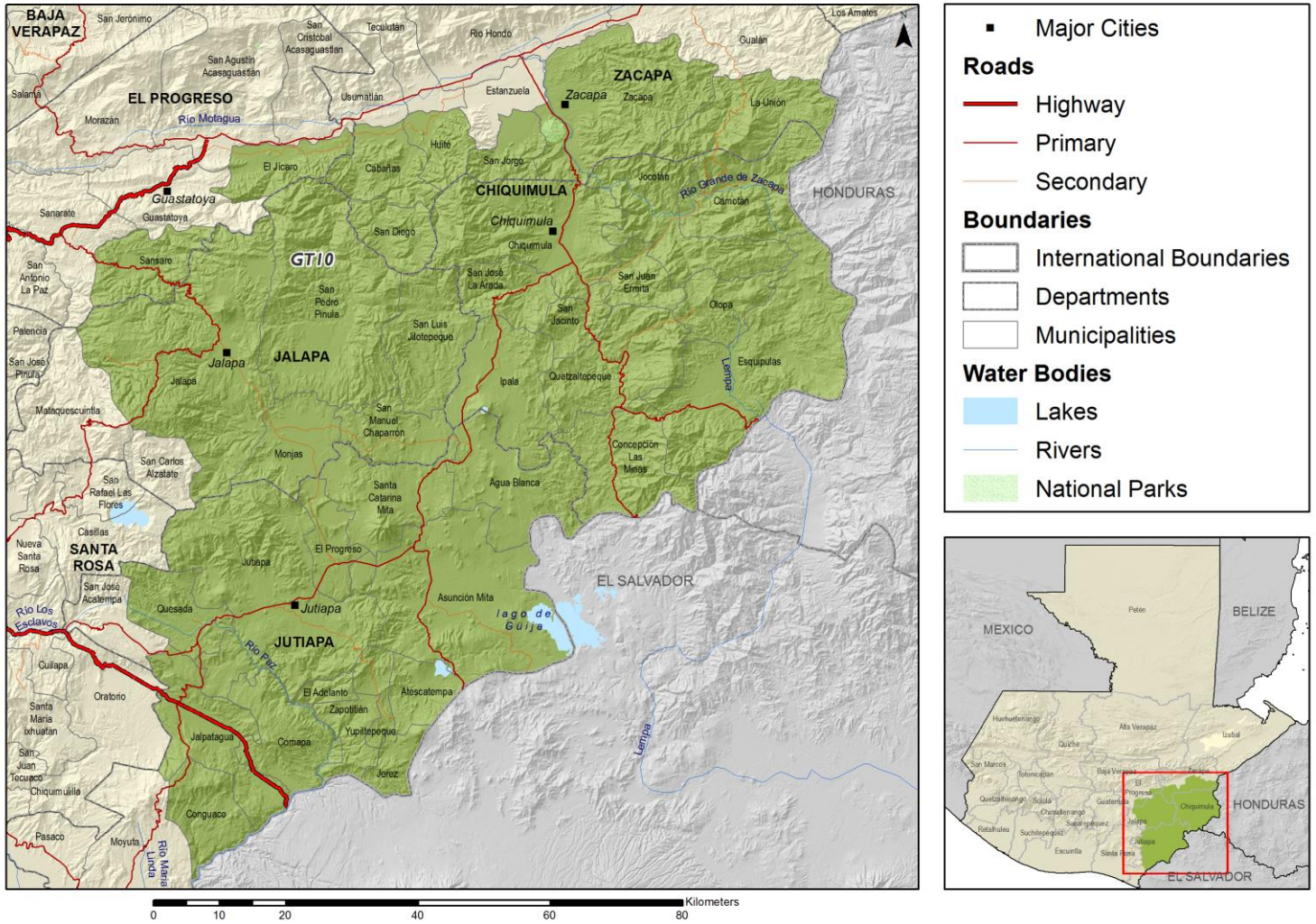
GT08 - Motagua Valley, Fruit Agri-business Labor and Mining Labor



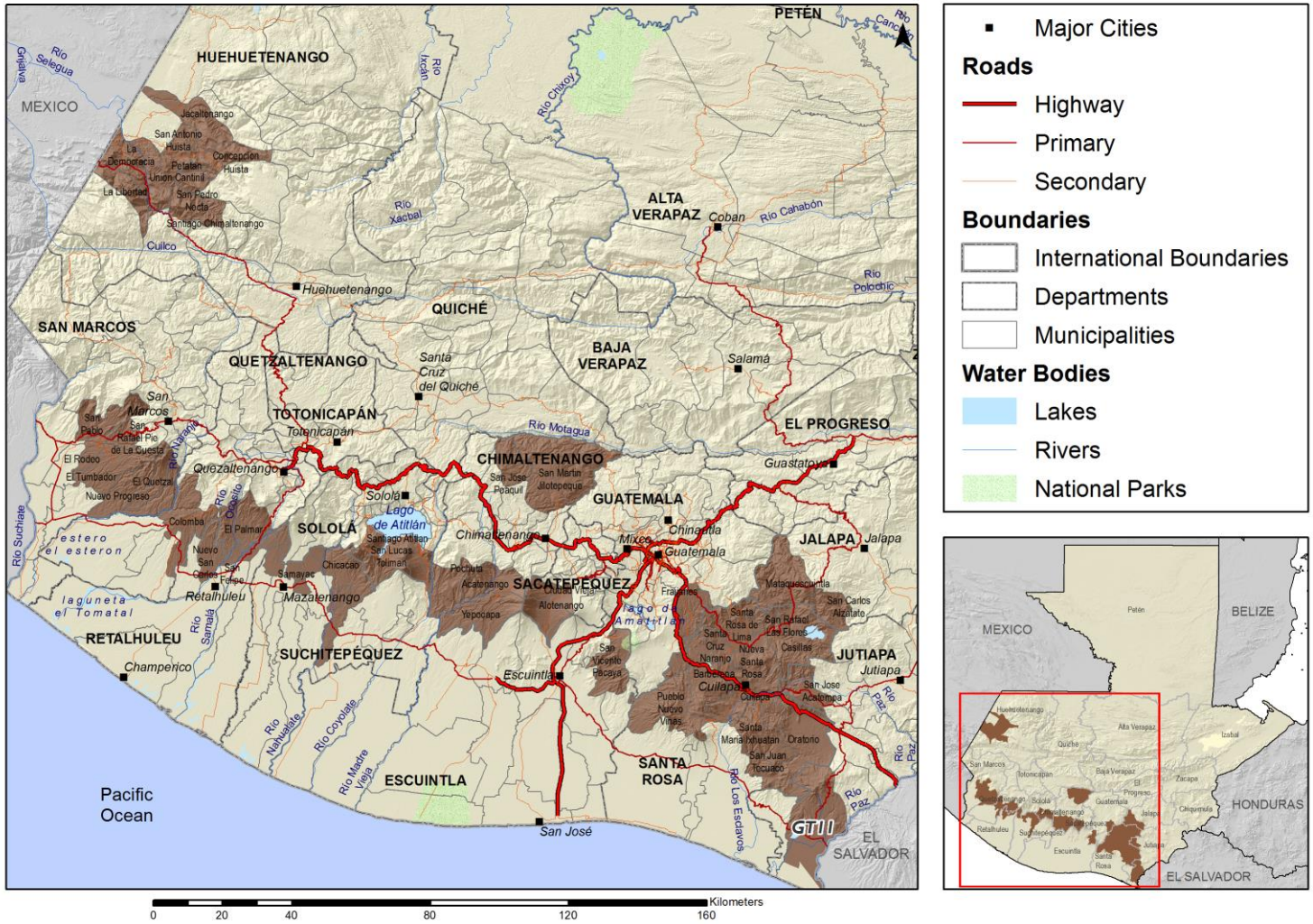
GT09 - Industrial, Agri-business Labor, Commerce and Services of Central Area



GT10 - Eastern Subsistence Food Crops and Agricultural Labor (Coffee, Fruit and Vegetables)



GT11 - Coffee Production



GT12 - Southern Agricultural Industry Labor and Food Crops

▪ Major Cities	**Boundaries**	**Water Bodies**
Roads	International Boundaries	Lakes
Highway	Departments	Rivers
Primary	Municipalities	National Parks
Secondary		

GT13 - Pacific Ocean Artisanal Fishing, Trade and Services

▪ Major Cities	**Boundaries**	**Water Bodies**
Roads	International Boundaries	Lakes
Highway	Departments	Rivers
Primary	Municipalities	National Parks
Secondary