FEWS NET
FAMINE EARLY WARNING SYSTEMS NETWORK

SALOHI

WFP
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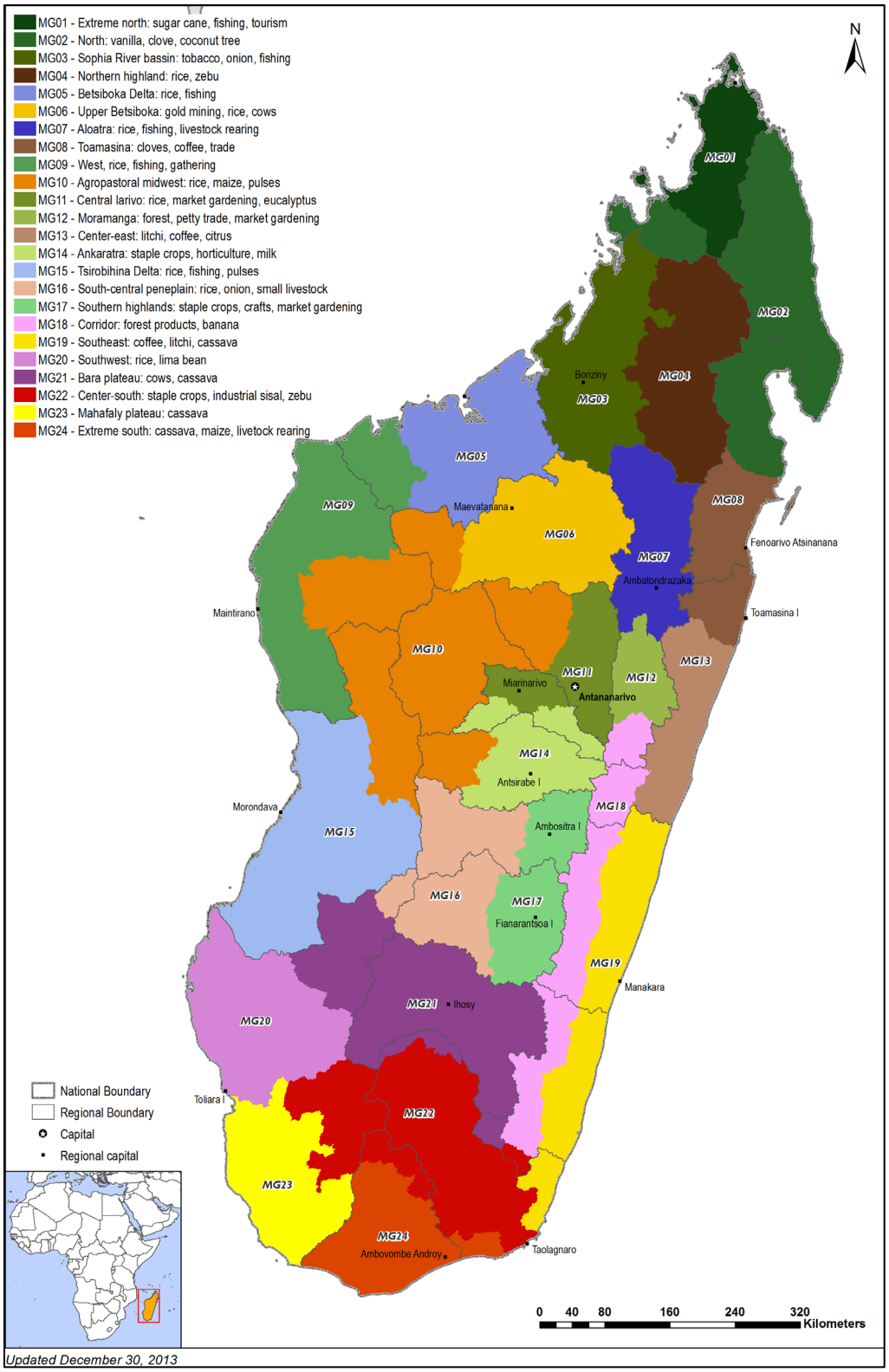
MADAGASCAR Livelihood zone map and descriptions

December 2013

LIVELIHOOD ZONE MAP FOR MADAGASCAR



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ACRONYMS AND ABBREVIATIONS

ADRA	Adventist Development and Relief Agency
AGOA	African Growth and Opportunity Act
CARE	Cooperative for Assistance and Relief Everywhere
CRS	Catholic Relief Services
FEWS NET	Famine Early Warning Systems Network
G	Gathering
GDP	Gross Domestic Product
HEA	Household Economy Approach
LOL	Land O'Lakes
MGA	Malagasy Ariary
MP	Market purchase (of food)
NGO	Non-Governmental Organization
OP	Own production of crops or livestock
SALOHI	Strengthening and Accessing Livelihoods Opportunities for Household Impact (SALOHI) Program
USAID	United States Agency for International Development
WFP	World Food Programme

GLOSSARY

Malgasy	French	English
Adidy	*Responsabilité; devoir, blâme, censure; référence aussi aux devoirs sociaux ou familiaux, surtout circoncision, funérailles et fêtes des ancêtres, nouvel an*	Responsibility, duties; reference to social or familial rites and ceremonies, notably circumcision, funerals, celebrations for ancestors, and New Year
Alizay	*Vent violent surtout venant du sud (Alizé)*	Violent winds mainly from the South
Amparitra	*Contrat de la main-d'œuvre*	Labor contract
Anana	*Feuilles, surtout herbes potagères, brèdes*	Edible leaves, including herbs
Anjavidy	*Tourbe. mousse qui pousse sur les mauvaises terres. en brulant donne beaucoup de chaleur et peu de fumée*	Peat; a moss that grows on poor-quality soils which, when burnt gives off a great deal of heat with little smoke
Ankaratra	*Ankaratra est une chaîne de volcans éteint/dormants située à environ 50 km d'Antanarivo. Elle se situe entre les villes d'Arivonimamo au nord, Ambatolampy à l'est, Faratsiho à l'Ouest et Betafo au sud. Un peu d'activité volcanique subsiste dans la partie Sud de la chaîne, donnant lieu à des sources thermales autour d'Antsirabe. Le plus haut sommet de la chaîne Ankaratra est Tsiafajavona (jamais sans brouillard) à 2642 m (8668 pieds) au-dessus du niveau de l'océan. Il est situé dans le Plateau Central.*	Ankaratra is an extinct/dormant volcano range located about 50 kilometers southwest of Antananarivo. It lies between the towns of Arivonimamo to the North, Ambatolampy to the East, Faratsiho to the West and Betafo to the South. Some trace of activity remains in the southernmost part of the range, creating hot springs in the area around Antsirabe. The highest peak in Ankaratra is Tsiafajavona ("never out of the fog"), at 2,642 meters (8,668 ft.) above sea level. It is located in the Central Highlands.
Are	*Unité de mesure de terre équivalente à environ 0,01 ha (10 mètres x 10 mètres)*	Unit of land measurement equivalent to approximately 0.01 ha (10 m x 10 m).
Asara	*Saison pluvieuse de novembre à avril*	Rainy season (November-April)
Asotry	*Saison sèche de mai à octobre*	Dry season (May-October)
Avotra	*Réfère aussi à une coopérative qui facilite l'acquisition d'une proportion plus importante de la chaine de valeur aux producteurs*	Refers to a "cooperative" that facilitates the acquisition of a larger proportion of the value chain to producers
Babo/baboha, bemandry	*Une plante entortillant avec une racine large qui stocke de l'eau (*Dioscorea*)*	A twining plant with a large, succulent root, which is eaten by the Sakalava to quench thirst (*Dioscorea*)
Baiboho	*Bourrelet de terre pour délimiter les parcelles de riz. terres de bas-fonds*	Roll of earth that differentiates between parcels; lowlands
Bambaza	*Fève*	Fava bean
Dahalo	*Bandits*	Bandits
Danga	*Herbe dont la graine est en forme d'hameçon (*Andropogon contortus*)*	A grass with very sharp-pointed awns (*Andropogon contortus*)
DINA	*Une loi mutuellement convenue en vue de prendre des mesures disciplinaires sur un sujet précis. Tous les membres de l'entité concernée doivent donc être soumis aux obligations de cette règlementation.*	A mutually agreed-upon compact for taking disciplinary measures in order to solve a problem of common interest. All members must abide by the rules of the compact.
Famadihana	*Une tradition funéraire malgache qui veut dire « le 'retournement' des os des ancêtres. Le rituel consiste à déterrer les os des ancêtres, à les envelopper cérémonieusement dans des tissus blancs et frais (lamba) et à les promener en dansant autour de la tombe avant de les ré-enterrer.*	A funerary tradition of the Malagasy people. Known as the turning of the bones, people bring forth the bodies of their ancestors from the family crypts and rewrap them in fresh cloth, then dance with the corpses around the tomb to music.
Fandevenana	*Action d'enterrer, funérailles*	The act of burial, a funeral
Faritra	*Unité administrative 1 (région)*	Administrative Unit 1 (region)
Firaisana (Kaominina)	*Unité administrative 3 (commune)*	Administrative Unit 3 (commune)

Fivondronana (Distrika)	*Unité administrative 2 (district)*	Administrative Unit 2 (district)
Fokontany	*Unité administrative 4 (sous-commune)*	Hamlet (Administrative Unit 4 (sub-commune/county)
Hosy	*Saison plus sèche et frais de la côte est de juin à novembre*	Cool and dry season on the East coast from June to November
Jeby	*Contre saison récolté surtout de décembre à février*	Off-season typically harvested from December to February
Kibarou	*Collecteur*	Assembles agricultural produce for wholesale
Kinanga	*Petite spéculation/intermédiaire*	Petty trade, middle man
Lamoty	*Un arbuste épineux avec un fruit comestible similaire à une pomme sauvage. Consommé, utilité pour la fabrication de l'alcool et comme remède à la folie (ziziphus).*	A small, thorny tree with edible fruit similar in appearance and taste to a crab-apple. It is used in making rum, also as a medicine for lunacy.
Malaso	*Voleurs de boeuf*	Cattle raiding
Mokary	*Petit galette malgache, typiquement consommé avec du café*	Small, Malagasy pancakes, typically consumed with coffee
Niaouli	*Eucalyptus*	Eucalyptus
Omby	*Zébu malgache*	Malagasy zebu
Ovy	*Pomme de terre*	Irish potato
Oviala	*Igname sauvage*	Wild yams
Tanety	*Collines, pentes*	Hills, slopes
Taolagnaro	*Ft. Dauphin*	Ft. Dauphin
Tavy	*Culture par défrichement et brûlis*	Slash-and-burn agriculture
Toamasina	*Tamatave*	Tamatave
Tsipala (voir *Vatomandry*)	*Saison chaude et pluvieuse de la côte est de décembre à mai*	Warmer, rainier season on the East coast between December and May
Tsena	*Marché, réunion*	Market, meeting
Tovy	*Petit poisson typiquement capturé avec des moustiquaires entre février et avril*	Small fishes, commonly fished using mosquito nets between February and April
Varimadena	*Racine vari signifie qu'on supporte, qu'on cherche à accomplir; se rapporte à la troisième saison, surtout dans les zones 10 et 17 récoltée en mars/avril et pour laquelle la culture de maïs est significative*	The root "*vari*" means what one withstands or strives to accomplish; refers to a third season cultivation mainly in zones 9 and 13 that is harvested in March/April and for which maize is significant
Vatomandry (voir *Tsipalala*)	*Saison chaude et pluvieuse de la côte est de décembre à mai*	Warmer, rainier season on the East coast between December and May
Vézo	*Groupe ethnique de la côte ouest qui spécialise dans la pêche artisanale*	Ethnic group on the West coast that specializes in artisanal fishing
Via	*« Plante d'oreille d'éléphant » dont les racines et les graines sont consommées comme aliment de pénurie (*Typhnodorum*).*	"Elephant ear plant," whose roots and seeds are consumed as a famine food.
Zetra	*Marais*	Wetland

INTRODUCTION

The Famine Early Warning System Network, known by its acronym FEWS NET, is a worldwide project financed by the United States Agency for International Development (USAID). In cooperation with international, regional, and national partners, it provides timely and ample early notice of probable food security trends. FEWS NET works in over 20 countries around the world and remotely monitors at least 10 additional countries from its regional offices.

The program for Strengthening and Accessing Livelihood Opportunities for Household Impact (SALOHI) is a USAID-funded program implemented since 2009 by a consortium of four NGOs (CARE, ADRA, CRS and LOL) from the United States. It aims to alleviate food insecurity in seven regions and 112 communes of Madagascar, primarily located in the southern part of the country. SALOHI works in these zones to improve the nutritional and health status of children and food security for households and to strengthen community resilience to shocks.

In 2013, FEWS NET plans to initiate remote monitoring of food security in Madagascar from its regional office in South Africa. To this end, FEWS NET—in cooperation with SALOHI and with technical support from the World Food Programme (WFP) — has developed this product concerning livelihood zone mapping and descriptions, in order to make available the information base that will underlie the regular food security analyses.

The livelihood mapping workshops and development of this product were led by Maman Bachir Yacouba (FEWS NET) and Epitace Nobera (Consultant), with technical support from Abdou Karim Ouedraogo (FEWS NET), Jenny Coneff (FEWS NET), and Yahaye Tahirou (CRS/SALOHI). This work could not have been accomplished without the strong commitment and outstanding involvement of SALOHI (CRS/CARE/ADRA/LOL), WFP, and the Government of Madagascar.

MAPPING METHODOLOGY AND LIVELIHOOD DESCRIPTIONS

The process for livelihood mapping and preparing descriptions is based on the Household Economy Approach.[1] It includes a traditional livelihood mapping[2] component and identification of the main characteristics of socio-economic groups by comparing—out of poorer, middle-income, and better-off households in a community—the poorer and the better-off households. Mapping and descriptions offer a minimum of information about livelihoods, such as the main sources of food and income for each group in each zone. The product includes a brief description of general characteristics and seasonal calendars, in addition to food access calendars for each zone. Lastly, areas most vulnerable to food insecurity have been identified in the initial summary.

The Household Economy Approach defines a livelihood zone as a geographic area where households rely on relatively similar means—production systems and access to markets—to meet their survival needs, particularly for their food and cash income. Therefore, the socio-economic distribution of these households and their productive assets are similar; consumption patterns (both food and non-food) are also quite similar.

To learn more about the Household Economy Approach, its principles, and its analytical process, visit the livelihood pages on the FEWS NET Web site: www.fews.net or download "Application of the Livelihood Zone Maps and Profiles for Food Security Analysis and Early Warning."[3]

The livelihood maps and descriptions will form part of the knowledge base for food security monitoring by FEWS NET. These tools were not designed to provide a complete system for food security monitoring or analysis; they only establish reference points to indicate whether the conditions reported at any given time justify more in-depth assessment. They supply a geographic context for interpreting existing monitoring data on production, prices, and other indicators in order to identify potential anomalies. The results presented in this report describe how households in the various parts of the country could be affected by various shocks. Rapid assessment teams may be able to use the zones as a basis for sampling in their studies.

The process for developing livelihood maps and descriptions includes the following steps:

1. Before the mapping exercise, a study of secondary information was conducted to collect available data in order to identify gaps of necessary information for developing the livelihood zones map. This information includes agricultural/ecological maps; demographic, rainfall, and production data; and reports from partners. The FEWS NET Madagascar desk review was also included in the reference documents for this study.[4] These data were used as a guide to pose questions during the mapping workshop and to corroborate information collected during the workshop.

2. A national livelihood mapping workshop to divide the country into different livelihood zones using administration level 2 (district) was held in Antananarivo on April 16–19, 2013; many government services, international institutions, and NGOs participated. It should be noted that the Antananarivo workshop participants lacked in-depth knowledge about the country's western and northwestern zones, for which the descriptions are relatively more general as a result. A second workshop of partners with more expertise on the southern zones took place April 23–25 in Taolagnaro (Ft. Dauphin). In addition to demarcating the livelihood zones and verifying the boundaries of previously drawn zones, participants in the two workshops also described the main livelihood characteristics, seasonal calendars, and prominent characteristics of the markets in each zone, which forms the basis for the descriptions presented below.

   Note: Madagascar is large and agro-ecologically diverse. As a result, the identification of livelihood zones is relatively rough and generalized.

[1] http://www.feg-consulting.com/resource/practitioners-guide-to-hea/practitioners-guide-to-hea/
[2] http://www.feg-consulting.com/resource/practitioners-guide-to-hea/2%20Livelihood%20Zoning.pdf
[3] http://v4.fews.net/docs/Publications/Guidance_Application%20of%20Livelihood%20Zone%20Maps%20and%20Profiles_final_en.pdf
[4] http://www.fews.net/docs/Publications/MG_deskreview_2012_11_en.pdf

3. FEWS NET corroborated information from the workshops during assessments to zones 10 and 15 in April 2013 and zones 10, 15, 16, 17, 21, and 22 in September 2013. Field verification included informal, unstructured interviews with key informants or in small focus groups dealing with one or two key issues identified during the workshops or while developing the following descriptions.

4. In addition, an early draft of the report was circulated to all participants and other key informants in May 2013 for additional comments in order to produce this final version, published in December 2013.

LIVELIHOODS IN MADAGASCAR

Approximately 22 million people[5] call the island of Madagascar home. Located in the Indian Ocean, Madagascar is known for its exceptional biodiversity and the richness of its microclimates, resulting in significant geographic diversity, even within the same livelihood zones.

Madagascar is also highly exposed to weather hazards. Between 1980 and 2010, the country was hit by 35 cyclones causing significant flooding and experienced five periods of severe drought. Earthquakes are another frequent hazard in Madagascar. The frequency of these risks is increasing and has an impact on livelihoods, irrigation systems, drinking water supply, health systems, and road infrastructure.

Since the political crisis in 2009, sanctions against Madagascar have had a major impact on the economy and sometimes on livelihoods. According to the International Labor Organization (ILO), the 2009 political crisis, combined with the international financial crisis, wiped out about 336,000 jobs. It also led to a significant rise in corruption. Madagascar's trade balance is in deficit.

Agriculture accounts for approximately 26 percent of national GDP and employs 78 percent of the workforce. Domestic cereal production does not fully cover domestic needs; tuber production, especially cassava, covers the remaining needs. Madagascar is nearly self-sufficient in terms of rice, and imports often fall below five percent of domestic production.

Sugar cane and groundnut are the main cash crops grown by the highest proportion of households. Beans, onions, fruits, and vegetables are also cash crops, typically sold in domestic markets. Groundnut is also used for home consumption as a condiment for the main meal; it is also used to make traditional oil, for example in Soanala (Anosy region, Betroka district).

The markets are fairly well integrated within the same regions; they are less so on a national scale. This is particularly true for tubers and vegetables. Rice is the most widely marketed food domestically. Posting lower price variations from one market to another, the local rice markets tend to be better integrated than the imported rice markets. In general, markets in the North and Central parts of the country are better integrated than in the South.[6] Transaction costs are high, particularly for transport, which came to 41 percent of the final price in 2004.[7] Moreover, many regions have frequent roadblocks and are affected by widespread cattle raiding by *dahalo* (bandits).

Rural households spend a higher percentage of their budget (71 percent) on food expenditures than households in urban areas (66 percent). In the poorest households, rice purchases account for the highest share (32 percent) of food expenditures. Market purchases are the main source of rice for 62 percent of households and for 47 percent of households for cassava.[8] A lack of storage capacity, particularly in poor and rural households, may be one explanation for the high rates of market dependence, even to obtain the area's main food products.

Analysis of the food consumption scores provided by WFP (2009, 2011, and 2013) found a high proportion of households (sometimes 30–50 percent) with "poor" food consumption scores in the southern part of the country. However, in the 2011 CFSVA survey, an analysis combining the food consumption score with the coping strategies index and household incomes and expenses concluded that the proportion of food insecure households was significantly lower than the proportion of households having "poor" food consumption scores.[9]

Some of the main livelihood characteristics identified by the livelihood mapping and description process include:

- Changes in national average prices for local rice generally exhibit high intra-annual seasonal variability of +/-30 percent in a typical year. Intra-annual variability is quite similar to that of inflation rates. Although the price of

[5] CIA World Factbook, estimate for 2013.
[6] WFP, Madagascar: Rapport sur l'analyse de marchés et la faisabilité d'une intervention basée sur le transfert d'espèces/coupons, 2009.
[7] Catholic University of Louvain, *Madagascar: Profil des marchés pour les évaluations d'urgence de la sécurité alimentaire*, WFP SENAC, 2006.
[8] UNICEF WFP, CFSVA + N, 2011.
[9] UNICEF WFP, CFSVA + N, 2011.

imported rice sometime acts as a buffer for the price of local rice, price fluctuations for local rice become significantly more volatile during a crisis year when a shock has affected production. For example, in 2006 the price of rice increased by 85 percent between the start and finish of the consumption year. High local rice prices, particularly between March/April and October, are cited as a significant hazard in many zones as they may diminish better-off households' capacity to hire labor during the harvest or put additional pressure on the price of substitute products (cassava, imported rice, etc.) consumed by poor households.

- Local rice is the main staple food for the entire country and for all wealth groups, except in the South where cassava is the staple. Workshop participants identified three types of rice: upland rice, lowland rice, and mangrove rice.

- Differentiation of livelihoods based on consumption mainly depends on food substitutes for rice after harvest. These substitute foods are primarily cassava, maize, sweet potato, breadfruit, plantain, the *via* root, and taro. For this reason, the most severe period of the lean season is not necessarily when rice prices peak (March–April), but sometimes the period when rice substitutes are least available (October–November).

- In zones producing export crops (vanilla, cloves, coffee, litchi, pepper, and cocoa), both poor and better-off households diversify production between as many crops as possible. This limits their exposure to weather hazards or high variability of producer prices based on prices on the global market. Currently, vanilla is the most profitable crop.

- Access to land is often problematic; most of the population farms less than 1.2 ha.[10] Sharecropping practices differ in the zones depending on land availability. In areas where land is more available (and less expensive), as in the western plains, it is common for poor households to rent small parcels from better-off households. In the mountainous or densely populated zones and especially in those of the East coast, where cash crops dominate, land is expensive, and it is common to see poor households rent their parcels to better-off households.

- Certain asset and income management practices reinforce the poverty cycle in the zone:
    - Social obligations make up a high proportion of expenditures for poor households, particularly during the harvest between June and July.
    - Particularly in zones where exported cash crops predominate, it has been noted that poor households engage in a cycle of economic over-consumption at high prices during harvests and rapid de-capitalization at low prices within a period of a few months.
    - Informal credit systems, mostly between the poor and better-off households, respond to poor households' urgent needs for cash, particularly during the lean period and in difficult years. However, after a short, initial grace period, interest rates are very high, often resulting in repayments that are twice the borrowed amount after just a few months.
    - The poor miss out on opportunities to derive more income from cash crop sectors due to their weak capacity to meet the quality and quantity requirements for exportation. For example, in 2012 green vanilla was only worth approximately 20,000 MGA/kg, while processed (cured) vanilla was worth approximately 700,000–800,000 MGA/kg.

- The *via*, or elephant ear seed, which is unappetizing and poisonous if prepared incorrectly, is considered a famine food in most of the livelihood zones.

[10] UNICEF WFP, CFSVA+N 2011.

RECENT EVENTS AFFECTING FOOD SECURITY IN MADAGASCAR

Period	Event
1996 to 2002	Economic stabilization and structural adjustment program encouraged by major donors with a view to liberalize economic sectors and services and the expansion of infrastructure; the effects were more pronounced in the cities than in rural areas.
2002	Major political crisis affecting all sectors due to a decrease in government investments in priority sectors (education, health, employment, and infrastructure) and a rise in the unemployment and poverty rates. The poverty rate went from 70 percent in 2001 to 80 percent in 2002. This crisis affected both urban and village households.
End of 2002 to 2008	The country implements an Accelerated Economic Development Plan, which leads to large investments in the social sector, public buildings, and infrastructure. This results in improvements in sectors such as mining, trade, transport, and tourism. These initiatives also reduced unemployment.
2008/09	Political crisis leading to Madagascar's suspension from various international organizations and the suspension of foreign development assistance. The crisis resulted in a serious economic depression with a decline in public investments and other sectors such as textiles, construction, and tourism, which contribute considerably to employment and household incomes. High rice prices in the country.
2009/10	A 50 percent decrease in public investments due to suspension of foreign development assistance; the agricultural and livestock sectors are directly affected.
2010/11	Political crisis and cyclone resulted in destroyed crops on the East Coast. Price increase of basic foodstuffs in the affected areas.
2011/12	Cyclone Giovanna caused a 10 percent drop in rice production compared to 2010/2011 in the affected areas.
2012/13	Category-2 tropical cyclone Haruna hits the Southeast, causing major damage to household livelihoods in the southern and southeastern areas. Major locust invasion between October/November 2012 and May/June 2013, resulting in moderate damage, predominantly in the center and west. Erratic rains in northern rice-surplus areas.

FREQUENT HAZARDS

The two greatest recurring hazards threatening Madagascar are cyclones and locust invasions. These hazards are fairly localized in the country: cyclone frequency and intensity varies depending on location, but they affect the East Coast more than the West Coast, while locust invasions are mainly located in the southern and western part of the country.

Cyclones

The cyclone period is from November to April. Cyclones occur most frequently in zone 5 in the Northwest and least often in the Southwest and south of Sava.

The severity of these impacts depends on what time of year the cyclone strikes, its intensity and duration, and the number of times cyclones have hit in the same place during the same season. The main impacts from cyclones on food security are (in order of importance):

- Destruction of standing crops. This type of damage is highest in coastal areas. Loss of breadfruit and banana trees is particularly serious as they are both substitutes for rice when the price of rice peaks between February and May. This impact is most common for cyclones occurring just before the fruit harvest.
- Salinization and siltation of rice fields, resulting in decreased yields. For cyclones occurring in November and December, it is often possible to uproot seedlings and replant them in a nursery for a few weeks so they can be transplanted later, but this increases rice production costs.
- Suspension of fishing activities and loss of fishing equipment. Fresh fish is no longer available in the days or weeks immediately following the cyclones because fishermen are occupied with manual cleanup and repairs; in addition, demand falls because available resources are primarily used to cover urgent needs.
- Damage to buildings may be relatively greater in the South, particularly in Zone 23, due to the widespread use of adobe for construction.

Locusts

There are two main types of locusts in Madagascar: the migratory locust, which is a seedeater, and the red locust, which consumes the seeds as well as the leaves and stems.

In the southeastern part of the country, locusts are both endemic and a prized food. Locust “invasions” or “outbreaks”, therefore, actually suggest the departure of large numbers of locusts from the Southeast northward, usually heading to rice-growing areas in the west. An outbreak’s severity is determined by the location and extent of reproduction/hatching points.

The Division of the National Locust Center of the Department of Plant Protection within the Ministry of Agriculture oversees the management and prevention of locust invasions; this department only has the capacity to manage approximately 100,000 ha/year, though the estimated management needs were 500,000 ha in 2013.

FISHING IN MADAGASCAR

The following sections present a brief overview of fishing activities in Madagascar rather than describing them individually in the numerous livelihood zones where fishing plays a key role but only for a very limited segment of the population.

Fishing is a major activity in Madagascar, a country with 5600 km of coastline and many freshwater lakes and waterways. Fishing as a livelihood activity typically involves the population primarily located on the coast or near rivers. This is usually a small minority of the total population of a given district.

Technologies for small-scale fishing vary by zone and species. Poor households rely on line or net fishing. However, in some zones, they have no boats and must rent them from better-off households. Generally, poor households engage in small-scale fishing. Men and boys usually do the actual fishing while women often oversee processing activities (drying, salting, or smoking). Given their access to means of transportation, the better-off households dominate the fishing market, especially for fresh fish.

The capacity to earn a profit on small-scale maritime fishing depends on maritime conditions, which are more favorable in the West than the East. In general, fishermen on the West Coast, where the sea is much calmer, have access to 8 to 10 km of sea for fishing. Those on the East and South Coasts only have access to two to four km of sea for fishing, due to the sea's high turbulence. Strong winds from the south between May and September and frequent cyclones between December and April occasionally restrict fishing and disproportionately affect the East Coast. For this reason, small-scale fishing on the West Coast is able to produce a marketable surplus. Due to the lack of roads or access to the cold chain, this surplus is processed (dried and salted or smoked) and then sold at inland markets (especially Antsirabe and Antananarivo) or at markets on the Northeast coast that are accessible by road. In the Northeast, demand for fish exceeds the capacity of local producers.

The fishery product sector on the East Coast concentrates on fresh fish. The largest market for these products is in the port-city of Toamasina (Tamatave), where fresh fish can be transported to Antananarivo and Antsirabe more easily via a cold chain by truck (refrigerated for frozen products and a standard truck for dried or salted products).[11] Highly dependant on the force of the sea and access to markets, shrimp production is particularly important on the West Coast, notably the industrial production between Morombe and Antsiranana and around Toamasina (between Mahanoro and Vivanivao). The government established regulations stopping shrimping during the breeding season from December to March, but, unfortunately, these regulations are rarely followed.

Fishing activities practiced from Soalala up to the north of Nosy Be and through Mahajanga (Madagascar's main fishing port) are the most diversified with the greatest links to international markets. This area produces shimp, crab, and sea cucumber for international (Europe, China, and island countries), national, and local markets. Dried fish is sold in local and national markets. Shark fishing and marketing (fins to China and meat to Comoros) have been developed in the area.

Fishing for local consumption is noteworthy between Itampolo and Morombe; large quantities of processed fish are routed to Antananarivo from Toliara (Tuléar). There is an export market for octopus from this area to Europe.

Lobster production is particular to the southeastern part of the country between Faux Cap (Tsiombe) and Vangaindrano. Lobster is exported from the port of Taolagnaro (Ft. Dauphin). There are biological regulations stopping lobster fishing between January and April that are also rarely followed.

The southern area between Faux Cap and Itampolo is not a significant fishing area due to the extremely low population density and poor access to markets in this most arid part of Madagascar.

Freshwater fishing is also widespread throughout the country, especially around the four large lakes: Alaotra, Itasy, Ihotry, and Kinkony. The lake and river area in the western part of the Melaky region (where Lake Mandrozo is an anchor) is also an

[11] In the past, this transport was conducted by train when it was running properly.

area of high freshwater fish production. Tilapia and carp are the most common freshwater fish. They are marketed fresh or processed in Antsirabe and Antananarivo.

LIVESTOCK IN MADAGASCAR

This section is brief because livestock-raising activities are described in more detail in the descriptions of the various livelihood zones, often without distinguishing from other agricultural activities since the majority of the population in Madagascar is made up of crop/livestock farmers.

There are eight main livestock sectors that are sometimes concentrated in specific regions:

- Raising Malagasy zebu, found throughout the island
- Raising small ruminants: especially in the South and Northwest
- Dairy farming: upper plateau
- Raising pigs: throughout the island
- Traditional poultry raising (local chickens, turkeys, rabbits, geese): throughout the island
- Modern poultry raising (broiler hens, laying hens): upper plateau
- Beekeeping: East Coast
- Silk worm breeding: upper plateau

The livestock production in Madagascar is traditional almost everywhere except for the production of broiler hens and laying hens. Livestock products are usually consumed locally, except for processed by-products (horns, silk thread, and beeswax) that are sold throughout the country or to tourists.

The Malagasy zebu has important cultural significance for the Malagasy people (*famadihana* and *fandevenana*).The main zebu markets (*tsenan'omby*) are Tsiroanomandidy, Ambalavao, Ihosy, and Ambatonapoaka.

It is important to note that the number of veterinarians is severely insufficient compared to needs.

EXTREME NORTH: SUGAR CANE, FISHING, TOURISM (ZONE 1)

Main productive assets	
Poor households	Better-off households
Land <1 ha Family labor Small farming/fishing tools	Land >2 ha Motorcycle/bike Storage facility
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP) Fish (OP)	Rice (OP) Meat (MP) Fish (MP)
Main income sources	
Poor households	Better-off households
Labor Fishing Artisanal gold mining (Dariana)	Sugar cane Trade Transport Tourism Khat
Main markets	
Ambilobe Nosy Be	Antsiranana
Main hazards, periods, and frequency	
Flooding	November–April
Insufficient rainfall	January–October
High local rice prices	March–April/October
Coping strategies for poor households	
Borrow from better-off households Migration of girls in search of work in district capitals Set controlled fires to protect crops from pests	

The Extreme North Zone covers most of the Diana region. It has a large area of land along the coast and the second largest port in the country. In addition, the country's only boat repair workshop is in the Antsiranana port.

The zone's rural population lives mainly in the savannah lowlands, a sub-zone with low population density (5–25 people/km^2). The rainforests in the Ambre Mountains and a section of Nosy Be and Tsingy form a temperate microclimate (average temperature of 15°C–18°C) and are sparsely populated. The types of soil vary (for example, hydromorphic in Ambilobe and volcanic in Nosy Be), but are generally fertile. With 1,000–2,000 mm of rain per year, this zone is conducive to agriculture and fishing. It produces rice, sugar cane, khat (exported to Yemen and Djibouti), and cocoa.

The ecological conditions allow for two rice harvests per year. The rainfed rice, which is the most common, is harvested in June–July, while the lowland or irrigated rice is harvested in December–January. Even though the zone produces a great deal of rice, local and export demand is so high that the zone also imports rice from areas in the country with a surplus. Cassava is also grown in the zone.

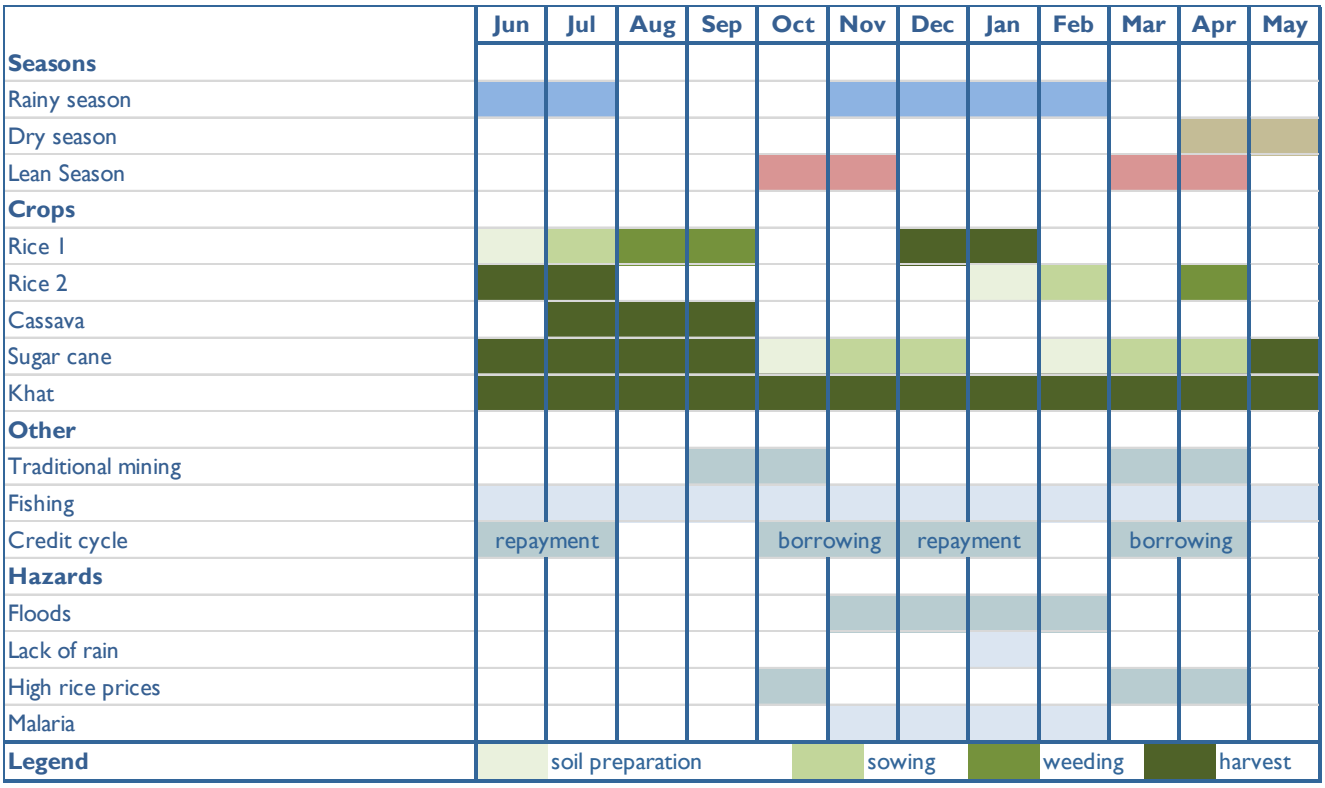
Animal breeding (zebu) is widespread but is mainly used to supply draft animals for agriculture. Fishing is also important in the region, which means that fresh fish is another basic food in the zone.

Labor supplied by poor households supports the following economic sectors:

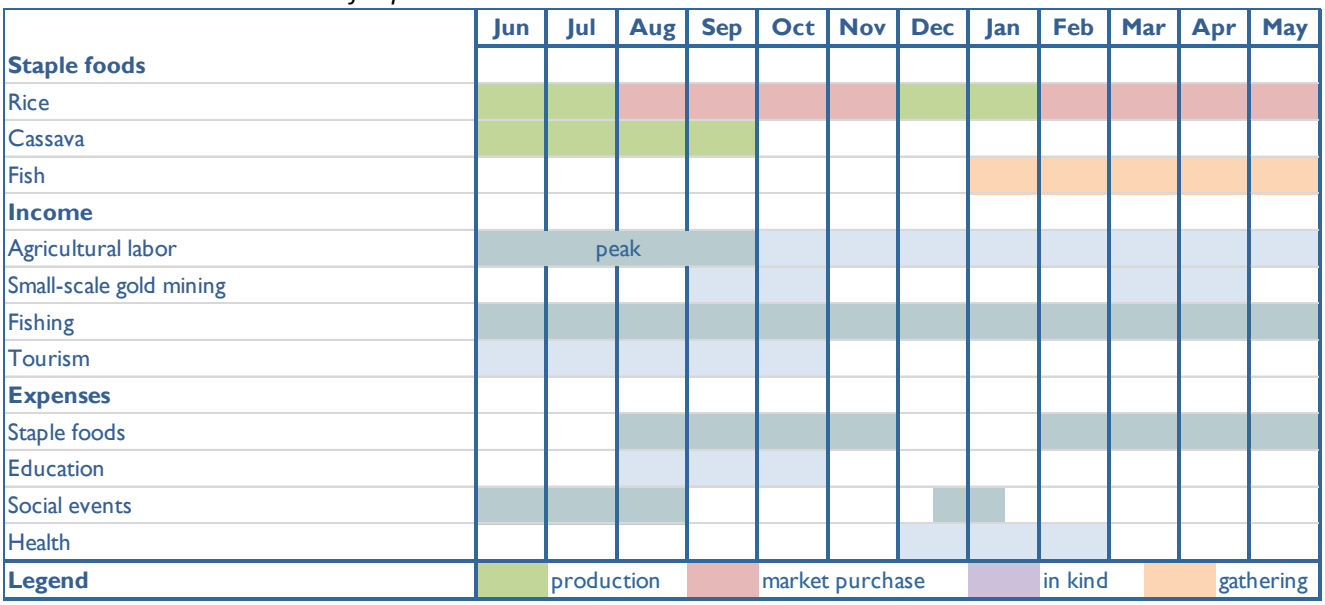
- Cash crops (sugar cane, khat, cocoa) during the planting and the harvesting;
- Industrial and small-scale fishing, especially on the west coast. It should be noted that sea fishing is more prevalent than inland fishing and that the shrimp stock in zone 1 is considered to be the largest in the country;
- Activities around the port, including those tied to illegal trafficking (especially trafficking of protected species and sex trafficking);

The peak demand for labor corresponds to the peak tourism season and the sugar cane harvest (May and September). Around Dariana (Vohemar district), small-scale gold mining is possible especially during the dry months. There are two sugar cane processing plants in Nosy Be and Ambilobe. However, small-scale (and illegal) production of alcohol is sometimes more profitable for poor and middle-income households. The cost of living is relatively expensive compared to the other zones in the country, mainly because of tourism, but acute food insecurity is relatively rare.

Zone 1: Seasonal calendar



Zone 1: Food access calendar for poor households



NORTH: VANILLA, CLOVE, COCONUT TREE (ZONE 2)

Main productive assets	
Poor households	Better-off households
Land <1 ha Small farming tools	Land >2 ha Motorcycle/bike Storage facility
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP) Maize (OP, MP) Plantain (OP) Breadfruit (OP) Taro (OP) Coconut (OP)	Rice (OP) Meat (MP) Fish (MP) Coconut (OP)
Main income sources	
Poor households	Better-off households
Wages (agricultural, migrant labor) Traditional mining Gathering Fishing Basketwork	Cash crops (vanilla, clove, coffee, cocoa, pepper) Trade Transport
Main hazards, periods, and frequency	
Cyclone (coast)	November–May
Flooding (rivers, usually with cyclone)	November–May
Low producer prices	June–July, November–December
High retail price of rice	March/April, October
Coping strategies for poor households	
Increased consumption of wild foods Migration in search of labor opportunities Increased poultry sales Borrow from better-off households	

Zone 2 is an area of sandy, clay plains mainly located on the Northeast Coast, but with a small section lying on the Northwest Coast of Madagascar. Its terrain includes a mix of plains, hills, and mountains with mostly lateritic soil. Rainforests cover the hills and mountains of the Masoala and Marojejy nature reserves and the Andapa and Ambinanintelo basins. Soils are quite fertile, and average rainfall is between 1,500 mm/year (west coast) and 2,000 mm/year (east coast); rainfall is more concentrated between May and October. There are less than 60 days without rain per year on the East Coast, and the seasons differ more with respect to temperature. Temperatures are fairly high from September to April and cooler from May to October.

The population is relatively more dense in the permanent river valleys of the Sambava watershed and on the coast around Antalaha; it is less dense elsewhere.

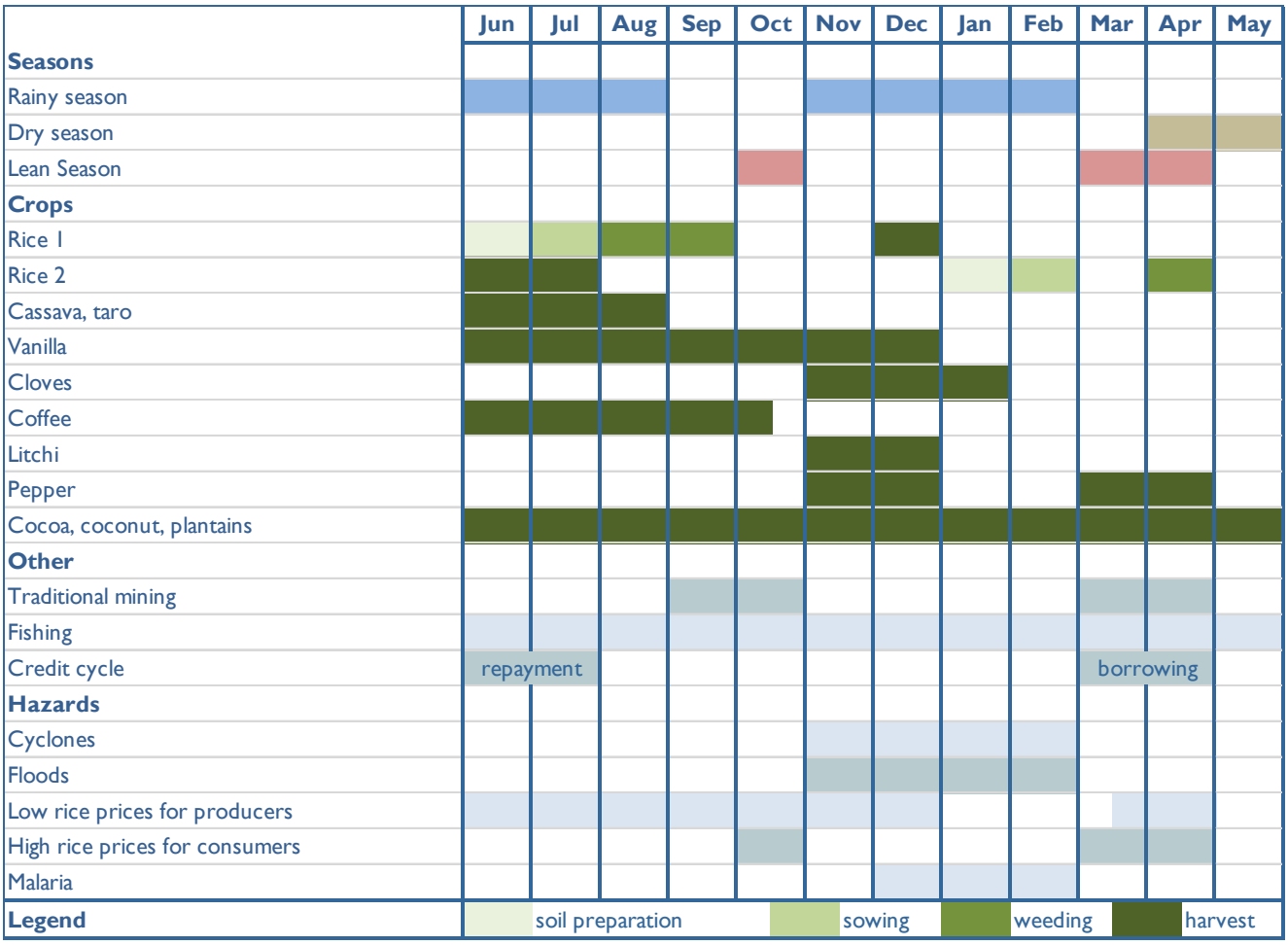
This zone is economically better off than zone 8 in the South due to income earned from vanilla, its primary crop. Vanilla is generally more profitable than other cash crops that predominate farther South.

Rice cultivation is irrigated in the plains and rainfed in the hills and mountains on the West. All households grow it during the two seasons (main harvest in May/June with the other in November/December). Though the zone is a major rice producer (approximately 300 days of consumption/person/year), a small portion of the rice consumed in the zone comes from the rice fields of zones 3 and 4 (Sofia) in the West, where per capita production in caloric terms is twice as much as that of Zone 2. In addition to the relatively higher income in Zone 2 compared to that of zone 8 to the South, zone 2 is better supplied in rice substitutes. These include fresh cassava, maize, breadfruit, plantain, taro, and coconut.

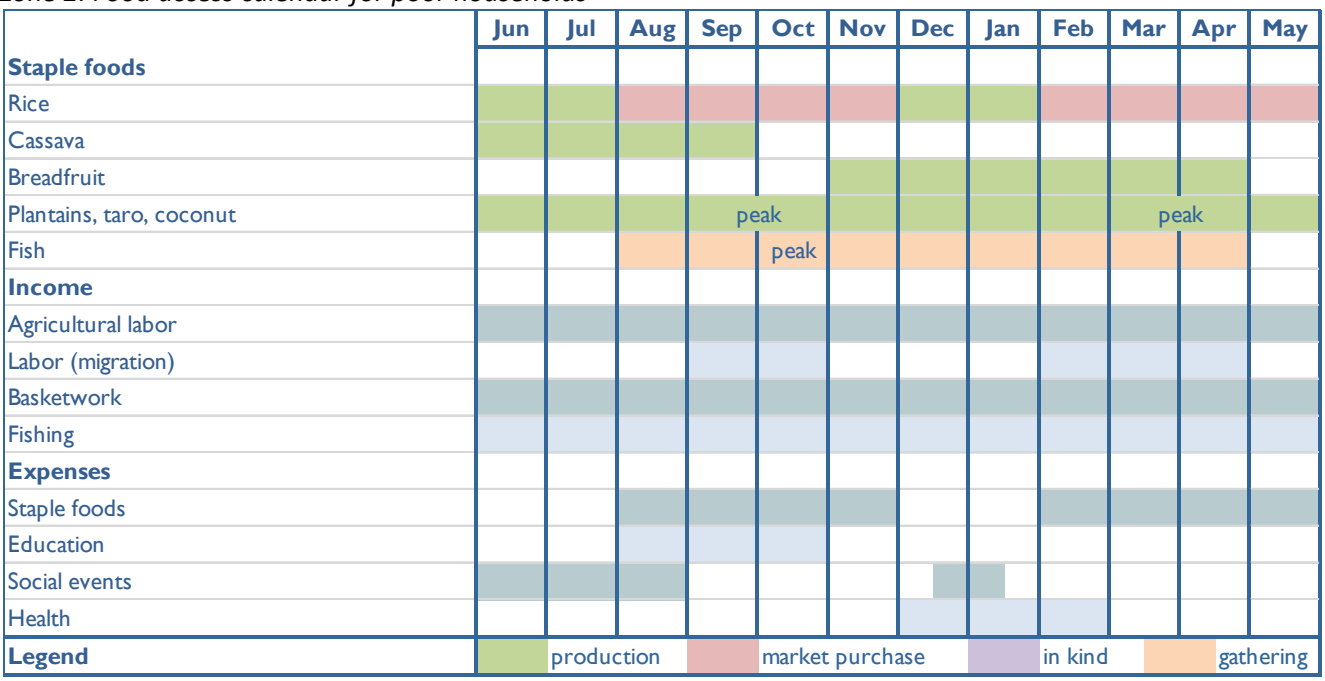
Generally, the poor glean little more than three to four months' consumption from their harvests; they earn their living mostly through agricultural labor in the plains and hills or through work in fishing and artisan mining in crystal quarries scattered throughout the zone. They get relatively little income from cash crop sales. The better-off households, who own nearly all means of transportation, both produce enough rice to meet virtually all of their rice consumption needs and live from marketing cash crops. They are able to meet the required quality and quantity standards for exporting agricultural products and have the necessary capital to ensure the local supply of basic necessities. Some better-off households specialize in marketing artisan mining products, fishery products, or wood products. The better-off households are also involved in the tourism sector through small restaurants or by serving as guides. Tourism is limited by the zone's isolation as tourists can only reach the area by plane.

The fishing period peaks for poor households on the coast at the same time as the peak of the lean period (October), when the availability of substitute foods for rice is lowest and access to the sea is generally safer. Although the price of fish is lower at this time, poor households prefer to sell their catch to buy rice. All year long, poor households consume the unsold fish surplus, but the zone's fish supply is usually lower than demand due to the relatively heavy seas. Dried and salted or smoked fish is imported from more productive areas on the West Coast. The fishing activities on the East Coast in zone 2 are similar to, but less productive than, zone 8 due to lack of infrastructure to access the largest markets.

Zone 2: Seasonal calendar



Zone 2: Food access calendar for poor households



SOFIA RIVER BASSIN: TOBACCO, ONION, FISHING (ZONE 3)

Main productive assets	
Poor households	Better-off households
Land <1 ha Small farming tools	Plot of land >1 ha Cart, plow Cattle
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Legumes (MP) Tubers (OP) Fish (OP) Fruits (G)	Rice (OP) Legumes (OP) Tubers (OP) Meat/fish (MP) Milk (OP)
Main income sources	
Poor households	Better-off households
Sale of rice Agricultural labor Inland fishing	Sale of rice Marketing of tobacco, onion, cowpea
Main markets	
Majunga Mampikony	Antananarivo Tamatave
Main hazards, periods, and frequency	
Flooding	January–March
Drought	November–December
Coping strategies for poor households Shift the agricultural calendar Adapting farming practices (e.g., direct sowing of rice instead of transplanting)	

Located in the northwest of the country, zone 3 is characterized by deciduous dry forest and dense ombrophilous forest, grassy savannah, and grassy shrub savannah, as well as mangrove in the coastal part. The soil is alluvial, hydromorphic, or ferruginous; it is quite rich but partially sandy. The zone has eight lakes where inland fishing has been developed.

There is one rainy season from November to March with an average annual rainfall of approximately 1,500 mm. The average temperature is 27°C, with a low of 12°C in June/July and a high of 34°C, especially in December/January. The population density is approximately 15 people/km^2.

The average surface area of cultivated land is 1.3 ha/household. The main production system is irrigated rice cultivation, with little mechanization, occurring over two seasons. Industrial crops—tobacco and onions—are also grown as cash crops in the zone.

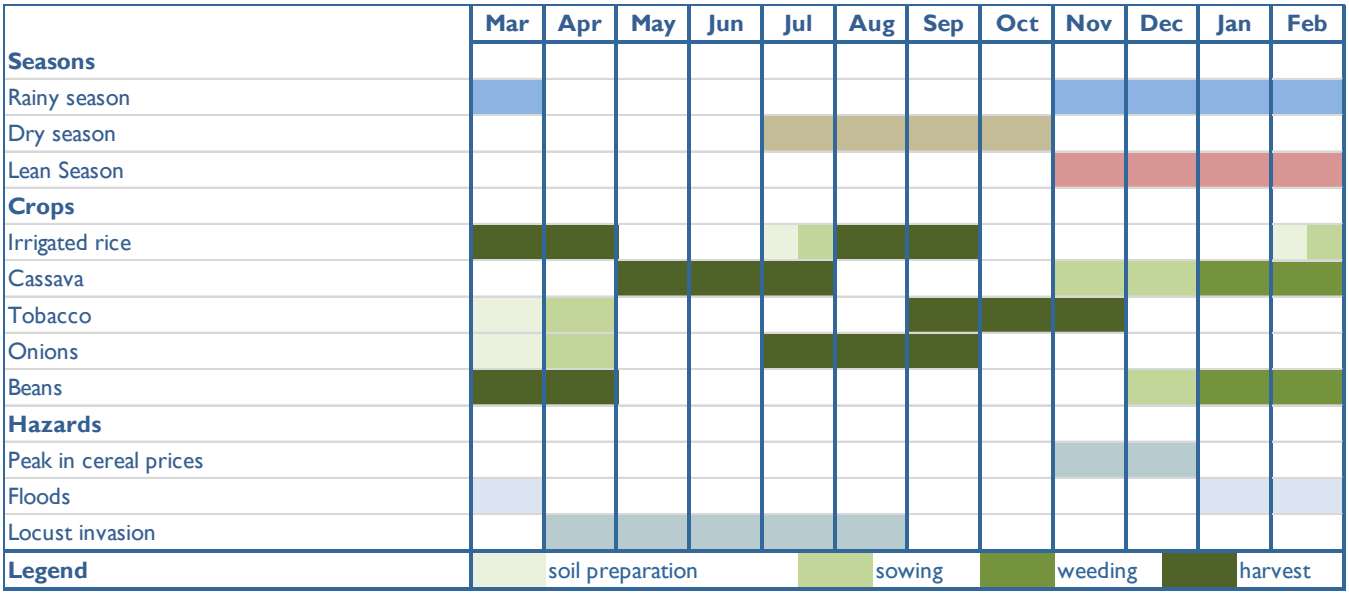
Fishing is maritime or freshwater. Freshwater fishing is traditional and uses nets and dugout canoes in lakes and rivers that cross the zone. Crab fishing predominates in the mangrove.

Livestock rearing is widespread and dominated by cattle, which only better-off households own. Goats, poultry, and bees are also raised.

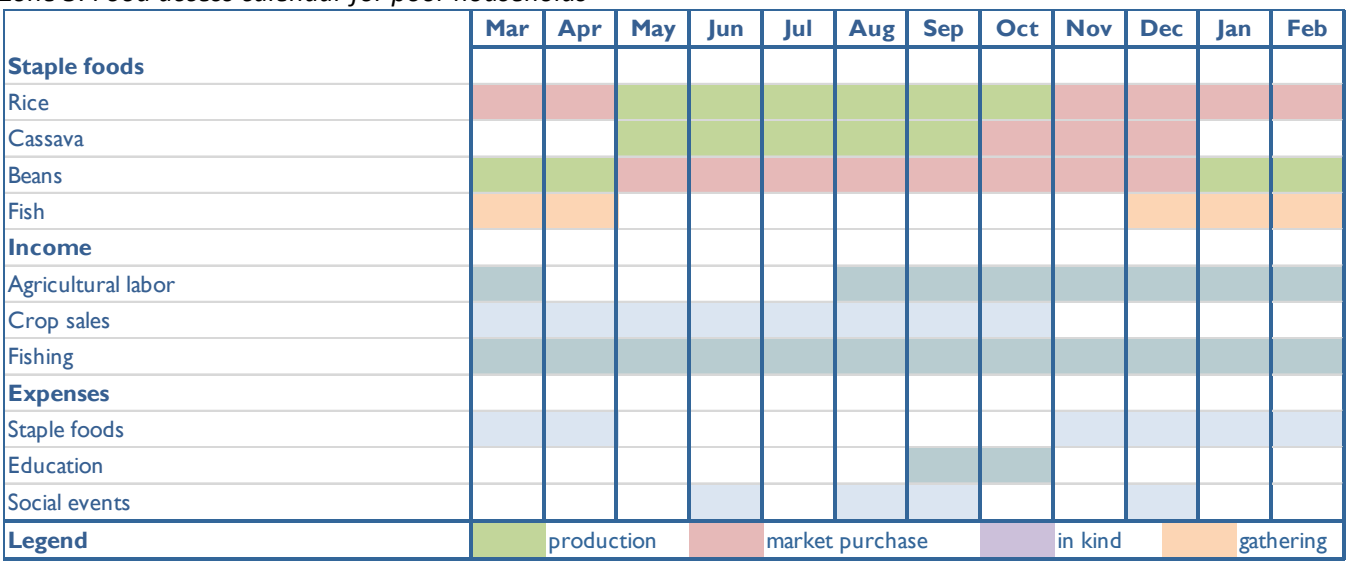
The Majunga (Marolaka) and Antananarivo markets are the primary destination for the zone's cash crops, namely: rice, onion, and fishery products. Tobacco is sold to industries. The rest of the harvest (cassava and maize) is bought and sold in local markets.

Acute food insecurity is relatively less common here than in other areas of the country.

Zone 3: Seasonal calendar



Zone 3: Food access calendar for poor households



NORTHERN HIGHLAND: RICE, ZEBU (ZONE 4)

Main productive assets	
Poor households	Better-off households
Land <1 ha Small farming tools	Land >2.5 ha Cart, plow Livestock
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Legumes (MP) Tubers (OP) Fish (OP)	Rice (OP) Legumes (OP) Tubers (OP) Meat/fish (MP)
Main income sources	
Poor households	Better-off households
Sale of rice Agricultural labor Fishing Collection and sale of honey	Sale of rice Sale of agricultural products Marketing honey
Main markets	
Majunga	Tananarive
Main hazards, periods, and frequency	
Delayed rains	February–March
Theft of zebus	November–December
Coping strategies for poor households Adapting agricultural practices (e.g., direct sowing of rice instead of transplanting, sowing flood recession crops, and shifting the agricultural calendar)	

Located in northern Madagascar in the highlands, zone 4 is characterized by dense ombrophilous forest at medium elevation as well as grassy savannah and grassy shrub savannah.

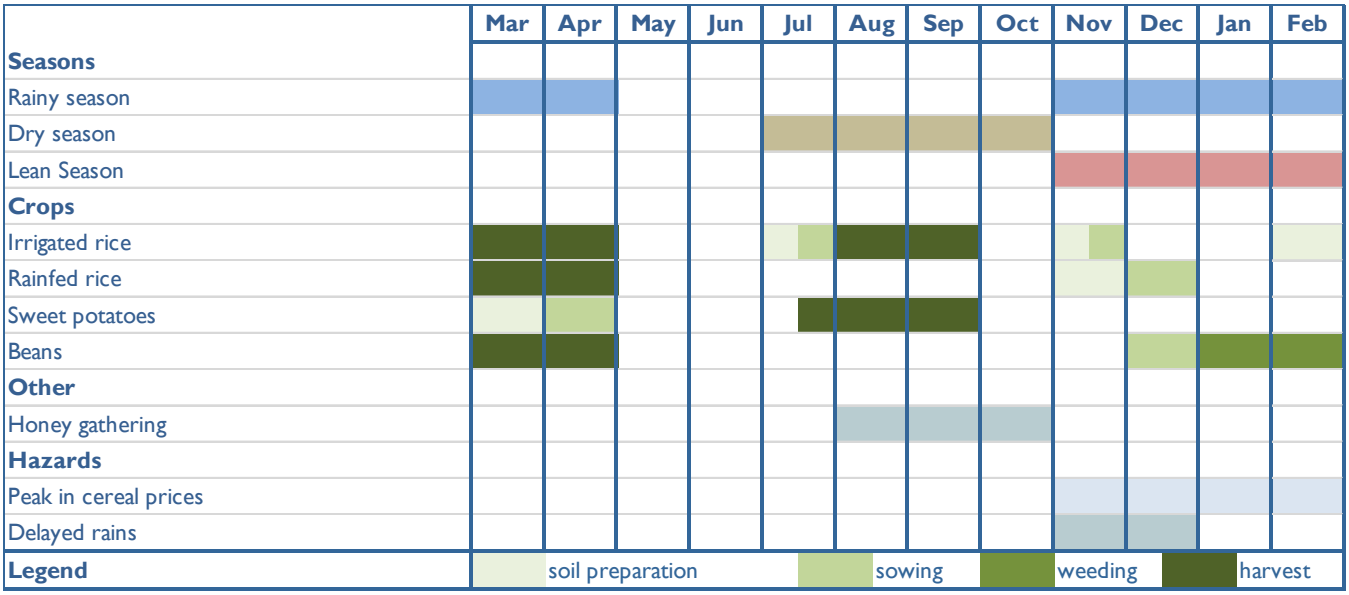
Soils are lithosol, ferralitic, or hydromorphic. Average annual rainfall ranges between 1,100 and 1,800 mm, with a rainy season between November and April and a dry season from May to October. The zone's average temperature is 25^{o}C. The climate is The zone has a low population density (17 people/km^{2}).

The agricultural production system, both rainfed and irrigated, is dominated by food crops (rice, maize, sweet potato, bean, and groundnut). Rice production is mainly irrigated with little mechanization. Cattle production in the zone serves primarily to support rice production, as the cattle are used for land preparation and fertilizer production.

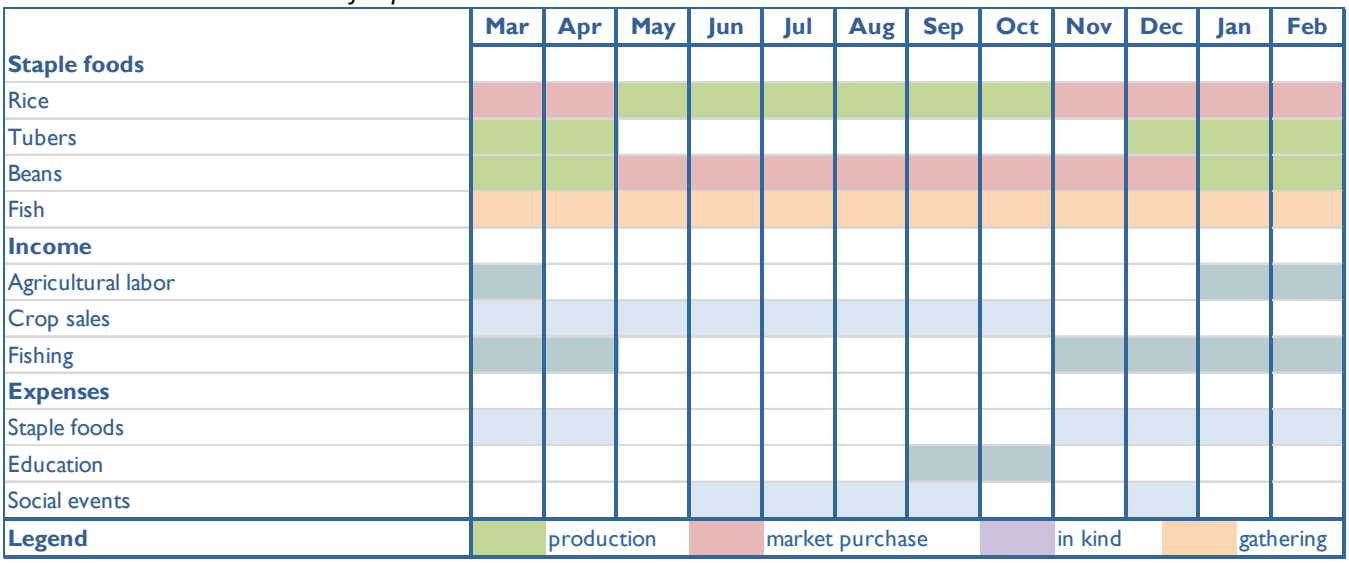
Extensive livestock farming mainly concerns cattle and goats. Freshwater fishing in lakes and rivers uses nets and dugout canoes.

The zone is an important source of supply for the North, despite the relatively difficult access to the area. Surplus products (rice and maize) are delivered to the Antananarivo market, while other agricultural products (groundnut and sweet potato) are mostly sold in the zone's local markets and Majunga market. Zone 4 supplies the markets in the large cities of the highlands with cattle.

Zone 4: Seasonal calendar



Zone 4: Food access calendar for poor households



BETSIBOKA DELTA: RICE, FISHING (ZONE 5)

Main productive assets	
Poor households	Better-off households
Plot of land Small hand tools Poultry	Plot of land Cart, plow Cattle
Main foods and sources	
Poor household	Better-off household
Rice (OP, MP) Legumes (MP) Tubers (OP)	Rice (OP) Legumes (OP) Tubers (OP) Meat/fish (MP)
Main income sources	
Poor households	Better-off households
Rice Fishing Agricultural labor	Rice Marketing cash crops (coconut, bean, groundnut)Livestock
Main markets	
Majunga Boanamary	Antananarivo
Main hazards, periods, and frequency	
Flooding	January–March
Locust invasion	Occasionally
Drought	November–December
Coping strategies for poor households Flood recession cropping Switching crops	

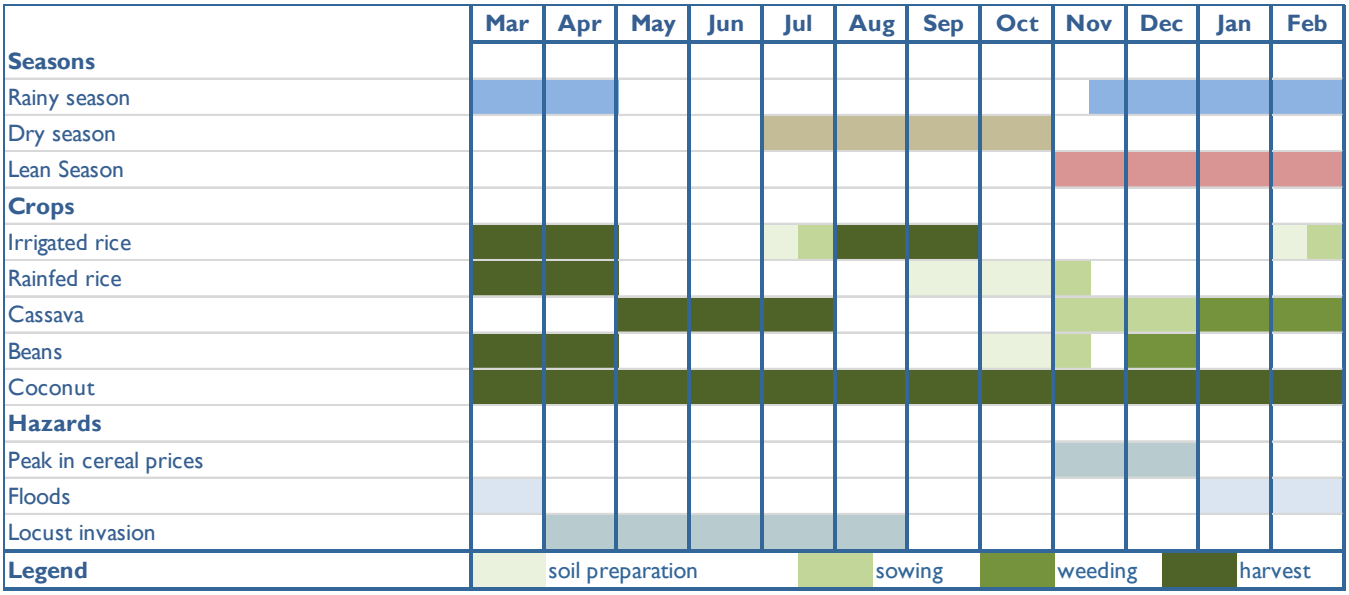
Located in the Northwest, this zone is characterized by deciduous dry forest and grassy shrub savannah as well as mangrove on its coast. The soil is alluvial, sodic, allomorphic, or hydromorphic. It is fairly fertile but partially silted.

Annual rainfall ranges between 1,000 mm and 1,200 mm, with a rainy season lasting from November to March. The average temperature is 26°C, with a low of 20°C and a high of 35°C. Population density is approximately 12 people/km^2.

The average surface area cultivated per household is 2.5 ha, with over 1 ha of rice fields. These landholdings are relatively higher than in some other parts of the country and are sufficient to allow poor households to consume own-produced rice as much as seven months of the year. Rice cultivation is irrigated with little mechanization. Since rice production yields a surplus (more than 600 days of consumption per person), the zone is a source market for Antananarivo and Mahajanga markets. This supply comes through markets in the district's administrative centers that also serve as the zone's main collection markets.

Maritime fishing is widespread in the zone, making Mahajanga the country's main fishing port. The main products from the sea in this zone are fish, shrimp (a specialty of the area), mud crab, sea cucumber, shark (fins and dried flesh), and brine. Freshwater inland fishing in lakes and rivers is also important in the zone. Fishing techniques are mostly traditional, using nets and dugout canoes. Poor households do most of the fishing. They sell their catch to traders who then supply the markets in Antananarivo with shrimp and other products (dried fish and brine). Fishing products are mostly exported to China and Europe.

Zone 5: Seasonal calendar



Zone 5: Food access calendar for poor households

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Staple foods												
Rice												
Tubers												
Fish												
Income												
Agricultural labor												
Crop sales												
Fishing												
Expenses												
Staple foods												
Education												
Social events												
Legend		production			market purchase				in kind		gathering	

UPPER BETSIBOKA: GOLD MINING, RICE, COWS (ZONE 6)

Main productive assets	
Poor households	Better-off households
Small Plot of land Small hand tools Fishing lines and nets Poultry	Plot of land Cattle Agricultural equipment
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (MP) Maize (MP) Fish (OP) Sweet potato (OP)	Rice (OP) Meat and fish (MP) Beans (OP)
Main income sources	
Poor households	Better-off households
Agricultural labor Gathering (raffia, palm) Small livestock Artisanal gold mining	Marketing agricultural products Artisanal gold mining Renting farming equipment
Main markets	
Majunga Mahajanga	Antananarivo
Main hazards, periods, and frequency	
Floods	January–March; 1/5 years
Crop pests	December–April)
Delayed payment for tobacco and cotton	May–October
Livestock diseases	May–October
Coping strategies for poor households	
Intensify the search for labor opportunities Borrow from the better-off Increase poultry sales	

Characterized by plains cut by volcanic intrusions and rocky outcrops, the Upper Betsiboka's vegetation is mostly shrub savannah with grassy heteropogan and a swamp formation that provides a source of plant fibers for handicrafts. The zone has abundant water resources, with 35 lakes in Maevatanana and two lakes in Tsaratanana, which support traditional fishing. The latter is an important source of food for poor households. In terms of natural resources, the zone is full of gold (particularly in the south), gypsum, quartz, beryl, and chromium.

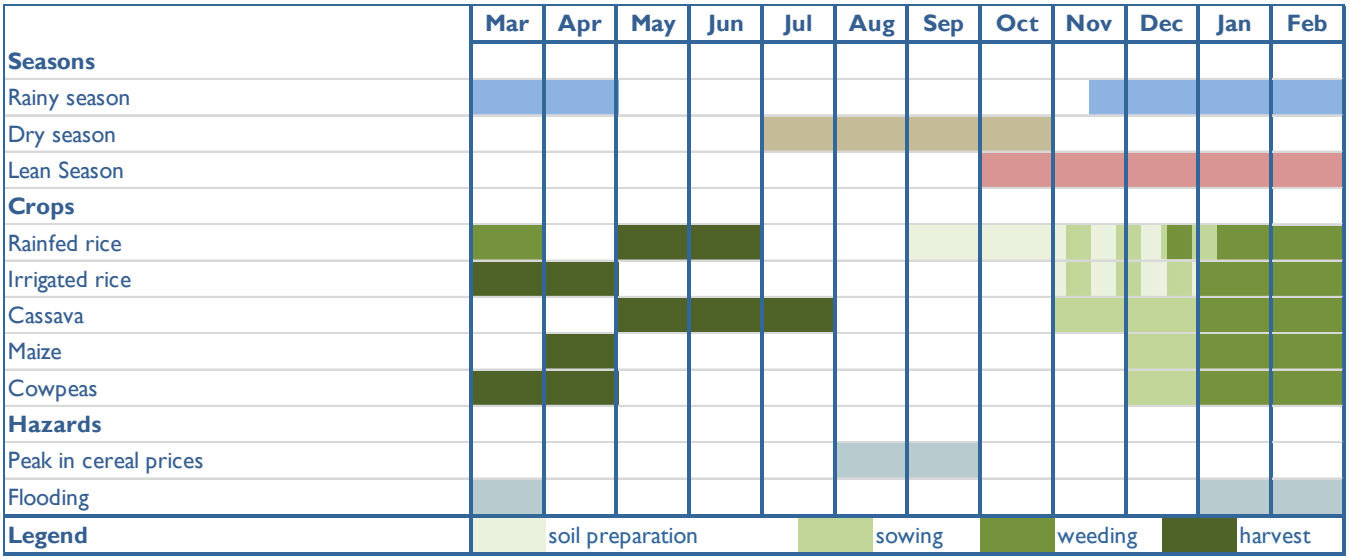
Population density is estimated to be 11 people/km^2. The average distribution of planted land area by crop is: rice: 0.6 ha; bean: 0.18 ha; cassava: 0.17 ha; maize: 0.08 ha; and sweet potato: 0.04 ha.

In general, the soil is moderately rich, tropical ferruginous. It is red lateritic with a clay texture in the *tanety*, colluvial and sandy on the lower slope, and alluvial in the *baiboho* and silty along the major rivers. The average rainfall is 1,700 mm, with a dry season (May–October) and a rainy season (December–April). The temperature ranges between a low of 16^{o}C and a high of 40^{o}C.

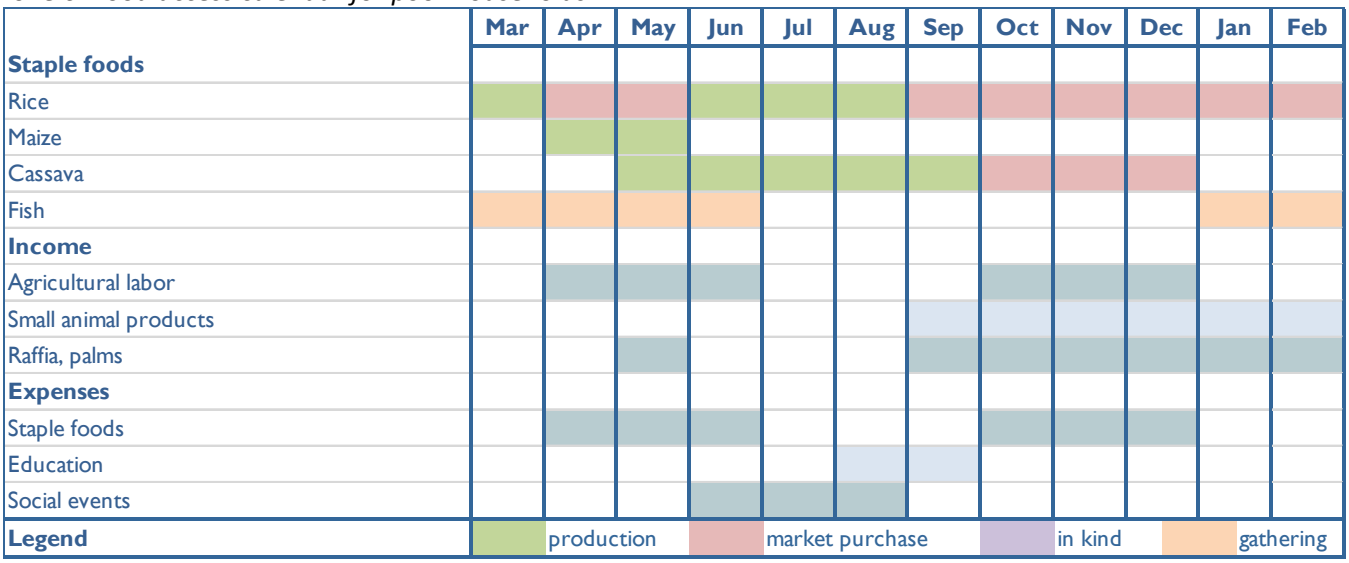
These conditions are favorable for intensive farming in some places. The agricultural production system is rainfed with some flood recession crops with an increasingly greater investment in mechanization by better-off and middle-income households. In addition to a surplus of rice sent to Antananarivo, the zone is noted for the industrial crops of tobacco, cotton, and groundnut.

The zone also supplies cattle to the central markets, which are the main markets for selling cattle in the country.

Zone 6: Seasonal calendar



Zone 6: Food access calendar for poor households



ALAOTRA: RICE, FISHING, LIVESTOCK REARING (ZONE 7)

Main productive assets	
Poor households	Better-off households
Land <1ha Small tools (scythe, spade) Labor Poultry (goose, duck)	Land >2 ha Rototiller or zebu Pigs Transport Rice paddies
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP) Maize (OP, MP)	Rice (OP) Meat (MP) Fish (MP)
Main income sources	
Poor households	Better-off households
Day labor Net fishing around the lake Charcoal and handicrafts production Pig fattening	Trade (especially rice) Rentals (plots, rice paddies, rototillers/zebu) Transport
Main markets	
Local	Regional/national
Ambatondrazaka, Morarano Chrome Amparafaravola	Antananarivo Toamasina
Main hazards, periods, and frequency	
Flooding, especially from cyclones	February–April, 1/4 years
Delayed rains, drought	November/December, 1/4 years;
lower prices at harvest	May/June, 1/4 years, often during an election year
Swine epizootic	
Coping strategies for poor households	
Sell more rice than usual Increase and diversify search for labor opportunities Increase fishing (for households around lake) Increase poultry sales	

This zone can be defined particularly by activities in the plains surrounding Lake Alaotra, Madagascar's largest lake. The natural vegetation is mostly composed of tertiary forest of eucalyptus on lateritic hills, but also *aristida* and clayey or peaty wetlands (*zetra*) around the lake. Rainfall ranges from 700 to 1,500 mm/year (average of 1,300 mm/year in the Alaotra-Mangoro region) with a rainy season occurring between November and March/April. The temperature is typically moderate, between 17°C and 24°C with a low of 7°C (June/July) and a high of 35°C (October–January). These conditions support mixed agricultural livelihoods primarily based on farming and fishing around the lake. The population density is approximately 35 people/km^2.

Rainfed crops (rice, maize, cassava, groundnut, Bambara groundnut, tomato, and tobacco) are grown on hills (*tanety*) and plains; irrigated rice predominates in the lowlands (*baiboho*). Most households have less than one ha of rice field per household. This land is divided between *tanety* and *baiboho*, with the majority of land on *baiboho* where rice fields predominate. Of the 100,000 ha of rice fields in the Alaotra zone, only 30,000 are well irrigated. Therefore, rice yields in this zone are quite dependent on rainfall. Nonetheless, this zone produces the largest rice surplus in the country in terms of per capita kilocalories.

The labor supply in the zone is insufficient during the harvest (May/June); therefore, producers depend on seasonal migration of laborers, particularly from Vakinakaratra (zone 11/14). If the supply of migrant laborers is too high, daily wages fall, resulting in lower incomes for local poor households, while a shortfall in labor raises production costs for rice and incomes for local poor households. Lastly, rice production is either based on cattle rearing or mechanization.

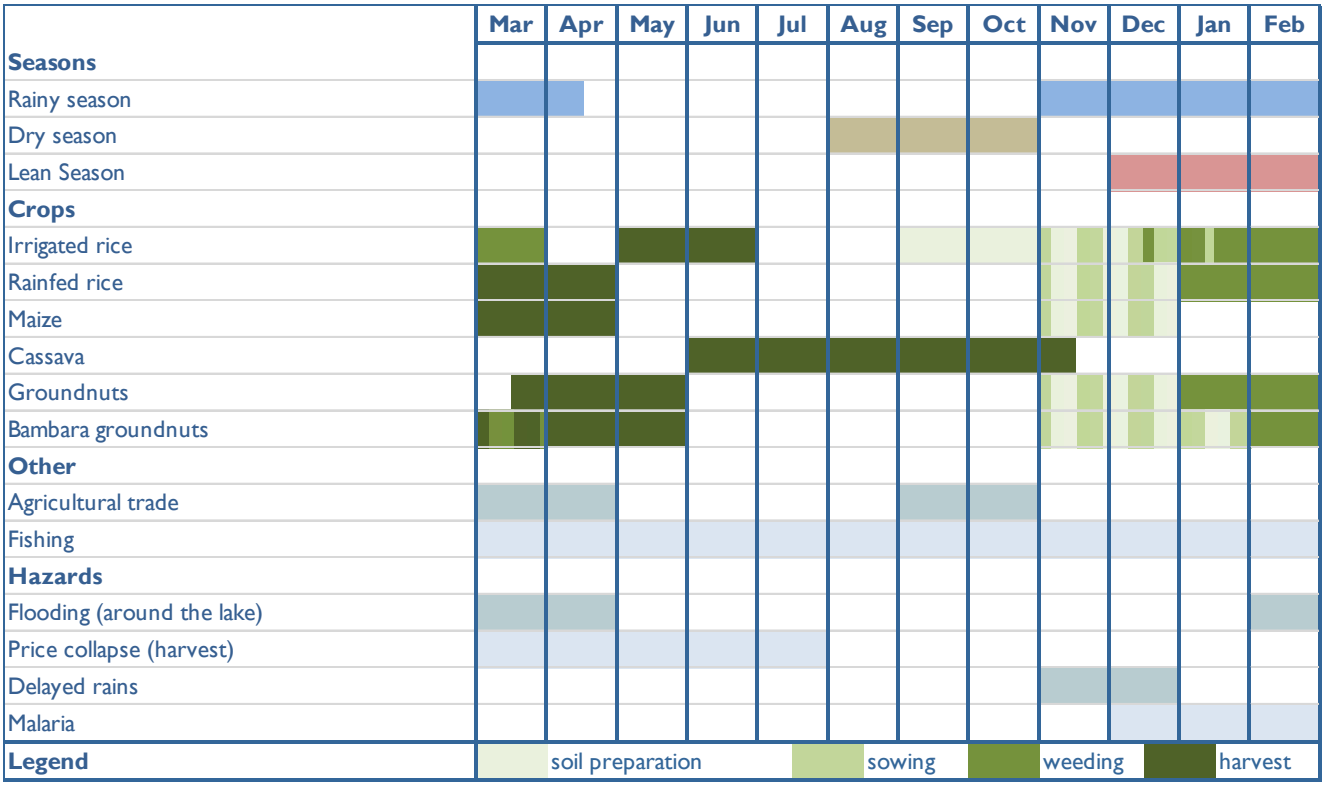
Cattle are primarily reared in this zone to facilitate work in rice fields, to produce manure, and to transport goods. The number of draft oxen for agriculture is gradually decreasing in favor of rototillers, also due to the rising risk of zebu theft. From the Andilamena side northward, cattle production is oriented primarily toward cattle sales, which is quite unique. Milk production and marketing are also expanding in the Alaotra zone. Raising and especially fattening pigs is a widespread activity in the zone, particularly among better-off households. Animals are mostly fed with crop residues, mainly rice straw, but a few forage crops are grown.

Most of the rice produced in the zone is marketed as paddy rice by producers and collectors who work for large companies, including SILAC on the eastern side of the lake, based in western Manakambahiny, and the Société Roger on the western side of the lake, based in Amparafaravola. These companies sell milled rice on a national-scale via Anatanarivo and Toamasina (Tamatave). A small quantity of rice is exported outside the zone. The small and medium rice fields of the better-off households also collect paddy rice to resell it after milling in Antananarivo and Toamasina.

Also in the North, some households engage in artisanal mining of rubies and sapphires. Around Lake Alaotra (Anororo and Vohotsoa), women make and sell handicrafts (woven reeds) during periods between rice transplanting and harvest. The common carp and tilapia are quite abundant in the lake and its streams; these fish are marketed locally and in Antananarivo.

The zone's most serious hazards are those affecting the rice sector. Inadequate rainfall can also lower demand for labor for off-season crops between August–October. The availability of work can also pose problems during droughts. Lastly, delayed rains increases production costs for the better-off households because they must either use motorized pumps for watering, or there is less time available to plant crops. Flooding also increases production costs since fields must either be re-transplanted or re-sown.

Zone 7: Seasonal calendar



Zone 7: Food access calendar for poor households

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Staple foods												
Rice												
Maize		green										
Cassava												
Income												
Agricultural labor												
Charcoal												
Handicrafts												
Fishing												
Expenses												
Staple foods												
Education												
Social events												
Legend		production			market purchase				in kind			gathering

TOAMASINA: CLOVE, COFFEE, TRADE (ZONE 8)

Main productive assets	
Poor households	Better-off households
Land (<1 ha) Small farming tools A few hens	Zebus Land (>1ha) Transport (motorcycle, dugout canoe or cart)
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP) Breadfruit (OP) Leaves (G, MP) Bean (MP) Fish (OP)	Rice (OP) Meat (MP) Fish (MP)
Main income sources	
Poor households	Better-off households
Labor Fishing Basketwork	Clove Coffee Litchi Trade Transport
Main markets	
Toamasina (Tamatave) Fenerive Est	Antananarivo
Main hazards, periods, and frequency	
Cyclones	November–April, 1/7 years
Low price at harvest	May–July
High retail price of rice	March–April/October
Coping strategies for poor households	
Consume *via* seeds Increase poultry sales Migrate in search of work (especially girls and toward district capitals)	

Located on the east coast, zone 8 roughly conforms to the borders of the Analanjirofo region. It is primarily made up of coastal plains and foothills, gently sloping down to the western highlands of zone 7. It is mostly composed of shrub savannahs and secondary forests. Soils become increasingly more clayey the further one moves westward. Annual rainfall averages range between 1,500 and 2,000 mm/year, concentrated between November and April with higher annual averages toward the East.. Population density is higher in this zone than in neighboring zone 2; most of the zone has over 50 people/km^2. The population is greater in the hills and valleys, but the coast north of Toamasina has an even higher population density.

The city of Toamasina (Tamatave), which hosts Madagascar's largest port, is located in this zone. Despite relatively easy access to export markets and to exchanges with the outside through the port and with Antananarivo by train and road, the zone is considered as being less well off than its northern neighbor (zone 2) where vanilla production is higher.

Rice cultivation is either done manually (poor households) or with draft animals (better-off households). There are two rice harvests per year: the main rainfed harvest in June–July and the second harvest mostly in the lowland valleys in December–January. The Iazafo plain is an area of high rice production. Local rice heads to Toamasina (Tamatave) and to Fenerive Est, approximately 120 km and 80 km, respectively, from growing areas.

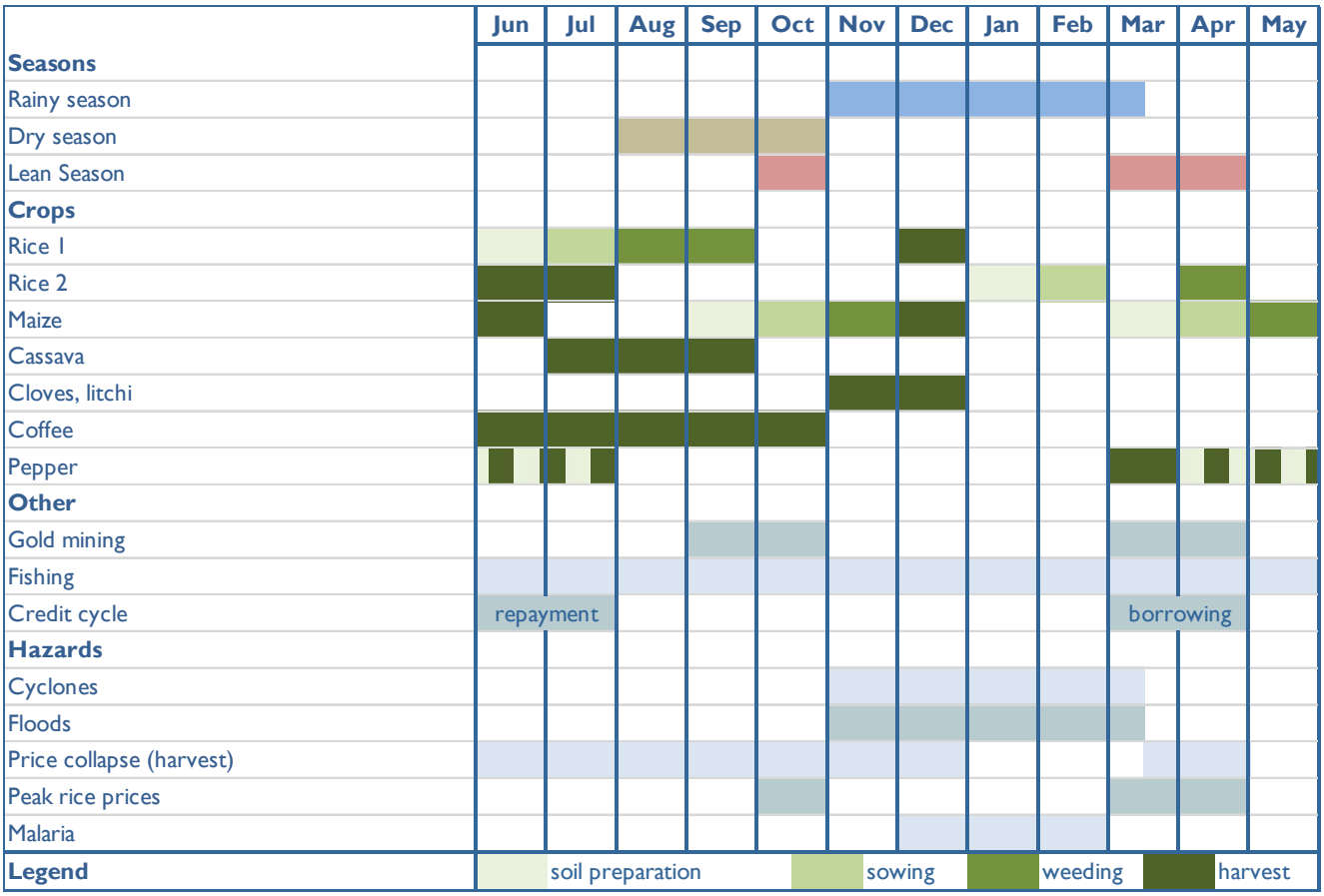
The better-off farming households cover their annual rice needs through their own production, but poor households consume small quantities of imported rice or consume their own production of fresh cassava, breadfruit, and banana. The availability of rice substitutes is lower in this zone than in zone 2 to the North. During lean periods, basketwork is the main income generating activity for the zone's poor households; however, poor households in the northern part of the zone can also work in small-scale gold mining.

Like all the eastern zones, zone 8 produces cash crops for export, with the most significant being, in order of importance: clove, coffee, litchi, pepper, and vanilla. Similar to the neighboring zone 2 to the North, nearly all households in zone 8 have several cash crops. They also tend to grow some of all of the crops. This strategy both extends income-generating seasons and decreases their exposure to shocks.

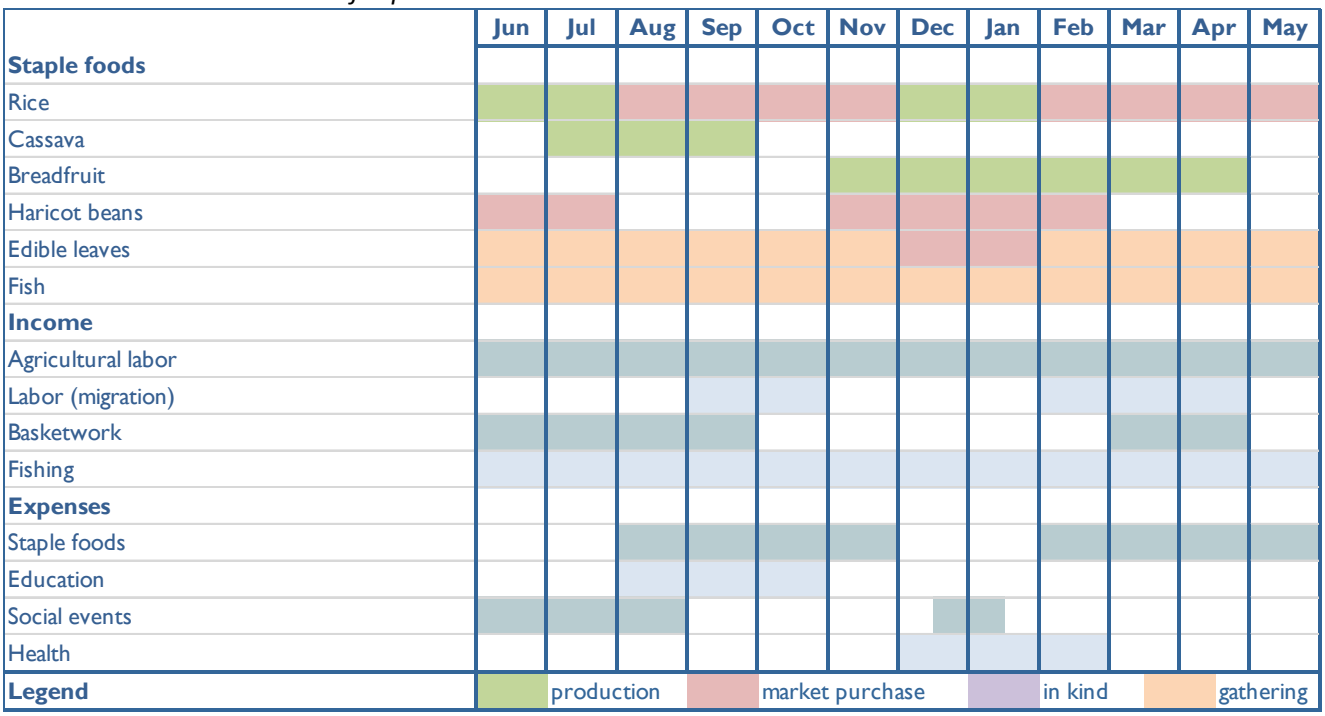
Additionally, as in zone 2, the role of poor households in the cash-cropping sectors primarily consists of selling their labor for the harvest and for processing cash products. Because better-off households own the means of transportation and can maintain the required quantity and quality standards for exportation, they dominate the marketing of cash crops to export companies. Day wages are slightly lower than in zone 2 in the North due to higher population density in zone 8, the greater integration of labor markets, and the relatively lower value of cash crops.

Shortcomings related to the capital and infrastructure needed to market cash products are quite real and do not allow for taking full advantage of the zone's opportunities, especially since transportation costs can double during the marketing season. Tourism could also be developed if the road infrastructure were better.

Zone 8: Seasonal calendar



Zone 8: Food access calendar for poor households



WEST: RICE, FISHING, MAIZE (ZONE 9)

Main productive assets	
Poor households	Better-off households
Land Goats, pigs, poultry Cart, dugout canoe, small tools	Land Cattle, goats, pigs Animal-drawn plow, cart
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP, MP) Maize (OP) Fish (G)	Rice (OP) Meat/fish (MP)
Main income sources	
Poor households	Better-off households
Agricultural production Small business Livestock, poultry Fishing Gathering (raffia, cashew) Charcoal	Agricultural production Livestock Fishing Provision of services (transport, rentals)
Main markets	
Antsalova, Morafenobe, Maintirano (also specializing in fishing products), Besalampy	
Main hazards, periods, and frequency	
Flooding Locusts Cyclone Cattle raiding	January–March December-June December-April Year round
Coping strategies for poor households	
Borrow money or food Intensify the search for work Remove children from school Increase small-scale fishing	

The zone is located in the western part of the country and covers the districts of Antsalova, Maintirano, Besalampy, and Morafenobe. In the zone's Southeast, the hilly terrain hosts a segment of the chain of hills known as "Tsingy de Bemaraha" and a natural reserve of the same name, which attracts tourists. The vegetation is made up of savannah combined with pseudo-steppes including woods and dense forests. The temperature here varies between 15°C in July–August and 35°C in January–February. The zone gets between 1,000 and 1,200 mm of rainfall per year. With moderately fertile soil—predominantly ferralitic combined with lithosol; ferruginous, sandy, and hydromorphic soil; and vertisols—these rains enable growing a variety of crops, notably food crops. The low population density (4–7 people/km^2) and seasonal isolation make the zone almost self-sufficient.

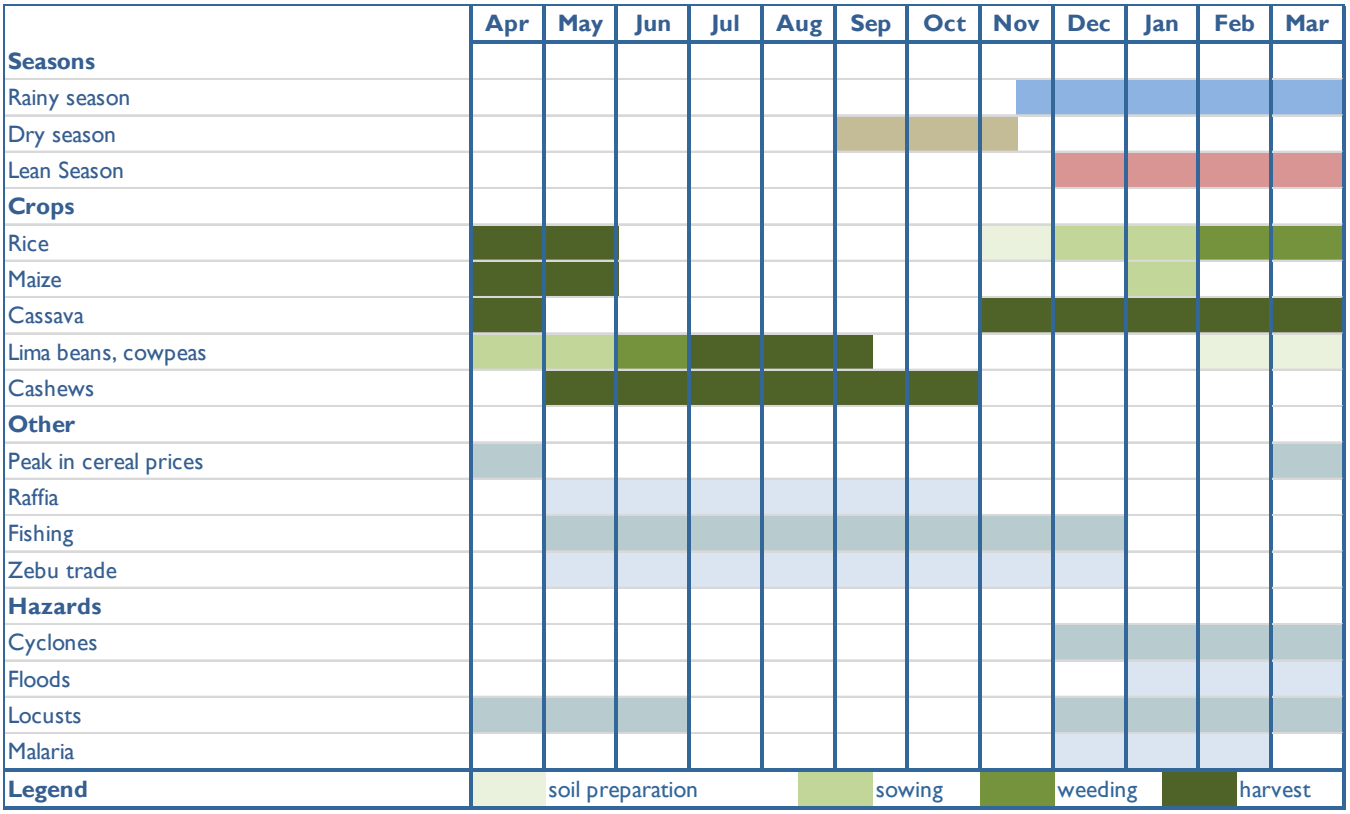
The zone has a coastline that allows for coastal fishing as well as the many waterways that enable inland fishing. However, a small minority of households, known as *"Vezo"*, rely heavily on fishing to support their livelihoods. Subsistence farming is the main source of food and income for the vast majority of households.

The better-off households focus more on rice production, which forms the basis of their diet. Because they have small areas of land and grow rice in part as a cash crop, the poor households diversify their production by growing rice, maize, and cassava. With small stocks of rice averaging four to five months of consumption, they consume maize and cassava as a rice substitute when rice stocks are exhausted, usually from September to April.

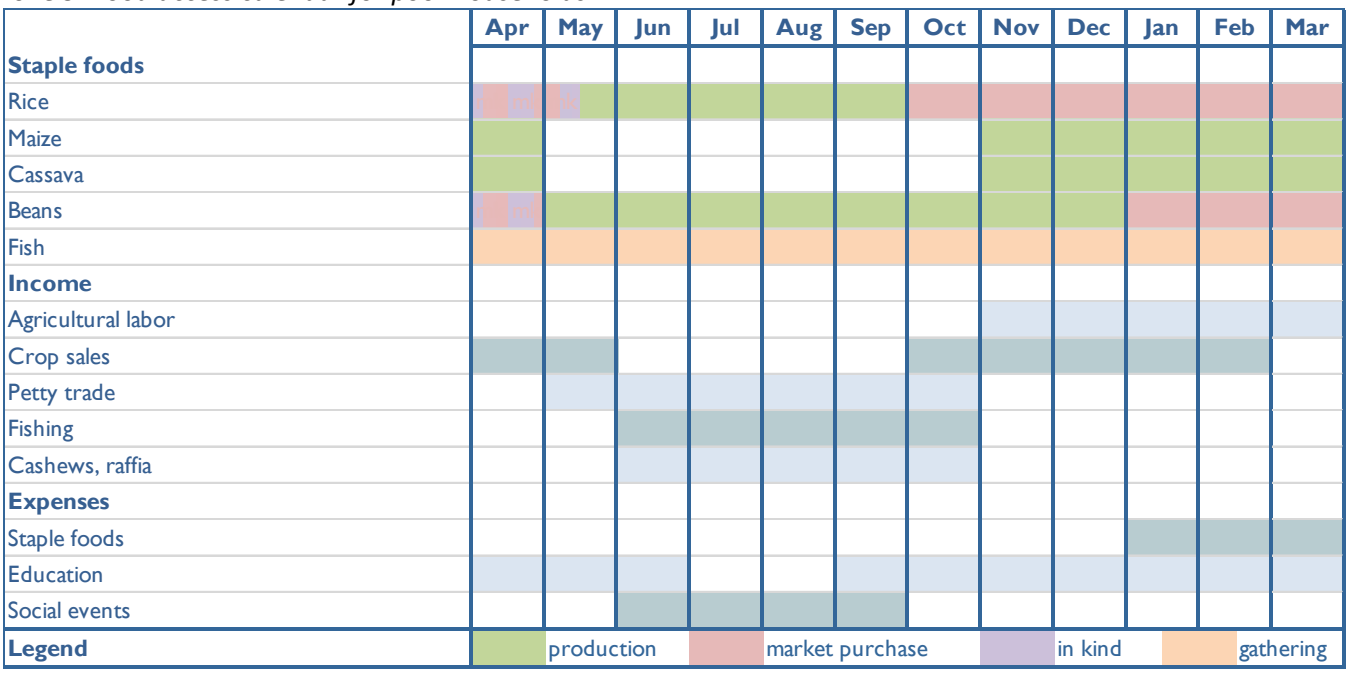
Better-off and poor households generally have the same sources of income, but the level of involvement varies. For example, the better-off households, who have larger harvests, buy a portion of the poor households' maize harvest in January–February, and a portion of their rice harvest in April–May. They resell the latter to collectors from urban centers, or locally in August–October when poor households no longer have any stocks and thus depend on the market. Like the poor households, the better-off are involved in marketing fishery products, cashews, and raffia, but their role consists of collecting the various products provided by poor households to store and resell them at a higher price later in the consumption year. Some well-off households own fishing equipment and employ poor households in fishing activities. They can also buy the fish catches of poor households and then route the fresh or dried fish to Antananarivo via Tsiroannomandidy by road during the dry season or toward Mahajanga by sea. Most poor households on the coast and along waterways consume a portion of the caught fish.

Expenditures for staple foods for poor households extend over seven months, from October to April. The better-off households only buy complementary foods such as meat or other condiments. Expenditures for rituals and cultural festivals are common to all wealth groups and occur most frequently between October and December.

Zone 9: Seasonal calendar



Zone 9: Food access calendar for poor households



AGROPASTORAL MIDWEST: RICE, MAIZE, PULSES (ZONE 10)

Main productive assets	
Poor households	Better-off households
Land Poultry, Goats/sheep, pigs Cart Small tools	Land Cattle, goats, pigs Animal-drawn plow, cart
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Maize (OP) Cassava (OP, MP)	Rice (OP) Meat/fish
Main income sources	
Poor households	Better-off households
Agricultural production Labor (*kibarou*) Poultry, livestock Fishing Charcoal	Agricultural production Trade Livestock Provision of services (transport, renting, tourism)
Main markets	
Miandrivazo, Mandoto, Tsiroanomandidy, Antsirabe, Antananarivo	Food products and livestock
Fianarantsoa, Ankazobe	Food products
Main hazards, periods, and frequency	
Cattle raiding Locusts Cyclone	Year-round December–June December–April
Coping strategies for poor households	
Borrow money or food Intensify the search for work Remove children from school to work Increase sales of poultry or household equipment	

The zone is located in the western part of the country and covers the northeastern part of the Menabe region, the eastern part of Melaky, the Bongolava region, the western part of Analamanga and the northwestern part of Vakinankaratra. The terrain is made up of highlands marked by flat surfaces, vast plateaus, and vast extended plains below the slopes, combined with hydromorphic soil suitable for growing rice. The zone hosts part of the "Tsingy de Bemaraha," which accommodates tourists. The vegetation comprises grassy savannah interrupted by rice paddy formations. The temperature ranges from 13°C in April to 30°C in December. The zone gets between 1,000 and 1,400 mm of rain per year.

The soil, predominantly ferralitic and alluvial, is moderately fertile. The zone relies mainly on agriculture and of that, mainly on rice cultivation: *baiboho* rice (flood-recession rice), irrigated or flood recession rice, *tanety* and lowland rice, and intermediary rice, grown between the main season and dry season. Rice is the basic food for households, but yields produced by poor households only cover four months of consumption, on average. For the rest of the consumption year, they grow maize and groundnuts.

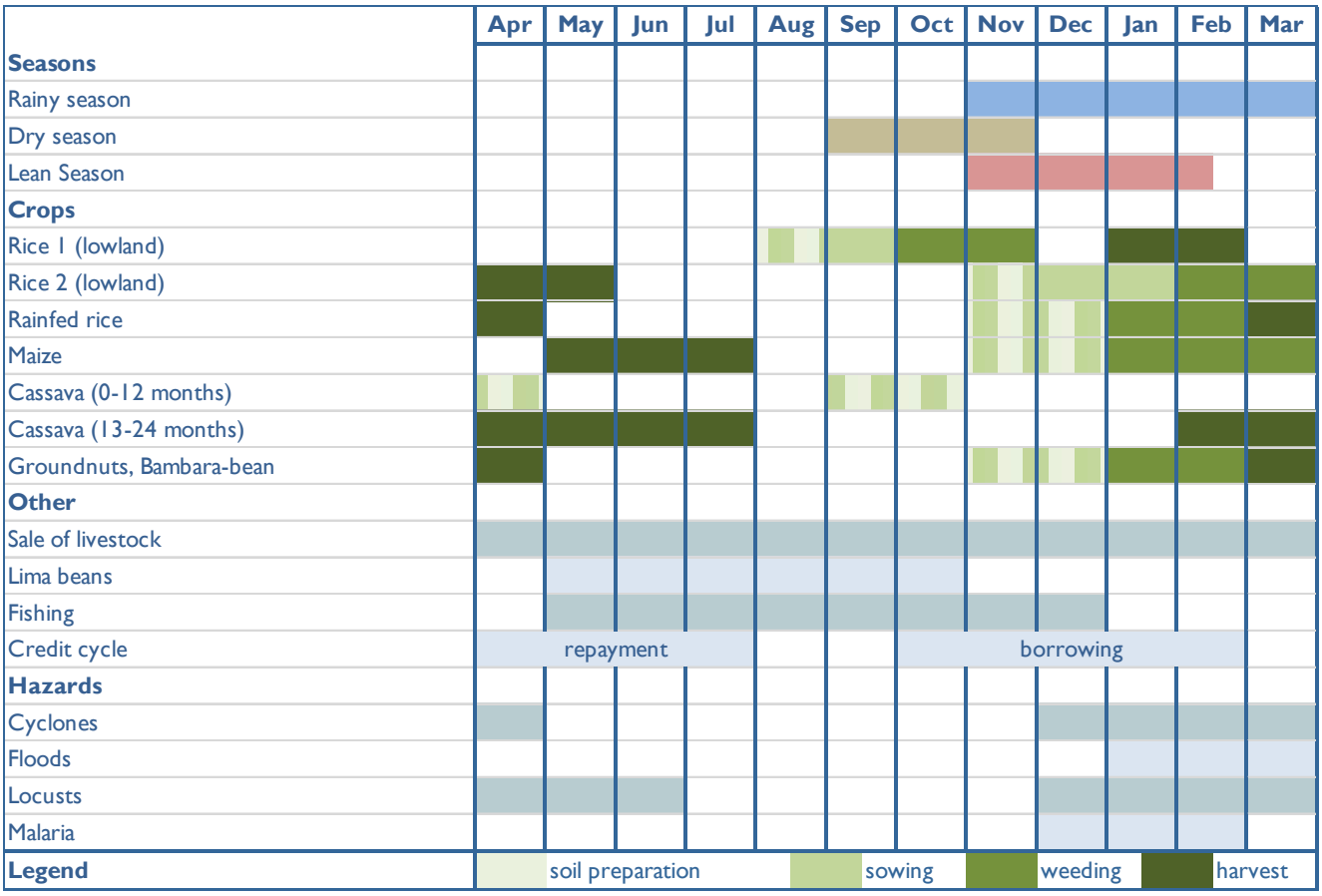
Agriculture mostly uses draft oxen in the zone. Unfortunately, since 2010, a rise in zebu theft in the area has become an obstacle to agriculture. Some better-off households now opt to buy rototillers, even though they run on fuel and therefore involve higher production costs.

In the southern part of the zone, toward Mandoto, households grow market gardening crops starting in May, which is facilitated by the national road that crosses the zone.

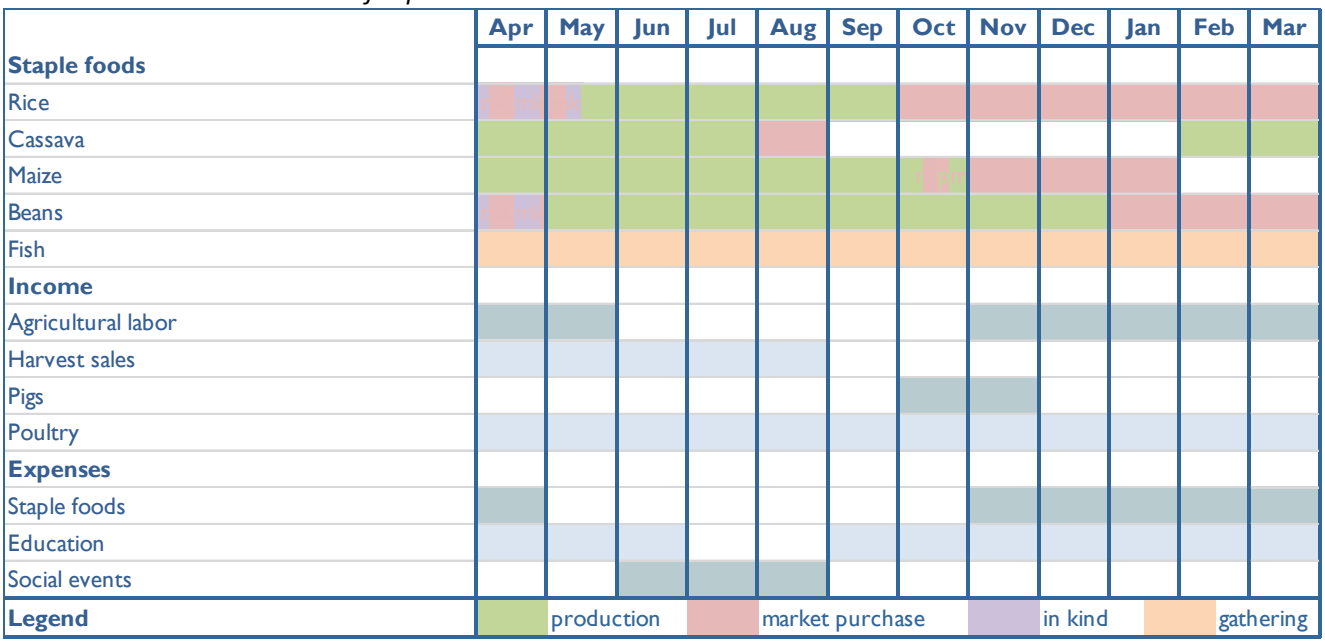
For poor households, income from the sale of agricultural products is also used to buy rice. Among these products, beans—especially lima beans and cowpeas—should be noted, as it is also a cash crop since its yields are almost entirely marketed. The bean buyers come from Antananarivo and Antsirabe. Maize and groundnut are also cash crops since an estimated 60 percent of their yields go to market. The other source of income used by the poor to buy rice is wage labor.

The vast lakes in the southern part of the zone toward Miandrivazo allow nearby households to draw income from fishing. Miandrivazo has been long recognized as the top source of freshwater fish supply to Antananarivo. Its fishery resources have dropped due to overuse, but fishing continues to engage many poor households.

Zone 10: Seasonal calendar



Zone 10: Food access calendar for poor households



CENTRAL IARIVO: RICE, MARKET GARDENING, EUCALYPTUS (ZONE 11)

Main productive assets	
Poor households	Better-off households
Land (2 acres ~ 0,1 ha) Small ruminants Poultry (<3) Small tools (spade)	Land >2 ha Draft ox >2 Plow/Cart Business
Main foods and sources	
Poor household	Better-off households
Rice (OP, MP) Cassava (OP, MP) Maize (OP, MP) Wild foods (G)	Rice (OP, MP) Cassava (OP) Maize (OP) Irish potato (OP) Meat, fish, condiment (MP)
Main income sources	
Poor households	Better-off households
Local labor Migratory labor	Agricultural trade Sharecropping Credit Transport
Main markets	
Antananarivo	
Main hazards, periods, and frequency	
Flooding, cyclone Diseases, crop pests Small livestock disease	November–April; 1/3 years
Coping strategies for poor households	
Intensify the search for work Pull children out of school	

Zone 11 is a high-altitude zone with many mountains separated by plains and lowlands, lakes, and rivers and streams. The forest cover has vestiges of natural forest, eucalyptus plantations, a Tapia forest, as well as steppes and savannahs. The zone gets abundant rainfall of 1,200 to 1,500 mm per year, primarily between November/December and April. The soil is moderately fertile. The population density is very high (>250 people/km^2 in urban areas and 25-250 people/km^2 in peri-urban and rural areas).

One particular advantage of zone 11, which distinguishes it from zone 14, for example, is the location of the city of Antanarivo, the largest final and supply market, in the area.

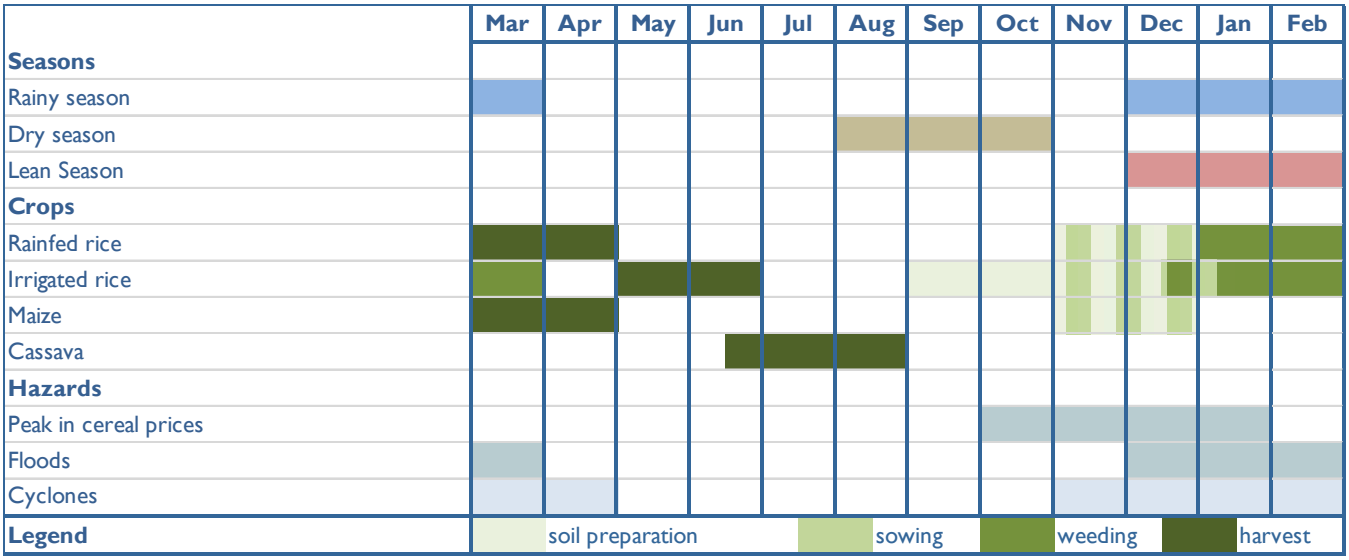
Agriculture is dominated by rice (irrigated or on terraces) and market garden crops. The most commonly grown food crops are maize, cassava, sweet potato, beans, and potato. People eat what they produce (rice, cassava, and maize), but they must make up their food shortfalls with market purchases.

Livestock rearing is primarily based on short-cycle animals (pigs and poultry); there is also silkworm breeding in the zone's highest areas.

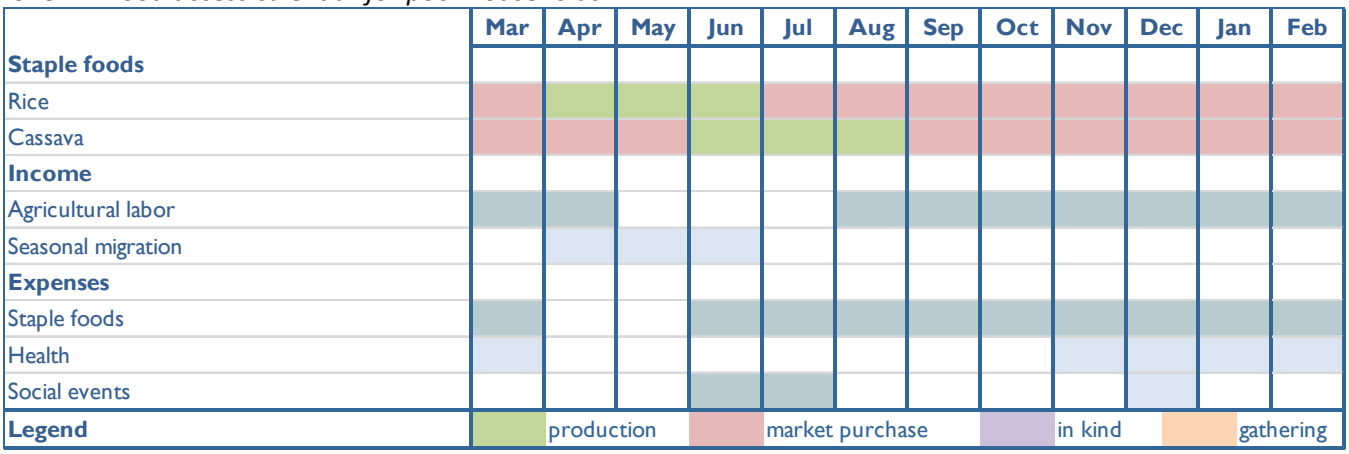
Numerous economic activities, in addition to agriculture, provide income for the zone's rural population. For poor households, this includes selling unskilled labor, handicrafts (blacksmithing, basketwork), construction trades, and local street vending. Line fishing (in lakes, ponds, and rivers) and rice plantations combined with fish cultivation in areas close to waterways. The better-off households often have family members who earn salaries from the private or public sector in the capital and/or who have small businesses (selling agricultural products or spices). Eucalyptus forestry, the labor for which is an important source of income for poor households, to supply the capital with timber and charcoal is more developed here than in the rest of the country.

Antananarivo is the main outlet for the zone's products and services (rice and other food crops, charcoal and lumber, handicrafts, small livestock, non-specialized labor, etc.). The Malagasy capital is also a supply source for the zone for various food products as well as basic necessities. The Antananarivo market is well connected to the collection markets and aggregators from zone 11, as it is for other major markets in the country. The presence of a supply and outlet market in addition to diversification of economic activities makes people in zone 11 less vulnerable to local agricultural production shocks than more remote regions. The zone also receives assistance more easily in case of food crises, due to its proximity to the capital. They receive assistance quickly in the event of a shock.

Zone 11: Seasonal calendar



Zone 11: Food access calendar for poor households



MORAMANGA: FOREST, SMALL BUSINESS, MARKET GARDENING (ZONE 12)

Main productive assets	
Poor households	Better-off households
Land <0.5 ha Small farming tools Local hens	Zebus, dairy cattle Land Cart/pushcart Laying/broiler hens
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP, MP) Fish (G, MP)	Rice (OP, MP) Meat (MP) Fish (MP)
Main income sources	
Poor households	Better-off households
Gathering (*ravinala*) Labor Market garden crops Freshwater fishing	Trade (restaurants, lumber, charcoal) Livestock Renting means of transport
Main markets	
Antananarivo	Toamasina
Main hazards, periods, and frequency	
Bush fires	June-October
Delayed rains	November/December
Damaged roads due to heavy rains	July-August
Coping strategies for poor households	
Quick development of burned land Grow something other than rice or plant short-cycle rice	

This mountainous zone (at an average elevation of 900 m) of the central-eastern part of the country has *Pinus* and eucalyptus forests. The zone is very wet, with an annual average rainfall of 1,500 to 2,000 mm. The rains are concentrated from November to April, but some rain falls during the dry season, lasting from June to October. Temperatures, cool year-round, generally range between 14°C and 25°C. The population density is approximately 30 people/km^2.

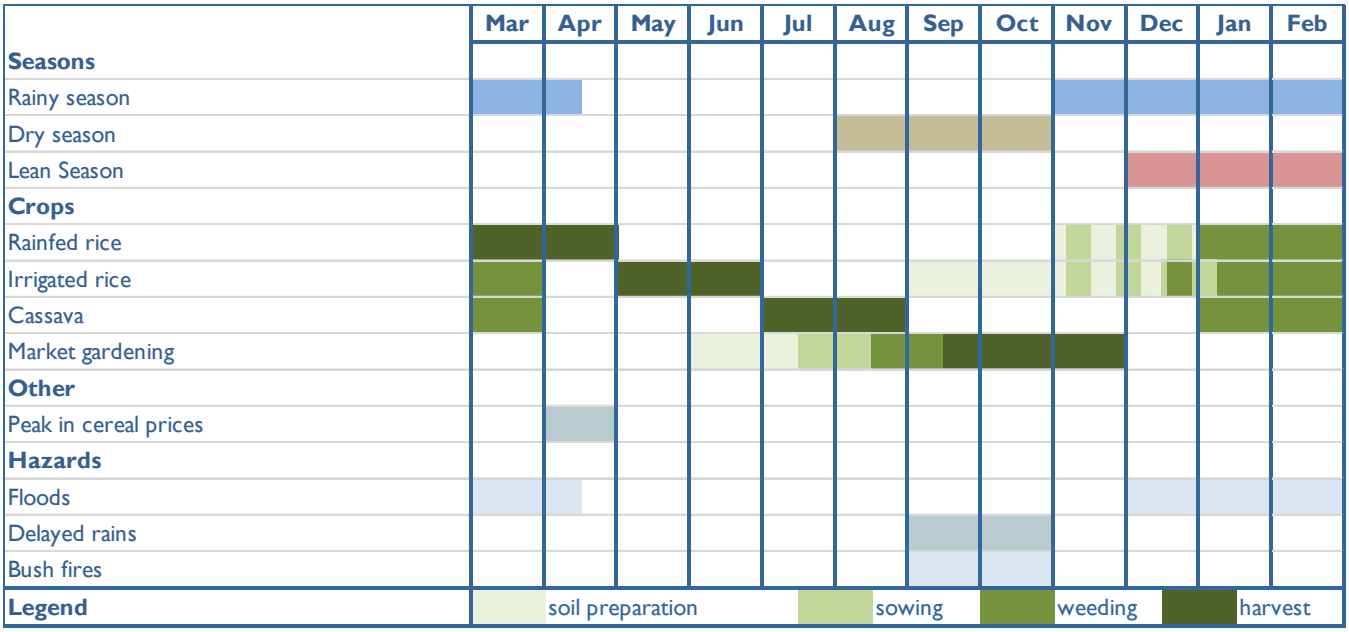
Households cultivate relatively small areas of approximately 1 ha of *tanety* and less than 0.5 ha in the more fertile lowlands. People depend on their own crops grown in the valleys, mainly irrigated rice. The zone is self-sufficient in rice.

The zone's main sources of income are, in addition to rice, essential oils, ginger, forestry, and small businesses. Business activities include small-scale services related to tourism offered on the roadside and in Andasibe Park. The sale of unskilled labor in Antananarivo, located in the neighboring livelihood zone, is also a significant source of income. People from the zone also work in small businesses close to the capital.

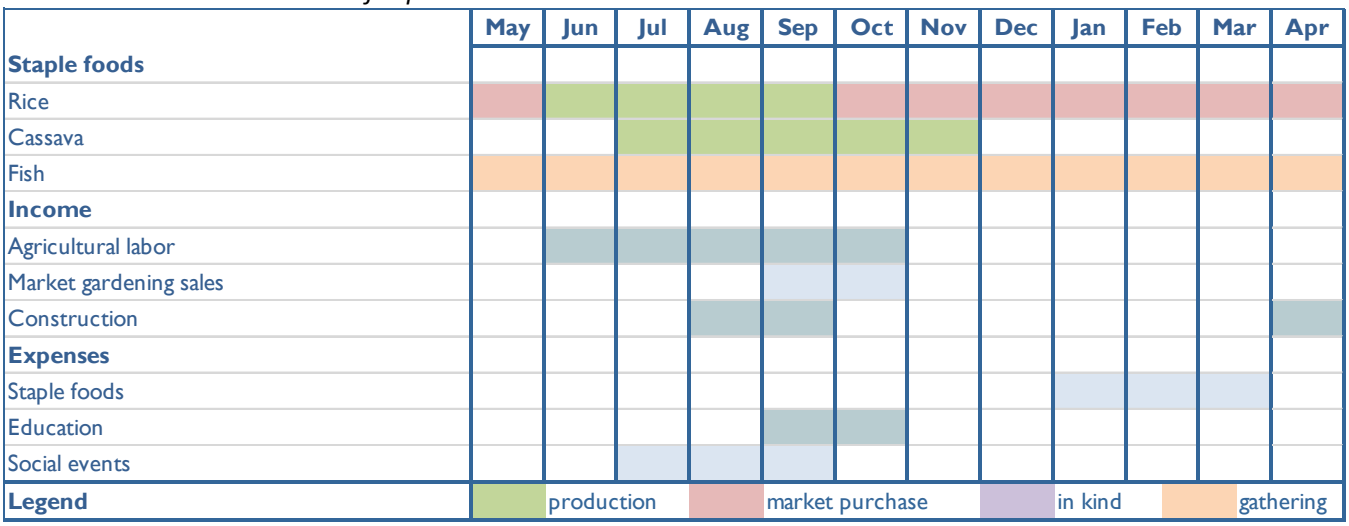
Forestry for lumber and charcoal is important to the economy in zone 12. The Fanalamanga Company is a major lumber producer and also provides a large market for unskilled, non-agricultural labor. The zone's economic activities also include line fishing (and occasionally net fishing) of king carp. Eel and crayfish are also caught along the Mangoro River. Antanarivo is the main outlet for wood products (charcoal and lumber), fish, and labor from zone 12. Other secondary markets for these goods and services are Toamasina and Moramanga.

Mineral mining units (nickel, cobalt, graphite, etc.) operate in the zone but do not use much unskilled labor from poor segments of the zone's population. Moreover, employees from these units mostly get their food supply from outside the area because products from Moramanga do not meet the required quality standards.

Zone 12: Seasonal calendar



Zone 12: Food access calendar for poor households



CENTER-EAST: LITCHI, COFFEE, CITRUS (ZONE 13)

Main productive assets	
Poor households	Better-off households
Land <0.1 ha Dugout canoe Small tools Poultry (hen, duck)	Plot in hills >1ha Zebus Motorized dugout canoe
Main foods and sources	
Poor households	Better-off households
Rice (OP) Cassava (OP) Breadfruit (G, OP) Yam/sweet potato (OP) Fish (OP)	Rice (OP) Cassava (OP) Yam/sweet potato (OP, MP) Fish (MP)
Main income sources	
Poor households	Better-off households
Labor Fishing Wood Basketwork	Cash crops Trading agricultural products Small business
Main markets	
Local	Regional/national
District administrative center Ambatondrazaka Mahanoro crossroads (for products from Mananjary)	Antananarivo Toamasina
Main hazards, periods, and frequency	
Cyclone (coast) Flooding (riparian areas)	December–April January to February
Coping strategies for poor households	
Intensify the search for labor opportunities Increased gathering Increased poultry and small livestock sales	

Located on the East Coast, this zone is divided between the regions of Atsinanana and Vatovavy-Fitovinany. The zone is primarily sandy coastline in addition to river basins of sandy-loam. Vegetation mainly consists of mangroves on the coast and savannah secondary forest, primarily *niaouli* (eucalyptus). The most fertile land lies around Mahanoro and Vatomandry. Population density averages approximately 50 people/km^2 with the highest density on the coast.

The agricultural system is mainly manual, although better-off households have access to zebus for preparing land.

The zone specializes in cash crops, mostly for export, including coffee (most prevalent south of Mahanor), litchi (more toward the North), clove, cinnamon, and pepper. Other cash crops produced in the zone include citrus fruits, pineapple, sugar-apple, and guava. However, food crops (rice, maize, cassava, banana, jackfruit, breadfruit, sweet potato, and yam) are even more widespread.

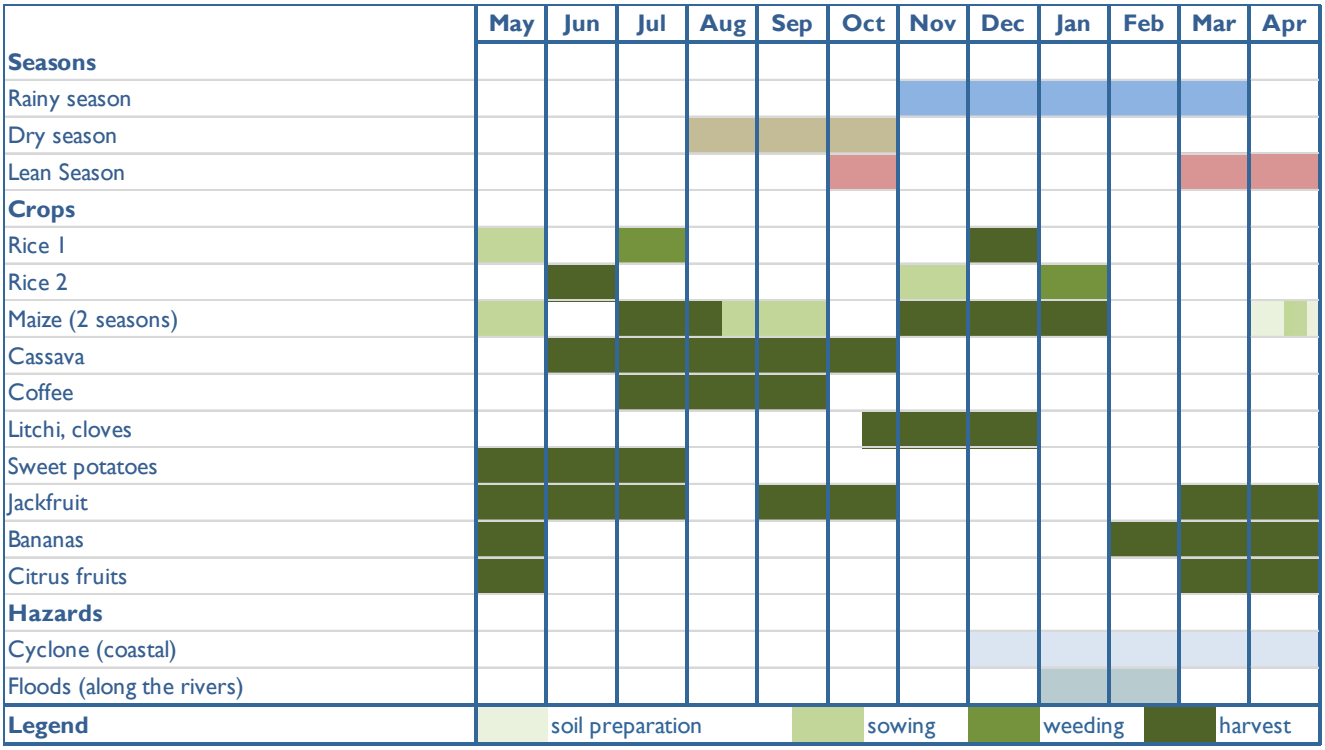
The vast majority of people have at least two parcels of land (main rainy season and off-season, sometimes irrigated) so they can grow rice for two seasons. The zone has a shortfall in rice production; thus, it brings it in from Antananarivo or d'Ambatondrazaka, especially from February–May and August–November. Small quantities of imported rice come in from Toamasina (Tamatave).

Although the zone grows cassava, it is not suitable for drying it. Thus, the product is primarily consumed fresh. A small amount of fresh cassava is delivered to Toamasina during the harvest.

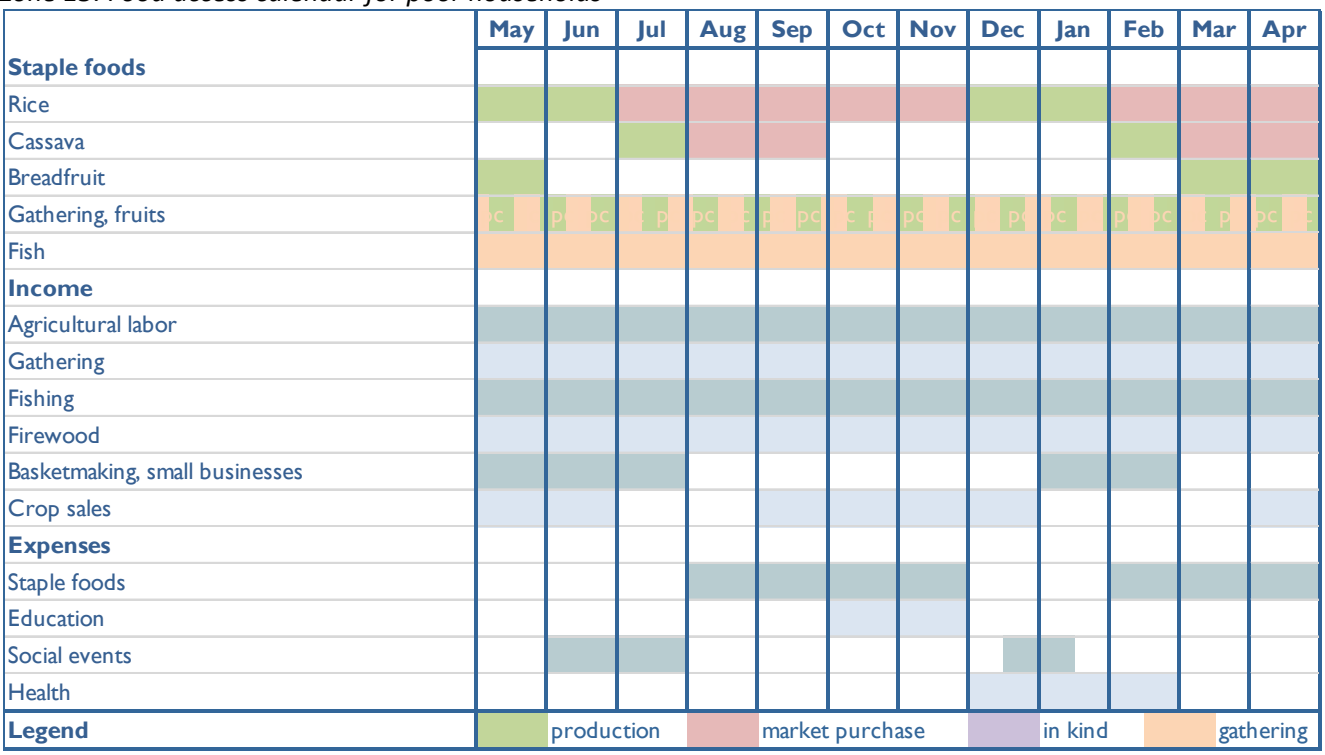
Zone 13 has the capacity to grow crops during a third short season (*varimadena*) in March/April and takes advantage of it to produce maize, which it markets throughout the country during this period because it is the only zone harvesting it then. Maize is considered more a cash crop rather than a food crop; it is sold as a dried grain in Antananarivo. However, the profitability of maize is limited by pests, especially seed-eating birds.

Selling labor is the main source of income for poor households; one day of work is worth approximately 1.5–2 kg of rice on the local market. Fishing is also an important economic activity for zone 13.

Zone 13: Seasonal calendar



Zone 13: Food access calendar for poor households



ANKARATRA: STAPLE CROPS, HORTICULTURE, MILK (ZONE 14)

Main productive assets	
Poor households	Better-off households
Land (0-0.2ha) Poultry Cart Small tools (spade)	Land >2 ha Spices Draft ox >2 Pig (>10) Poultry (>10)
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Maize (OP) Cassava (OP, MP) Irish potato (OP)	Rice (OP, MP) Cassava (OP) Maize (OP) Irish potato (OP) Meat, fish, condiment (MP)
Main income sources	
Poor households	Better-off households
Agricultural labor Transport (hand-drawn rickshaw) Small business	Agricultural trade Motorized transport Gemstones
Main markets	
Antananarivo, Morombé, Antsirabe, Finanarantsoa, Toliara, Toamasina	
Main hazards, periods, and frequency	
Flooding Cyclones Diseases, crop pests Small livestock diseases Frost	1/3 years November–April, 1/3 years December-February and July February-march and July-august May-August every year
Coping strategies for poor households	
Pull children out of school Intensify small-scale street vending	

This livelihood zone is a high-elevation zone located in the center of the country. It has mountains overlooking plains, lowlands, lakes, rivers, streams, and several hot springs. Its natural vegetation consists of forest planted with *Pinus* and *Mimosas* and remnants of natural forest. The rainy season occurs between November and April. It is the country's coolest zone, with low temperatures of approximately 2°C in July and highs of 27°C toward December. Population density is among the highest in the country, approximately 500 people/km^2 on average and higher in urban areas. The population density, good water availability, and the temperate climate means that the zone's agricultural production is among the most intensive of the country; even poor households use mineral fertilizer and pesticides.

The zone's economy is predominantly based on subsistence farming, which is dominated by rice cultivation. However, other crops such as barley, wheat, maize, and beans, in addition to fruits are also grown. Fruits and vegetables in this zone include fruits from temperate countries, such as the apple.

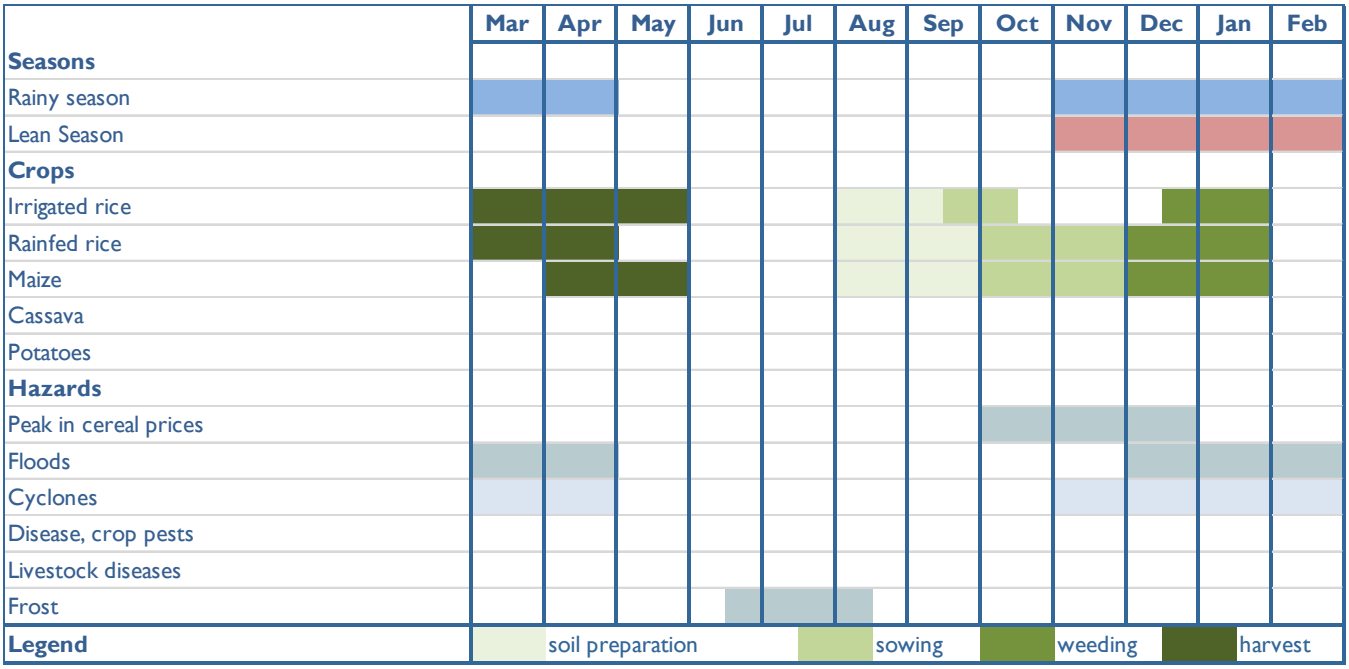
Rice cultivation is terraced (hill varieties) and in valleys (lowland varieties). The average cultivated area per household is low, approximately 0.10–0.5 ha. Landless households may sharecrop for own production. Well-to-do households might have two to five hectares—land they work using draft oxen. Growing rice is the zone's main agricultural activity. As with nearly everywhere in Madagascar, rice is the staple food in the zone. Well-to-do households obtain rice from their own production or by purchasing it. During lean periods, poor households often buy on credit and substitute less preferred food like cassava for rice.

Horticulture is highly developed in the zone. Irish potato (*ovy*) production should be highlighted, since zone 14 is the country's main surplus zone. High consumption of Irish potato, particularly among children, was identified as a possible contributing factor to high rates of chronic malnutrition in the area (it was sometimes given to children as a breast milk substitute).

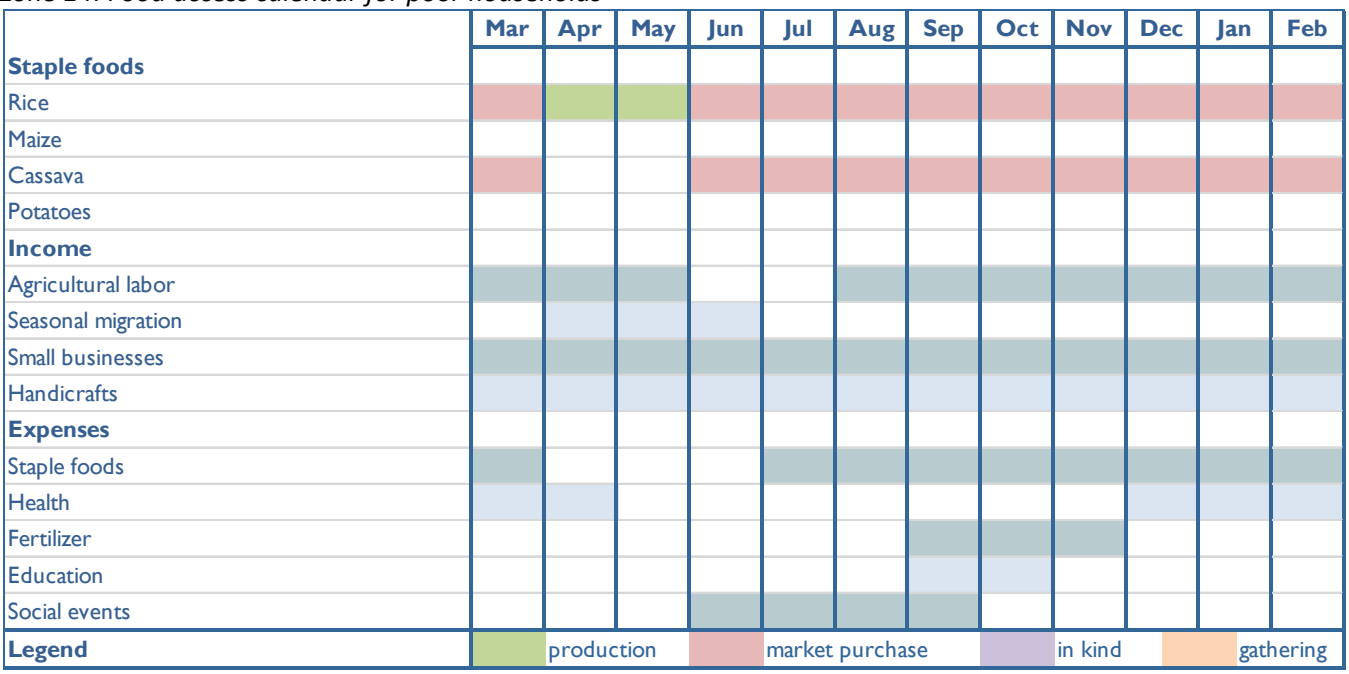
Increased agriculture and dairy farming has resulted in the emergence of other agro-food industries (beer, flour, dairy products, tobacco, etc.) in this densely populated zone.

However, the main income sources for poor households continue to be selling labor, whether locally or through seasonal emigration. Poor households also work in local small-scale street vending of used clothes or provide transportation via rickshaws. Other occupations among poor households include handicrafts, forestry, inland fishing, and raising small livestock (poultry and pigs).

Zone 14: Seasonal calendar



Zone 14: Food access calendar for poor households



TSIROBIHINA DELTA: RICE, FISHING, PULSES (ZONE 15)

Main productive assets	
Poor households	Better-off households
Land Goats, pigs, poultry Cart, dugout canoe, small tools	Land Cattle, goats, pigs Animal-drawn plow, cart
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP, MP) Maize (OP)	Rice (OP) Side dishes to rice (meat, fish, condiments) (MP)
Main income sources	
Poor households	Better-off households
Agricultural production Agricultural labor Fishing Livestock, poultry Wood and charcoal	Agricultural production Livestock Fishing Provision of services (transport, rentals, tourism)
Main markets	
Fianarantsoa Manja	Food products
Mahabo Ankilizato Antsirabe Antananarivo	Food and livestock
Morondava Belo-sur-Tiribinaha	Food, livestock, fishing
Main hazards, periods, and frequency	
Flooding Locusts Cyclone Drought Cattle raiding	January–March December–June December–April November–April January- December
Coping strategies for poor households	
Borrow money or food Intensify the search for work in manual labor, including children Increase poultry sales, sale of household equipment Increase gathering of wild foods	

The zone lies on the western part of the country and south of zone 9 and covers the Menabe region. The terrain is moderately hilly, and the zone is full of many large plains, basins, and bodies of water. Vegetation comprises savannah combined with dense forests and mangrove. The temperature ranges from 15°C in July–August and 35°C in January–February. Rainfall ranges between 800 and 1,400 mm per year. There is a variety of soil types that primarily include ferruginous, ferralitic, and hydromorphic soils. All these physical conditions allow up to three crops per year. The coastline on the west and the inland lakes and waterways enable fishing activities, which contributes to household incomes and food supply. Population density is low, estimated to be 7 people/km^2.

With access to the sea and a paved road that crosses the zone from Morondava on the coast to Antananarivo, this zone is much less isolated than the neighboring zone 9. Main products such as rice, fish, and livestock are delivered to Antsirabe, Antananarivo, and Fianarantsoa via the paved road.

Rice, the primary food and source of income, is grown two to three times a year due to the zone's good water resources. Despite having only small plots of land (averaging approximately 0.5 ha), poor households have diversified crops that include—in addition to rice—beans, lima beans, groundnuts, maize, cassava, and sweet potatoes. This is possible due to sharecropping from the better off. Approximately 30–35 percent of poor households participate in the sharecropping system.

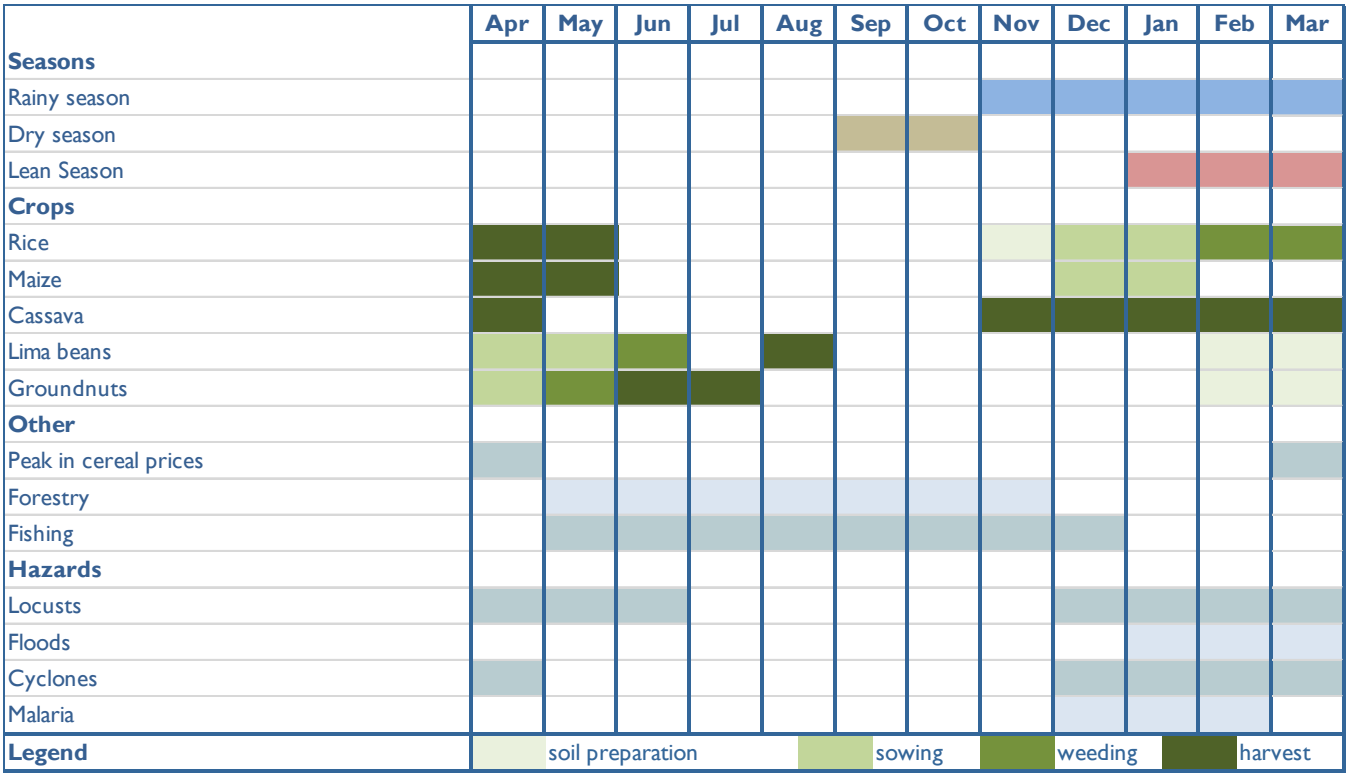
One of this zone's main characteristics is high bean and lima bean production by poor households, whose harvest in September–October improves incomes considerably. Between December and March, when own-produced rice stocks are depleted and incomes are more constrained, households switch consumption to more maize, cassava, sweet potato, or wild yams, depending on seasonal availability.

Fishing is a complementary activity for 20–25 percent of poor households overall. However, a smaller proportion of households, called *Vezo*, live primarily on fishing. The *Vezo* have implied contracts with the hotels along the coastline where they sell their catches first before putting the rest on the local market or consuming it themselves. The Morondava fishery company (Société de pêcherie de Morondava; SOPEMO) located there, sets up fishery-product collection in order to resell to Antananarivo or outside of the country. The Menabe Aquaculture Company, specializing in shrimp farming, also exports its production to Europe.

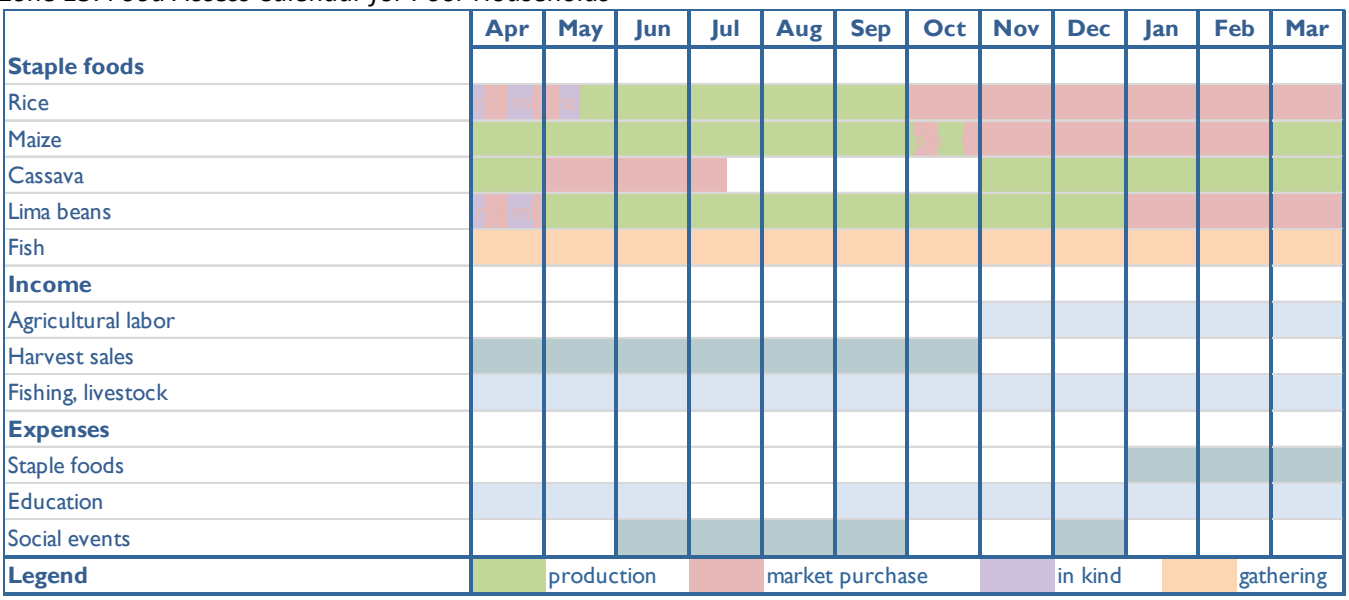
The zone also has a sugar cane processing plant in Analaiva. The plant has its own plantations and employs local labor for production.

The tourist season between May and November brings in income to some better-off households. Some of the poor households also benefit by selling small handicrafts, transport by bicycle or pushcart, or by the prostitution of girls.

Zone 15: Seasonal calendar



Zone 15: Food Access Calendar for Poor Households



SOUTH-CENTRAL PENEPLAIN: RICE, ONION, SMALL LIVESTOCK (ZONE 16)

Main productive assets	
Poor households	Better-off households
Land (about 2 acres to 0.1 ha) Pigs Poultry	Land >3 ha Cattle >10 head Plow Business Pigs, sheep, goats
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP, MP) Maize (OP, MP)	Rice (OP, MP) Cassava (OP, MP) Maize (OP, MP)
Main income sources	
Poor households	Better-off households
Labor Pigs Poultry	Livestock Small business Agricultural (cereal, tuber and onion) and mining trade Credit Transport
Main markets	
Ambositra, Fianarantsoa, Antananarivo	
Main hazards, periods, and frequency	
Cattle raiding	March–November
Crop diseases and pests	February–March, July–August
Livestock diseases	February–April
Bush fires	August–October
Locusts	March–April, September–October
Coping strategies for poor households	
Borrow money to purchase food Pull children out of school Increase wild food collection	

This zone also extends across highlands. However, it has a peneplain sub-zone on the West. Its natural vegetation is dominated by a steppe and grassy savannah serving as pasture for ruminants. Its ferralitic soil is moderately fertile, and rainfall is fairly low (600 to 1000 mm per year). The zone also has a fairly low population density (25 to 50 people/km^2).

Its economy is dominated by lowland crops (rice cultivation in rotation with food crops such as maize and groundnut) and by livestock rearing (extensive cattle, pigs, sheep, goats, and poultry.) Farmers in the zone also grow rainfed crops, in particular beans on *tanety* and onion in the off-season.

The better-off families in the zone have many head of livestock (over 10 cattle and over 10 pigs, sheep, or goats), but poor households only have a few pigs (approximately two) and some poultry (three to five).

Poor households depend on their own rice production and market purchases (rice, cassava, and maize) for their food. Poor households frequently borrow money during the lean season to purchase food. Better-off households eat the same staple foods as poor households, but they can add in side dishes from their own production and purchases.

Poor households mainly sell their labor to better-off households and work either in agriculture or in the quarries. Those who can also sell pigs or poultry. The better-off households have many more options accessing income and food: they are involved in trade, sometimes earn salaries, engage in semi-traditional mining, trade marble, and transport or process agricultural products, particularly groundnut.

The marketing network is relatively well integrated within a radius of 150 km (up to 500 km for onions), first on men's backs, then by vehicle. The zone's main final markets are Ambositra and Fianarantsoa, both located within the zone. For onion, a large portion of this product goes as far as Antananarivo.

Zone 16: Seasonal calendar

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Seasons												
Rainy season												
Dry season												
Lean Season												
Crops												
Irrigated rice												
Cassava												
Onions												
Hazards												
Peak in cereal prices												
Disease, crop pests												
Diseases of small ruminants and pigs												
Bush fires												
Locusts												
Legend	soil preparation					sowing		weeding		harvest		

Zone 16: Food access calendar for poor households

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Staple foods												
Rice												
Cassava												
Maize												
Income												
Agricultural labor												
Pigs												
Expenses												
Staple foods												
Health												
Education												
Social events												
Legend	production			market purchase				in kind		gathering		

SOUTHERN HIGHLANDS: STAPLE CROPS, HANDICRAFTS, MARKET GARDENING (ZONE 17)

Main productive assets	
Poor households	Better-off households
Land (< 0.1 ha) Small tools Agricultural labor Poultry	Land >2 ha Cattle >2 Pigs >10 Poultry >10 Capital to invest
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP, MP)	Rice (OP, MP) Cassava, maize (OP, MP) Side dishes (OP, MP)
Main income sources	
Poor households	Better-off households
Agricultural labor (local, migrant) Small local business Handicrafts	Agricultural trade Small business Sharecropping Credit Transport
Main markets	
Fianarantsoa, Antsirabe, Ambositra (fruits, poultry, pigs, pulses, honey, cassava, sweet potato) Fianaronstos and markets of southeast, Toliara (vegetables and tomatoes)	
Main hazards, periods, and frequency	
Flooding Cyclones Small livestock and crop diseases and pests Theft (livestock, standing crops) Bush fires	December–February December–February December–FebruaryYear-round August–October
Coping strategies for poor households	
Borrow money for food Pull children out of school Intensify the search for work Intensify small-scale street vending	

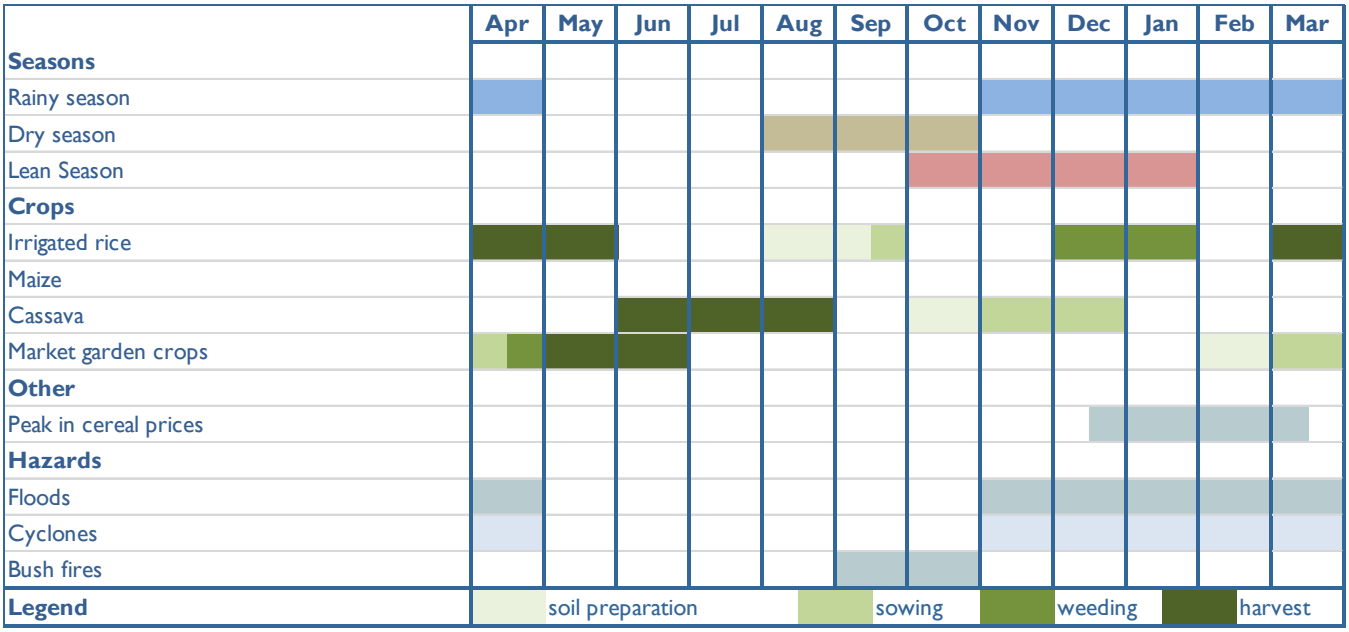
Zone 17 is also a high-elevation zone with many mountains separated by narrow developed valleys and covered in terraced rice fields. Streams and rivers also traverse the zone. Just like zone 14, the forest cover includes eucalyptus plantations used to produce charcoal and lumber, steppes, savannah, and vestiges of natural forest in the corridor of the eastern strip. The zone gets 1,300 to 1,600 mm of rainfall per year primarily between November and April. Its soil is moderately fertile. Population density varies depending on the sub-zone but overall is very high (100 to 250 people/km^2).

Agriculture, done manually or using draft oxen, is dominated by irrigated (sometimes in combination with fish cultivation) or terraced rice cultivation. Rice is grown in rotation with market garden crops. The zone is a net consumer of rice. Other food crops such as maize, cassava, sweet potato, bean, and groundnut are also grown on the *tanety*. The zone produces market garden crops and a surplus in fruits. It also produces artemisia (a shrub that produces an active ingredient for malaria), wine, and local alcohol.

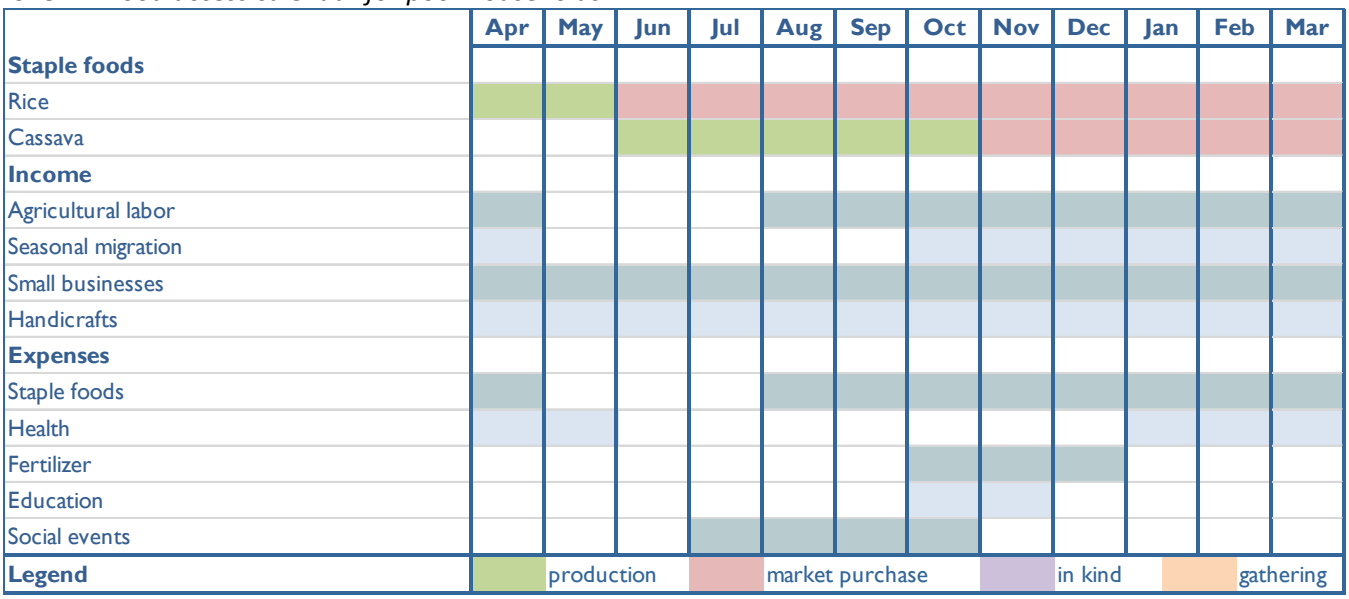
Small livestock (poultry and pigs) and handicrafts (sculpture, basketwork, brickworks, *antemoro* paper, etc.) are practiced intensively. There is also silkworm breeding in the highest areas of the zone.

Fruits are first purchased by local collectors so they can be distributed throughout the country. The largest retail markets for zone 17 are Fianarantsoa and Ambositra (both located in the zone) and Antsirabe (at the border of zone 14). The same type of network applies to food crops (beans, Bambara groundnut [*voandzou*], and groundnut) for which the two largest retail markets are Fiarantsoa and Ambositra. The marketing network for small livestock products (poultry and pigs) goes through Fianaranstsoa and Ambositra. Honey is sold in the markets of Fianarantsoa and Ambohimahasoa. The marketing of tubers (cassava and sweet potato) is limited to a radius of approximately 100 km from Fianaranstsoa.

Zone 17: Seasonal calendar



Zone 17: Food access calendar for poor households



CORRIDOR: FOREST PRODUCTS, BANANA (ZONE 18)

Main productive assets	
Poor households	Better-off households
Land <0.5 ha Dugout canoe, filet Poultry Small tools	Land >1 ha Zebus
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP, MP) Sweet potato (OP) Yam (G)	Rice (OP, MP) Cassava/banana (OP) Sweet potato/yam (OP, MP) Meat (OP, MP)
Main income sources	
Poor households	Better-off households
Labor Forest products Cash crops Honey Raising poultry	Cash crops Trade of agricultural and forest products
Main markets	
Fianarantsoa Ambala Vao	Ihosy Mahanoro
Main hazards, periods, and frequency	
Flooding (areas close to rivers)	January–February
Landslide	December–March, June–September
Drought	November–April
Coping strategies for poor households	
Gather more wild plants Increase sales of small animals Intensify the search for labor opportunities Borrow money, food, or seeds Consume seeds	

Located in the eastern-center of the country, this zone is characterized by highlands and cliffs with several rivers traversing it. The vegetation consists of a natural forest and savannah. The zone is full of mineral resources (corundum and gold), fishery products (eel and crayfish), and forestry products (honey, firewood, timber, medicinal plants, etc.). The soil is lateritic and clayey. Annual rainfall ranges between 1,000 and 2,000 mm, with a rainy season lasting from November to May. Although weather conditions are suitable for intensive farming, the small size of farm parcels and the zone's isolation limit the possibilities to do it.

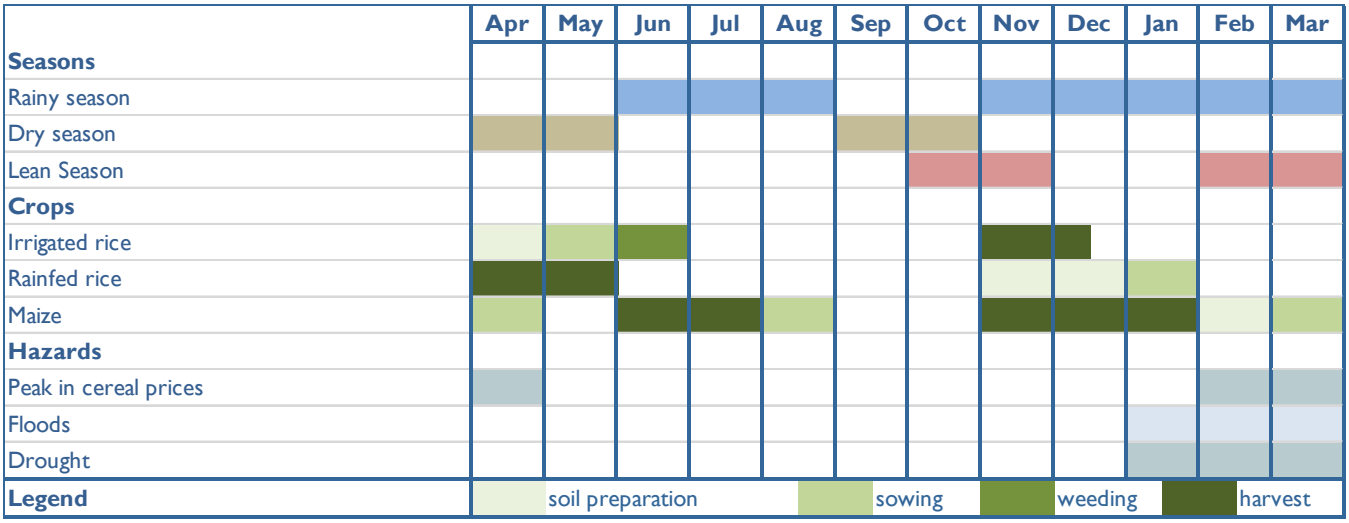
The winter is characterized by drizzles of rain from June to July and a dry season from August to October. The average temperature is 15°C, with a low of 10°C and a high of 30°C.

Agriculture, both rainfed and irrigated, includes food crops (rice, cassava, and sweet potato), coffee, and fruits (banana, jackfruit, litchi, and sugar-apple). Rice is primarily produced in the lowlands where better-off households can use animal traction, while other rainfed crops are grown on the slopes. The area's topography limits the extent of rainfed crops.

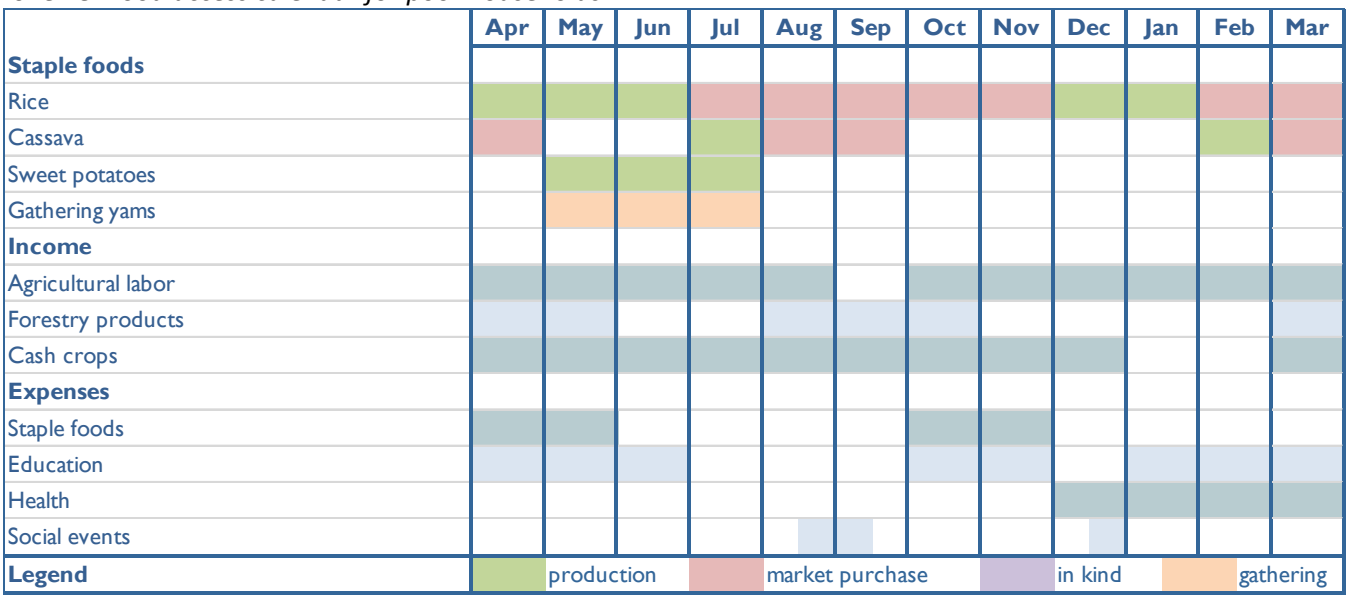
Poor households engage in agricultural income generating activities such as gathering honey and raising poultry. They also sell their labor locally, particularly to rich households who need it for forestry activities. There is gold mining in the zone, but production is industrialized and does not require unskilled labor.

Local markets receive their supply primarily from Fianarantsoa, Ambala Vao, Ihosy, and Mahanoro. Products from major lumbering operations are delivered to Fianarantsoa and Fandriana.

Zone 18: Seasonal calendar



Zone 18: Food access calendar for poor households



SOUTHEAST: COFFEE, LITCHI, CASSAVA (ZONE 19)

Main productive assets	
Poor households	Better-off households
Land <0.3 ha Poultry Small tools	Land >1 ha Zebus >10
Main foods and sources	
Poor households	Better-off households
Rice (OP, MP) Cassava (OP, MP) Plantain (OP) Yam, fruits (G) Meat (OP, MP)	Rice (OP, MP) Meat (OP, MP) Fish (MP) Cassava (OP) Plantain (OP)
Main income sources	
Poor households	Better-off households
Labor Own production Fishing Money transfers	Agricultural trade Cash crops
Main markets	
Mananjary Manakara	Farafangana Vangaindrano
Main hazards, periods, and frequency	
Cyclone (coast)	December–April
Flooding (riparian areas)	December–April
Drought	July–November, 1/2–3 years
Hail	February–April
Coping strategies for poor households	
Borrow food or cash Intensify the search for labor opportunities Rent land instead of engaging in own production Increase poultry sales	

The zone covers the southeast coastal strip of Madagascar and steep mountains. Several rivers also cross the zone. Soil is ferralitic, ferruginous, sandy, and hydromorphic. The zone is rich in fishery resources, precious wood, and mineral resources (gold, gemstones, and ilmenite).

Rainfall ranges from 1,700 to 3,500 mm per year with a hygrometry of 80 percent in the November-March rainy season, during which roads frequently become impassable. The zone is characterized by two seasons, a hotter season called *Vatomandry* or *Tsipala* from December to May, and a drier *Hosy* season from June to November. The temperature is moderate and ranges between a low of 18°C and a high of 32°C.

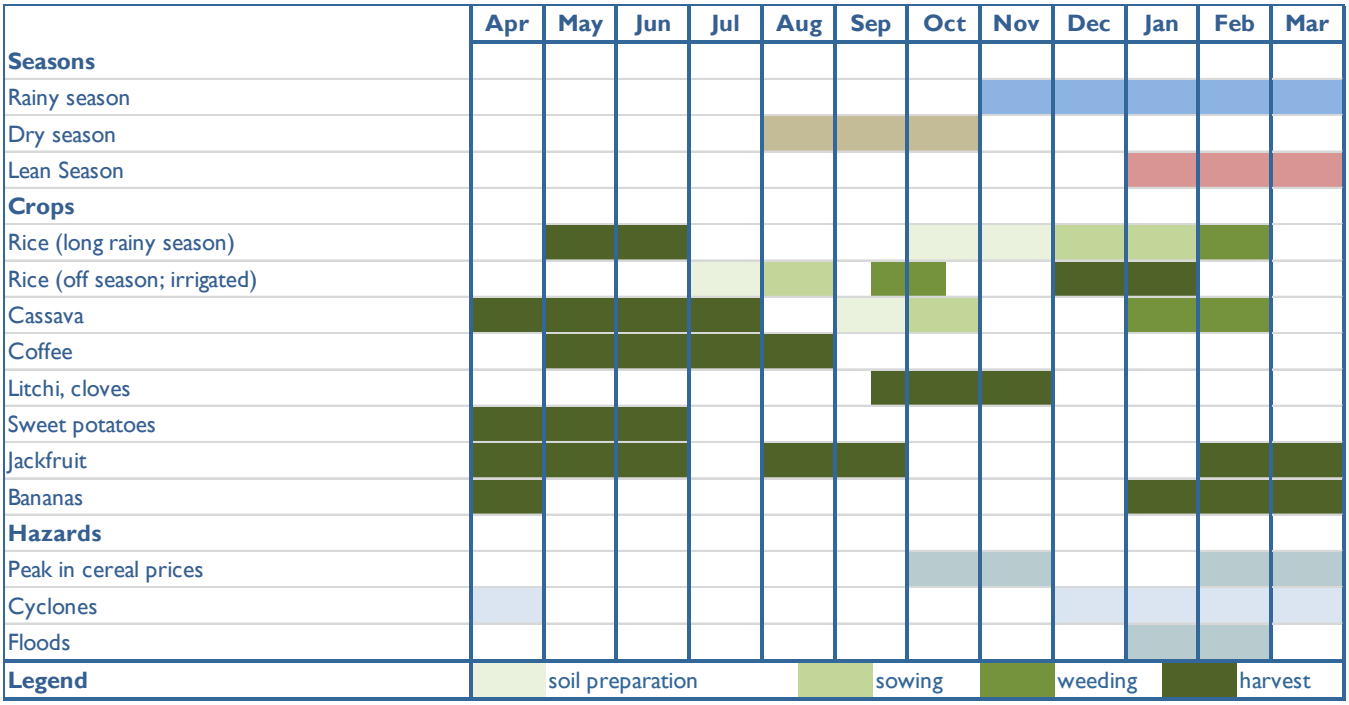
The population density in the zone is 55 people/km^2 on average. Agricultural parcels are fairly small, but also geographically dispersed because of topography and water availability. Poor households grow crops on *tavy* (slash-and-burn plots) due to lack of farming leases and money to buy fertilizer. The zone is a net consumer of rice. When local supply is low, rice is imported from the regions of Upper Matsiatra and Amoron'i Mania to the zone's main markets (Mananjary, Manakara, Farafangana, and Vangaindrano) and then to markets in the district administrative centers that supply most rural markets.

The sharecropping system in this zone is determined by the low availability of land. Poor households rent their plots to middle-income or better-off households. In exchange, these poor households receive either money or one-third or one-fourth of the yield depending on the agreement.

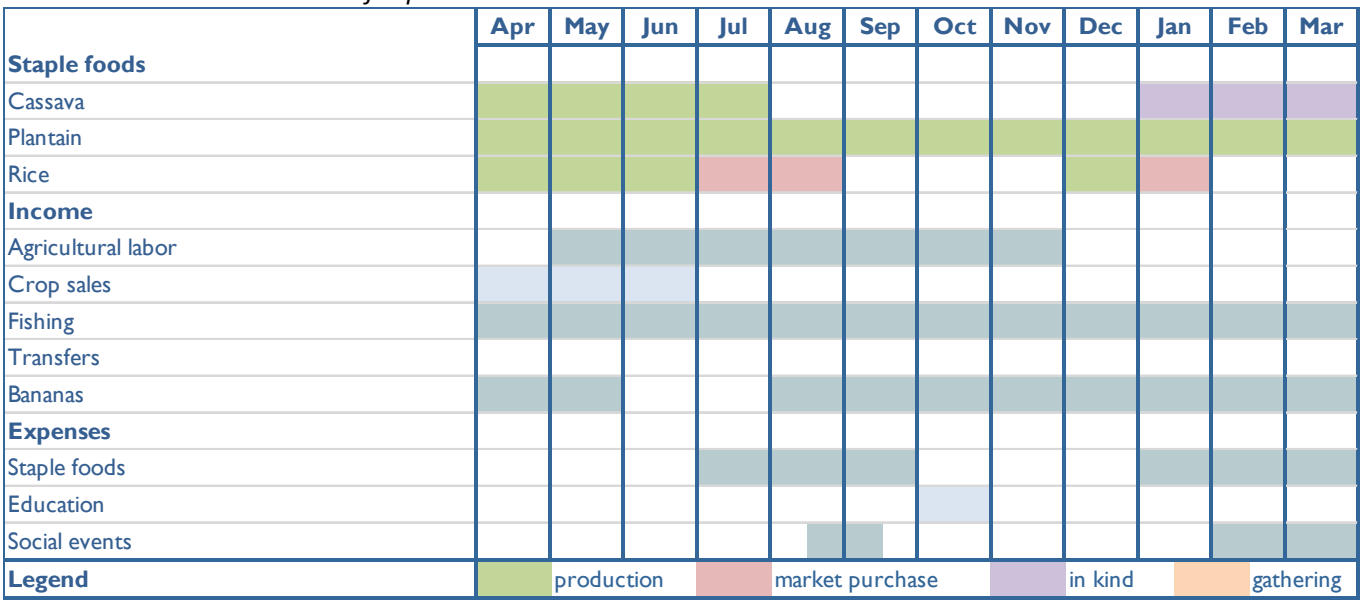
The zone's uniqueness primarily lies in growing cash crops such as coffee, clove, litchi, vanilla, and, especially in the north, pepper. These crops are grown on the land belonging to rich households with labor provided by poor households. Coffee and clove are grown for exportation. Coffee is centralized either in Manakara or Mananjary. That of Manakara is delivered to Ihosy, Fianarantsoa, and Toliara, while coffee from Mananjary goes to Antsirabe. Clove is exported to Indonesia; production goes directly to the collection center in Ampasimanjeva.

The agriculture sector uses the most labor. Rich households also rely on labor from outside the zone for rice cultivation. Depending on the season, poor households also migrate to export centers and production basins outside the zone during periods of flooding. They also go to industrial production areas for sugar cane such as Namakia (western Madagascar) and Ambilobe (north of the country). Remuneration for labor is paid in day wages (approximately 2,500 MGA per day), based on a contract (locally called *amparitra*), or paid in kind.

Zone 19: Seasonal calendar



Zone 19: Food access calendar for poor households



SOUTHWEST: RICE, LIMA BEAN (ZONE 20)

Main productive assets	
Poor	Better-off households
Land <0.5 ha Small ruminants <10 Poultry <20 Agricultural hand tools	Land >3 ha Cattle >10 Small ruminants >20 Plow, cart Motorcycle
Main foods and sources	
Poor households	Better-off households
Cassava (OP) Maize (OP, MP) Wild foods (G) Rice (OP, MP) Fish (OP)	Rice (OP, MP) Cassava (OP) Maize (OP, MP) Pulses (OP, MP) Meat/fish (MP)
Main income sources	
Poor households	Better-off households
Agricultural and mining labor Wild food sales Honey Fishing	Agricultural trade Livestock Tool rental Sharecropping Marketing of fishery products
Main markets	
Local	Regional
Ambahikily Ankililoaka	Morombe Sakaraha Ambahikily Toiliara
Main hazards, periods, and frequency	
Theft of cattle or harvest	Around holidays
Crop pests (locusts, caterpillars, plant bugs, etc.)	With heavy rains, ~1/5 years
Cyclones	February–April, ~1/10 years
Coping strategies for poor households Intensify livestock sales Intensify wild food collection Intensify artisanal mining activities	

This zone's varied terrain is made up of a coastal area in the West, a river basin in the middle, and plains in the East (300–400 m elevation). It contains many rivers and lakes (Ihotry and Ranobe) as well as a forest corridor on the Analavelona plateaus (elevation of 800 m). These plateaus are the main source of water feeding rivers, such as the Manombo where several dams have been built. The zone's vegetation is also varied and includes mangrove, a small forest corridor, shrub savannah in the West, and savannah woodland in the East. The zone has rich soils, such as vertisols in the South and alluvial soil along rivers.

The zone's temperature ranges between 18°C and 35°C. The climate is semi-arid with a hot and dry season (September to December), a rainy season (December to March, with an average rainfall of 500–600 mm per year), and cool season with no rain (May–August).

Demographic density is fairly low (15 people/ km^2), which explains the abundance of large farms. The zone's better-off households often own more than 3 ha of land, of which a portion is irrigated.

Zone 20 is the rice bowl of the Southwest, partly due to the presence of dams and irrigation canals, where rice is grown intensively. Middle-income and better-off households use draught power to till the land. There is no major off-season in zone 20; this could explain why rice production in terms of kilocalories per person per year is significantly lower here than in the surplus areas of the North and West, despite zone 20's higher yields. The zone produces maize and cassava, as in the rest of the South.

Cash crops are predominantly cotton, groundnut,[12] onion, and sugar cane. The sharecropping system is also used in this zone, depending on land availability. Better-off households provide poor households with seeds, land, and tools in exchange for a portion of the yield (approximately one-third). Labor is remunerated with the equivalent of two to three kg of local rice per day in a typical year.

Economic activities here are more varied than in neighboring zones. Poor households gather wild plants during the lean season, particularly the following products: *oiala* (wild yam), *babo* (succulent root), *balo*, guava, *lamoty* (crab-apple), jujube, and tamarind. People gather wild foods, especially when the rains return before crops are ready to be harvested. Honey is collected in the Mikea forest, Sakaraha, and Ankazoabo between August and December before the heavy rains. Honey is sent to the retail markets in Toliara and Morombe.

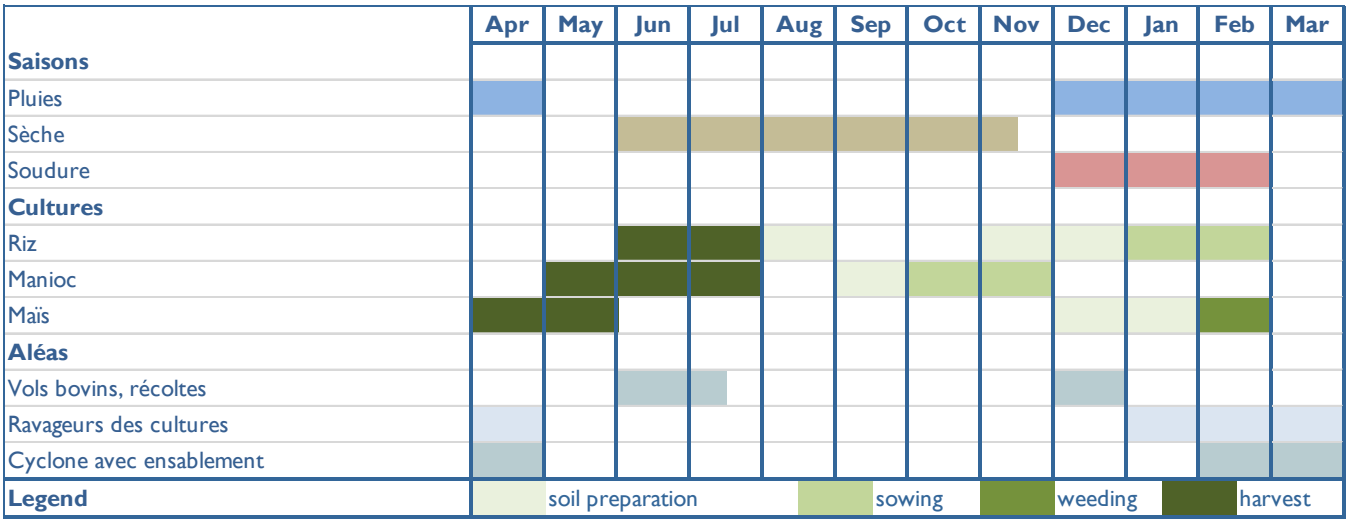
Livestock rearing is dominated by small livestock. Livestock migration heads to the northeast during the dry season, but on a small scale. Small ruminants are raised primarily in the West. Traditional, semi-industrial, and industrial mining of sapphires, beryl, and ilmenite is extensive, particularly in the eastern part of the zone. Ilmenite exploitation is still being explored.

[12] Groundnut is a cash crop that is also used as a side dish with rice and sometimes to produce oil using a traditional press.

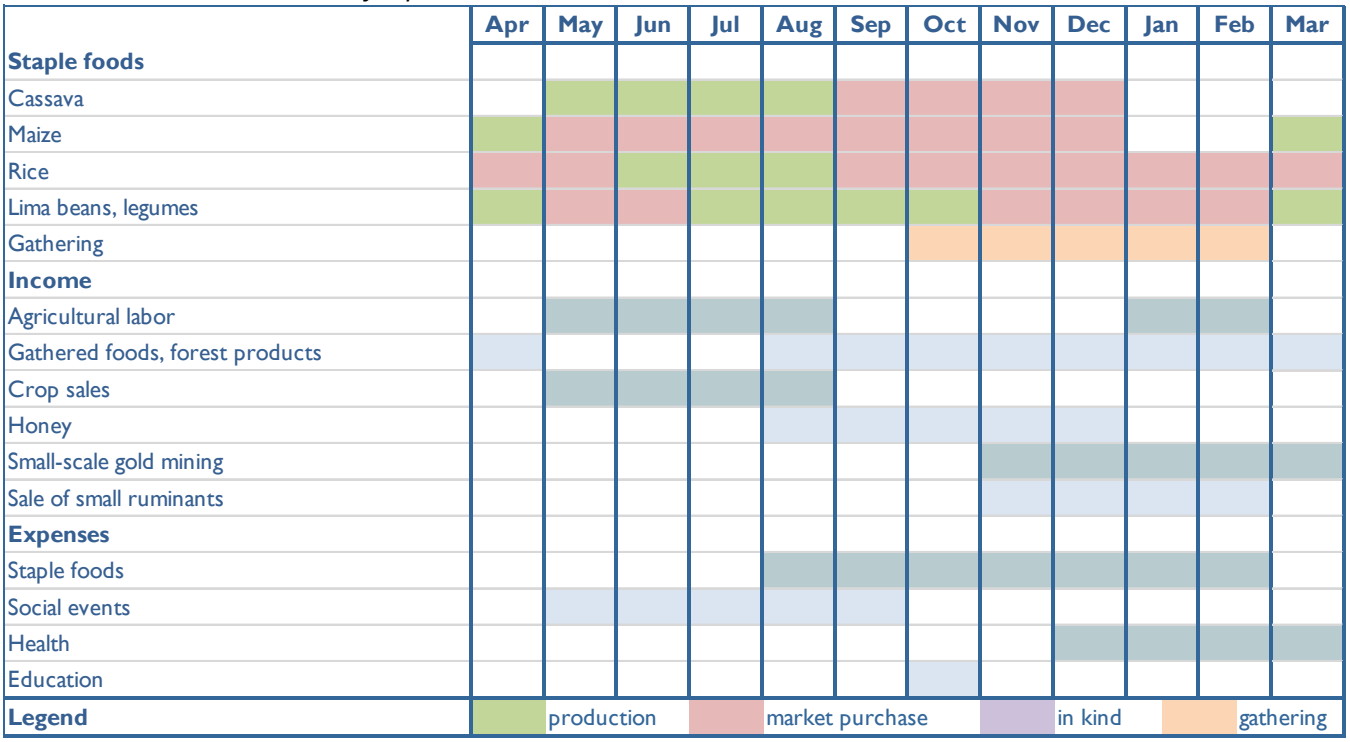
Fishing is mainly practiced along the coast, whether small-scale (nets and dugout canoes) by poor households or semi-industrially (with motorized dugout canoes) for the most well-off. Fishery products from the coast include fish, crustaceans, and shellfish. Fishing intensity is low from January to April because of poor weather and problems with product outflow due to the poor road. However, this period also corresponds to the *tovy* season (a highly prized small fish), which provides an alternative source of food and income.

Cyclones that occur in this semi-arid part of the country tend to be more beneficial to farming than they are harmful because they bring in more water to primary crops and quickly recharge the water table. They are still harmful to dams (over the long term) and roads because they cause silting.

Zone 20: Seasonal calendar



Zone 20: Food access calendar for poor households



BARA PLATEAU: COWS, CASSAVA (ZONE 21)

Main productive assets	
Poor households	Better-off households
Land ~0.25 ha Small livestock <10 head Traction tools	Land >~5 ha Cattle >100 Various traction tools Rototiller
Main foods and sources	
Poor households	Better-off households
Cassava (OP) Maize (OP, MP) Legumes (MP, OP) Wild foods (G) Rice (OP, MP) Fish (OP)	Rice (OP) Cassava (OP) Dairy products (OP) Meat (OP, MP)
Main income sources	
Poor households	Better-off households
Agricultural production Livestock	Agricultural production Livestock
Main markets	
Ihosy Ivohibe Iakora	Fanjakana Ampanihy Beloha Ambovombe Tsihombe
Main hazards, periods, and frequency	
Cattle raiding (*malaso*)	
Drought	October–December, 1/3–5 years
Crop disease	December–April
Coping strategies for poor households Increase livestock sales Intensify wild food collection	

Located in the south-central part of the country, this zone is characterized by grassy savannah (*Hyparrhenia rufa* and *Heteropogon* and "*danga*"), steppes, and forest. It also has a freshwater area dominated by plains suitable for growing rice and food crops such as groundnut. The soil is ferralitic and moderately fertile. The average rainfall is 500 to 600 mm/year. The rainy season lasts from December to April, with a dry season from May to November. The temperature varies between a low of 15°C and a high of 30°C. The zone's population density is 15 people/km^2.

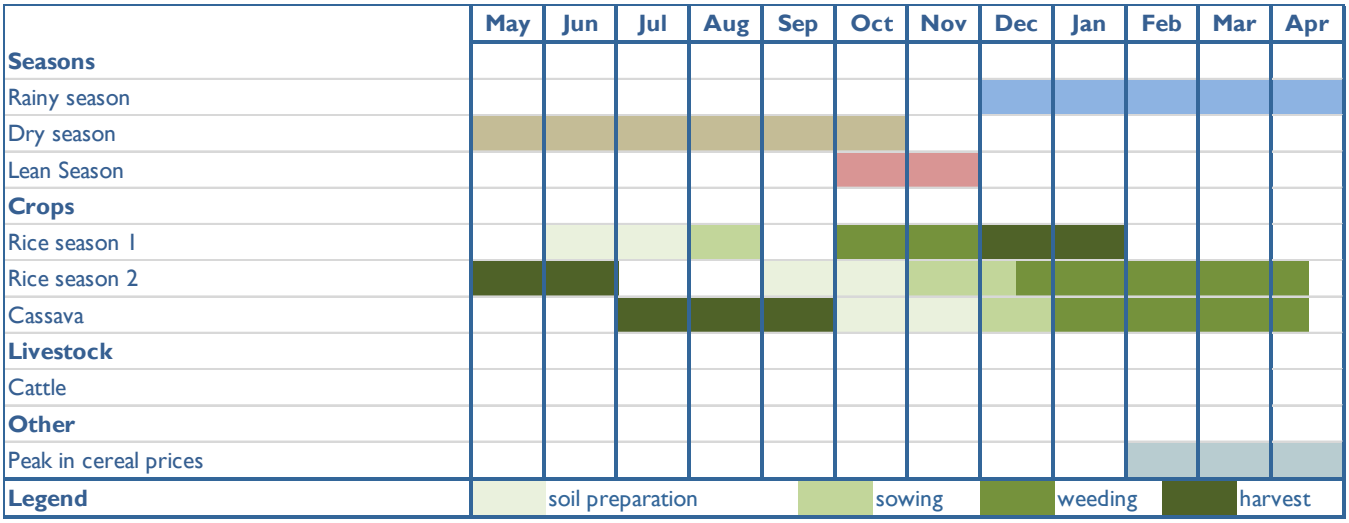
In the area east of Ihosy, farmers rely on irrigation to grow food crops (rice, cassava, groundnut, etc.) using animal traction, even among poor households. Market gardening is also practiced. The zone produces surplus rice and has great potential for raising livestock. The western part of Ihosy relies mainly on rainfed agriculture.

Pastoralism mostly involves cattle and is extensive. Cattle migrate eastward and toward the lowlands during the dry season, between May and November. Livestock rearing relies on local labor, particularly for guarding the animals and for moving them to market. Cattle for slaughter move from Ihosy toward Ambalavao and even as far as Antananarivo, while cattle destined for livestock-rearing move to the Southeast and East. Payment of herders is in kind (i.e., one cow/year). The agricultural workforce comes mostly from outside the zone, in particular from Upper Matsiatra, a predominantly agricultural region located in zone 16. Cattle-raiding is a major hazard in this zone. Also, households' greatest expenses are related to the security and surveillance of herds; better-off households also spend considerable money on vaccination and traditional rites.

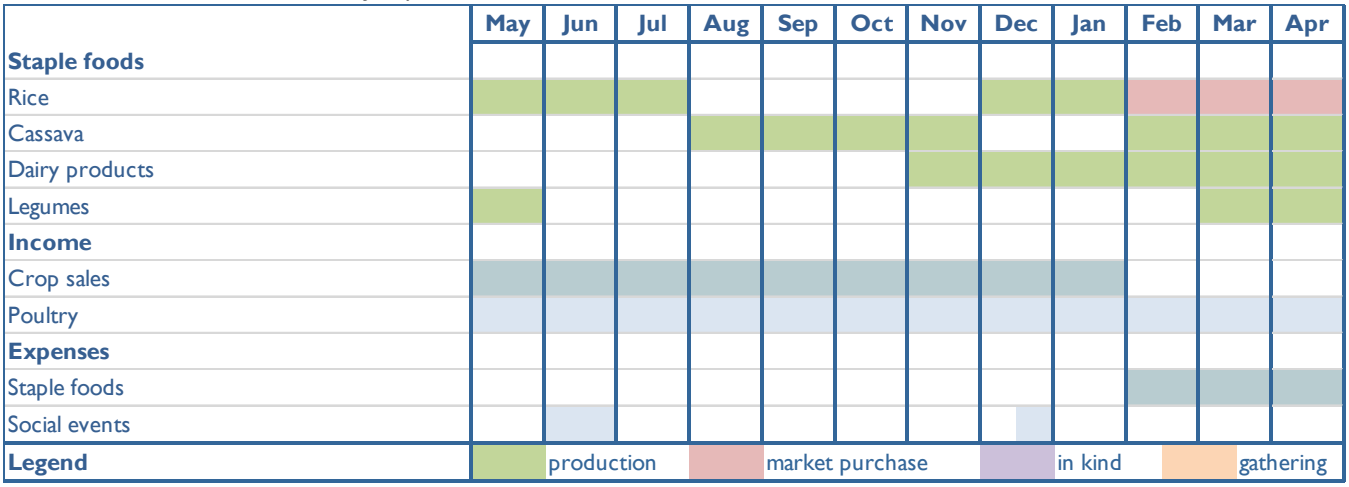
With its mineral resources, the zone has experienced a high concentration and substantial influx of labor to the Ilakaka mine, located in the zone's center. However, most of the workforce comes from other parts of the country.

The zone's marketing network runs very smoothly, given the presence of large markets in the zone and because National Highway 7 (RN7) crosses it. The zone's main markets are located in the zone's communes and districts. Producers sell rice at the markets of Ihosy, Ivohibe, Iakora, and Fanjakana (Beroroha). Some of these products supply the markets of Ilakaka and Toliara along with a portion from Fianarantsoa market. The cassava harvest goes directly to collection markets situated along RN7 from the Ivohibe, Iakora, and Fanjakana (Beroroha) markets, so it can then be transferred to Toliara and Androy.

Zone 21: Seasonal calendar



Zone 21: Food access calendar for poor households



CENTER-SOUTH AGROPASTORAL: STAPLE CROPS, INDUSTRIAL SISAL, ZEBU (ZONE 22)

Main productive assets	
Poor households	Better-off households
Land <0.25 ha Small tools Poultry	Land >1 ha Cattle (>50 head) Towing tools Storage facilities
Main foods and sources	
Poor households	Better-off households
Cassava (OP, MP) Sweet potato (OP) Maize (MP, OP) Rice (MP, OP) Meat (MP)	Rice (OP) Maize (MP, OP) Cassava (MP, OP) Meat/fish (MP) Milk and dairy products (OP)
Main income sources	
Poor households	Better-off households
Food crops Agricultural labor Poultry Firewood Small business Fishing Guarding livestock	Cattle Food and cash crops Trade
Main markets	
Local Androy Anosy	Regional/national Fianarantsoa Antananarivo
Main hazards, periods, and frequency	
Drought (1/2, 1/3 years) Insecurity/*dahalo* Crop disease	October–December
Coping strategies for poor households	
Consume red cactus (famine food that is a substitute for rice or maize) Intensify poultry sales Sale of household supplies and equipment	

Zone 22 includes the majority of Anosy region and an eastern part of the Atsimo-Andrefana region. The zone is primarily composed of savannah woodland with some degradation and natural pastures on lateritic plains. Rainfall varies from approximately 600 mm/year toward the north (Bara) and approximately 1,000 mm/year toward Taolagnaro (Ft. Dauphin). Land along the rivers is more fertile and suitable to growing rice in rotation with groundnut.

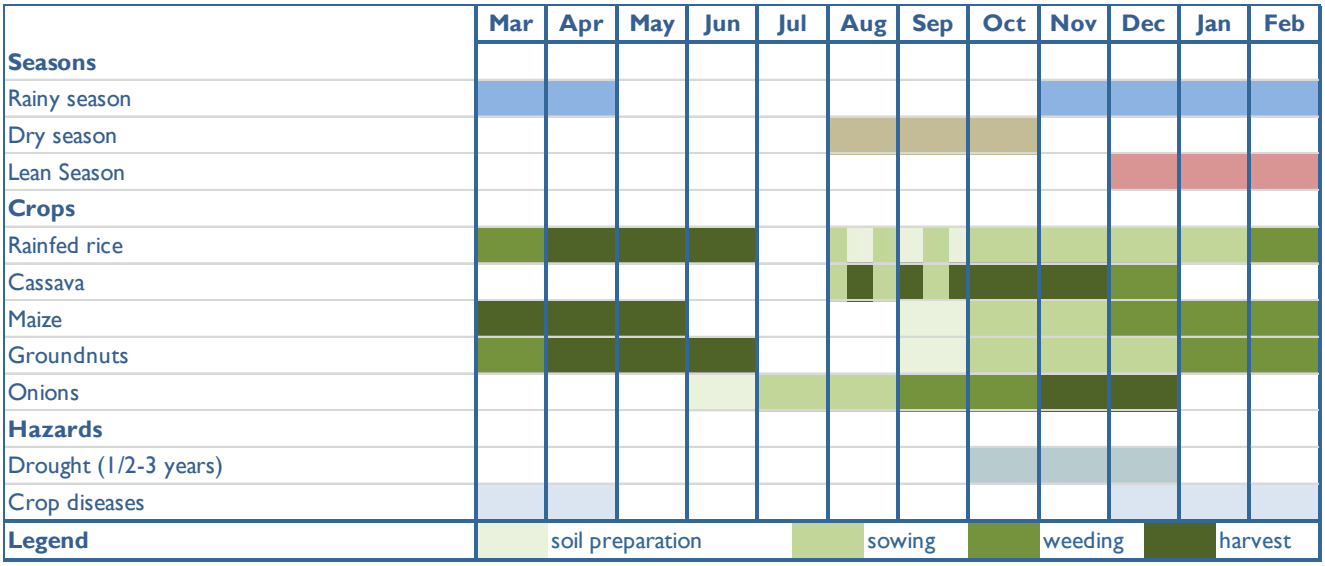
The population density of zone 22 is low, ranging around 6–25 people/km^2 in rural areas. Agricultural production systems are primarily traditional (manual labor or draft oxen).

The zone is the rice bowl of the south. The Anosy region produces over twice as much rice in terms of calories per person per year compared to Androy (in zone 24). However, rice production in caloric terms per person is among the country's lowest. This is possibly due to the fact that the rainfall pattern only allows for a single rice harvest per year. However, the zone does not import large quantities of rice; it mainly buys from warehouses in the district administrative centers or in Fianarantsoa.

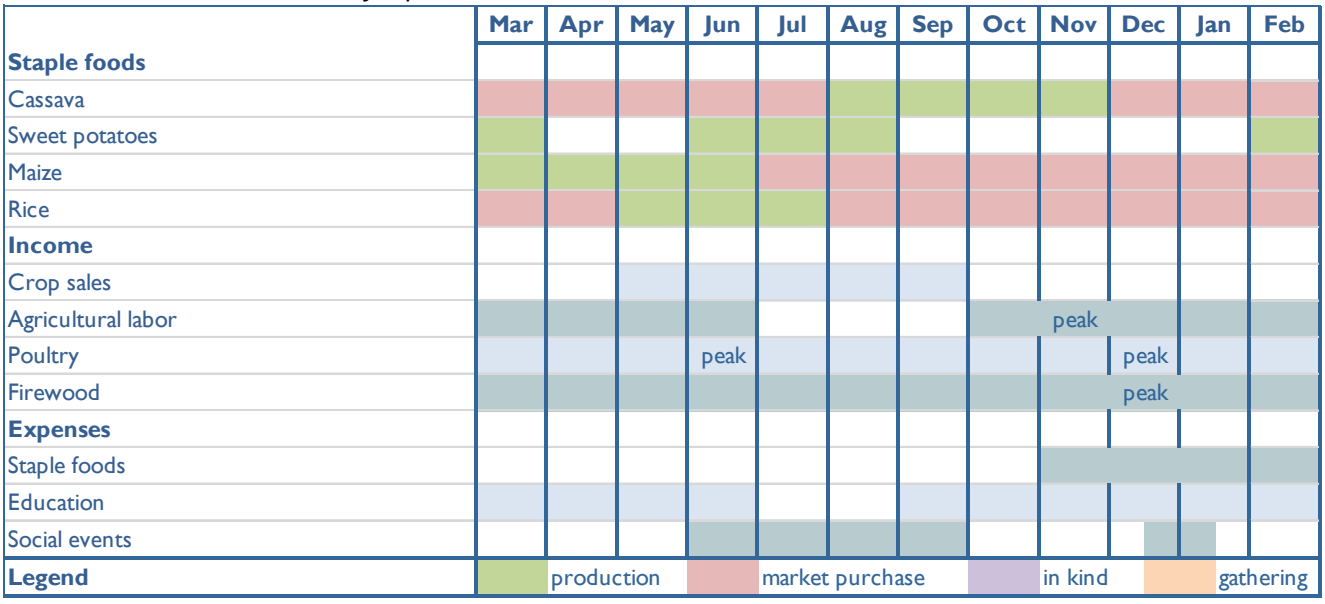
Labor is primarily agricultural in the zone. Members of poor households migrate, particularly to Tsivory, Betroka, and Bekily. Zone 22 has a colonial sisal plantation that attracts labor, even from neighboring zones.

Inland fishing is also practiced in zone 22.

Zone 22: Seasonal calendar



Zone 22: Food access calendar for poor households



MAHAFALY PLATEAU: CASSAVA (ZONE 23)

Main productive assets	
Poor households	Better-off households
Land <0.3 ha Small ruminants <10 Poultry <20 Handicrafts	Land >2 ha Cattle >10 Small ruminants >20
Main foods and sources	
Poor households	Better-off households
Cassava (OP, MP) Maize (OP, MP) Sweet potato (OP) Rice (OP, MP) Wild plants (G) Legumes (OP, MP) Gourds (OP)	Cassava (OP) Rice (OP, MP) Maize (OP, MP) Legumes (OP, MP) Meat/fish (MP)
Main income sources	
Poor households	Better-off households
Agricultural, mining labor Poultry Gathering Handicrafts Small business	Agricultural trade Livestock Small business Sharecropping
Main markets	
Local	Regional
Antranorao Ambatry Large livestock: Betioky, Ampanihy, Gogogo and Ejeda	Tuléar and highlands Large cities for handicrafts
Main hazards, periods, and frequency	
Drought	1/3 years
Insecurity (theft of cattle and harvest)	Especially around holidays
Locusts and other pests	May–July, 1/5 years
Cyclones	February–April, ~1/3–5 years
Animal epizootic	March–July, 1/3 years
Coping strategies for poor households Increase livestock sales Reduce average age of the herd Increase gathering Migrate in search of labor opportunities	

This zone in the South of the country is characterized by low-elevation plateaus (100 to 300 m). Except for the dry, dense forest in the west, the zone's vegetation consists of *xerophile* and *euphorbiaceae* thickets as well as arbustive and grassy savannahs. Soil is primarily calcimorphic and not very fertile. With rainfall of only 300 to 400 mm per year, it is the most arid zone in the country. There are three seasons: a hot and rainy season (January to April), a cool and dry season (May to August), and a hot and dry season (September to December). The temperature ranges between approximately 20°C to 35°C.

Due to these difficult natural conditions, the population density is low (approximately 7 to 10 inhabitants per km²). Despite this, farms are also small due to the lack of good soil and problems with water access.

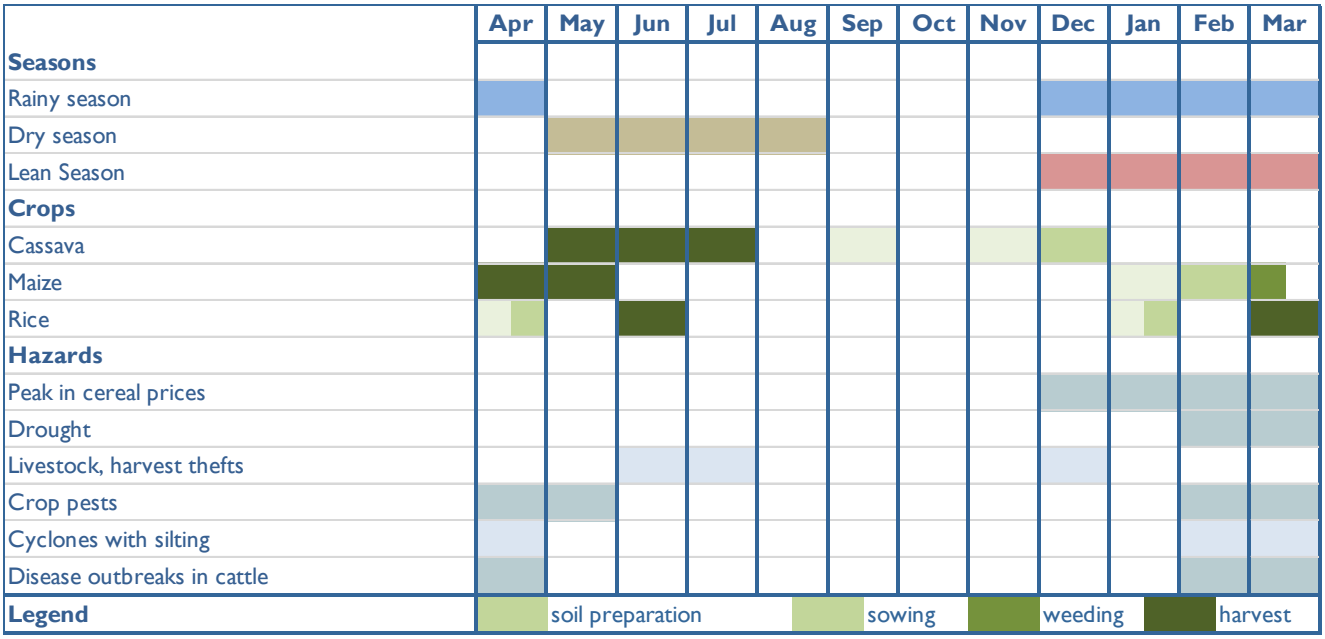
Livestock raising, more widespread than agriculture, is dominated by small herds of goats, and, to a lesser extent, flocks of sheep. Raising cattle is also important, but is practiced more for ceremonial purposes than economic reasons, given the strong belief in the divinity of the dead. When a death occurs, especially of a respected family or community member, many cattle are slaughtered and the meat distributed for free in his or her honor. Increasingly, people are beginning to sell zebus during difficult periods. They then purchase younger animals and use the remaining money to purchase food.

The zone's main crops are cassava and legumes. Maize is also grown, but in smaller quantities than in neighboring livelihood zones. Gathering of tubers and wild fruits contributes significantly to the diet and to the income of poor households. The list of wild plant products that are used as substitutes to basic foods during the lean season is very long in this zone. It includes the following plants: *sosa* (*Dioscorea sosa*), *babo* (*Dioscorea bemandri*), *ovy* (*Dioscorea acuminata*), *raketa* (*Opuntia*), *sakoa* (*Pourpatia caffra*), *lamonty* (*Flacourtia ramoutchy*) and *kily* (*Tamarindus indica*). The food extracted from these plants is generally consumed during the lean season, i.e. December to February for zone 23.

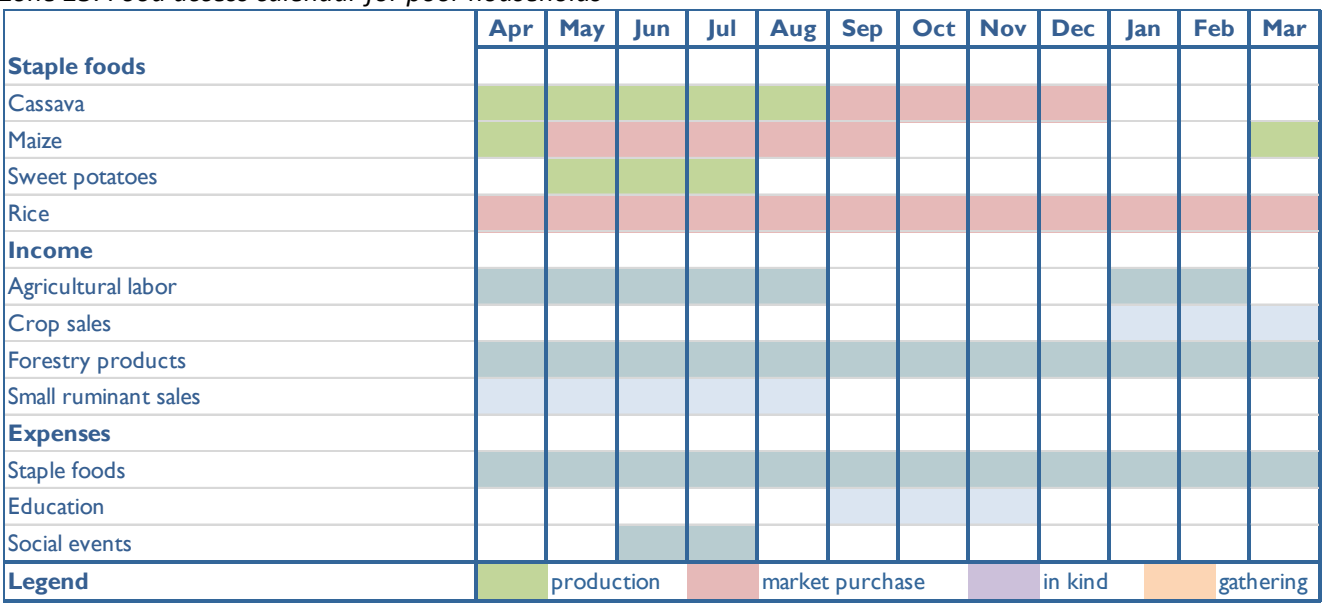
Groundnuts are grown in the western part of the zone, more as a cash crop. Unlike neighboring zones in the North and South, there is little or no rice cultivation in the Mahafaly Plateau zone (with the exception of the Bezaha Mahafaly plain, Ejeda, and around Bekily), nor much production of cash crops.

To reduce spending and increase income, people resort to gathering wild plants and migrating temporarily to the north (Toliara, Mahajanga) and to the mining areas in the east (Sakaraha, Lazarivo, Ilakaka, Ambatondrazaka, etc.), particularly during the zone's long lean season (December to February). Selling poultry and small ruminants is another coping strategy during the most difficult months of the year.

Zone 23: Seasonal calendar



Zone 23: Food access calendar for poor households



EXTREME SOUTH: CASSAVA, MAIZE, LIVESTOCK REARING (ZONE 24)

Main productive assets	
Poor households	Better-off households
Land <0.5 ha Small farming tools Draft oxen (1–2) Small ruminants (4–5) Poultry	Land >5 ha Plows, carts Draft oxen Small ruminants
Main foods and sources	
Poor households	Better-off households
Cassava (OP, MP) Maize (OP, MP) Sweet potato (OP, MP) Cactus (flower and flesh) (G) Cowpea (OP, MP) Rice (MP)	Rice (MP) Maize (OP, MP) Cassava (OP) Meat (OP, MP) Dairy products (OP) Fish (MP)
Main income sources	
Poor households	Better-off households
Food products Local labor Poultry and small ruminants Firewood Migrant labor Handicrafts Gathering (cactus, gourd fruit)	Marketing Cattle Cash crops Tool rental
Main markets	
Local	Regional/national
Tsihombe Ambovombe Bekily	Ihosy Taolagnaro (Ft. Dauphin)
Main hazards, periods, and frequency	
Drought Locust invasion Poultry disease	October–March; there is often a break in the rain in February April–June, November, 1/10-15 years May–August
Coping strategies for poor households	
Intensify migration in search of labor opportunities Increase consumption of red cactus, other wild foods Stock water Feed livestock burned cactus leaves Increase poultry sales	

This zone is in the southernmost part of the country and includes most of the Androy region. The zone is known for being the country's driest (semi-arid) area, with an average rainfall of only 300 mm/year in the south. This rainfall can reach up to 800 mm/year in the north. The rainy season lasts from December to March. The zone's average temperatures range from 22°C to 35°C. With 5–15 people/km^2, population density is relatively low, compared to the country's other zones.

The wetter northern part of the zone has more lateritic and crystalline soil (similar to that of zone 23) that is more suitable to growing tubers and roots, such as cassava, rather than cereals. The cassava surplus in the Androy region and the supply of dried cassava are the country's highest. Cassava yield per person in the zone, in terms of caloric value, amounts to nearly twice that of any other surplus region. Cassava leaves the collection markets in the administrative centers of communes in the North, passes through the assembly markets of Tsihombe and Ambovombe, and then through the wholesale markets of Ihosy before it is finally resold in the South or sent to Antananarivo.

Maize production is second after cassava, and is mostly grown in the sedimentary lowlands of the southern part of the zone. Maize is marketed more than it is consumed on the farm. Yields are distributed in markets in the southern commune's administrative centers to be sent to the district capitals, Fort Dauphin, and the highlands before reaching Antananarivo. Sweet potato and cactus are also important crops in the southern part of the zone. Maize and sweet potato have good yields in sedimentary areas since they get enough water.

Conversely, rice production is by far the least abundant crop in the Androy region. Rice production here is less than 15 percent of production in the highest-surplus region (Alaotra Mangoro) in terms of average per capita calorie needs per day, or less than 40 percent compared to Analamanga, the second most productive region. Farm systems are mostly traditional with manual labor and animal traction (zebu).

Livestock systems are extensive and involve an annual migration from the South (e.g., Ambanisarika commune/Androy region) to Northern and Western zones (e.g., Antanimora Sud commune/Androy region) between May/June and October. For those cattle farmers whose home base is located in the North (e.g., Antanimora commune/Androy region), they migrate East to the host land (e.g., Ebelo commune/Anosy region) during the dry season to take advantage of the pastures there and then return to their home base during the rainy season. Only zebus migrate since small ruminants are better able to withstand the heat. The distance between the home base and the destination area may be from 25 to 125 km in a normal year.

Livestock are raised for household consumption and to support agriculture, but even more so for marketing; this is particularly true for small ruminants (especially in Marolinta, Tranoroa, and Marovato) and poultry. Zebus are raised to

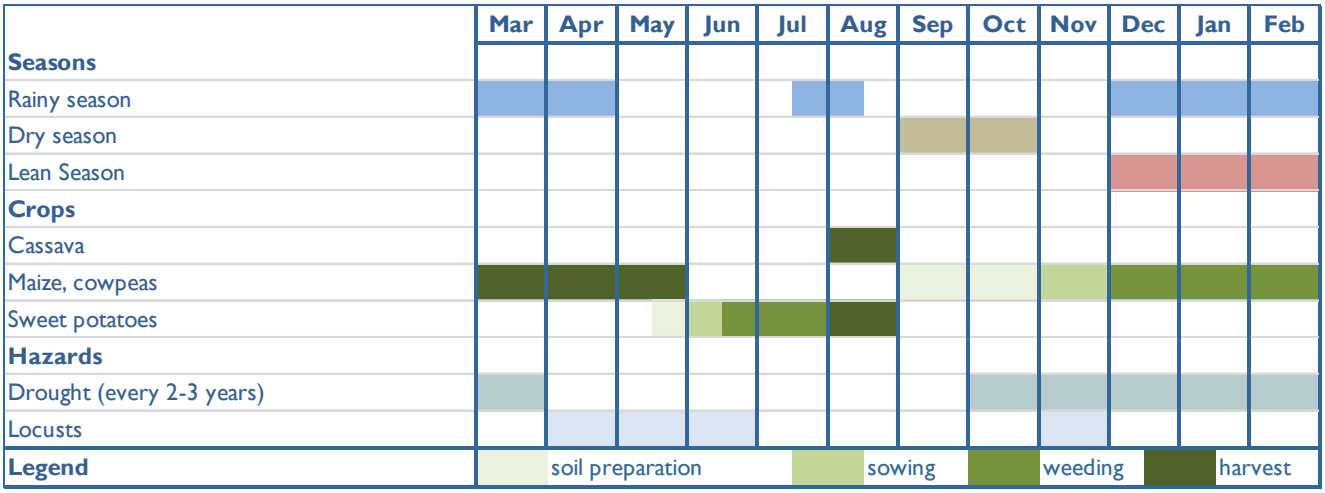
support agriculture (animal traction), but also in anticipation of funerals. When an important person from the family or community dies, households may decimate their zebu herd. Some households may choose to buy zebus for the funeral at the expense of buying food). This practice is gradually beginning to decline, particularly with the rising frequency of *dahalo* in the zone and in the transhumance corridors, which encourage pastoralists to limit herd size. Sometimes hundreds of zebus are stolen at a time, which sometimes leads to armed battles causing many deaths.

Fishing, mostly practiced by small fishermen, is an important activity on the zone's coast where waters are particularly rich in lobster. The zone's lobster production, especially for exports, is estimated between 250–350 tons per year.

Natural parks intended for conservation of protected species and game are also a distinguishing characteristic of the zone; artisan mining of gemstones is another distinctive feature. The NGO presence is strong, as is community outreach, which ensures that neighbors help a household with agricultural work such as plowing fields before transplanting sweet potato seedlings or rice.

Day labor in the zone is worth approximately 2,000 MGA/day in addition to two meals served on the job. However, demand for local labor is very limited because there is only one crop season, and livestock rearing is more prevalent than agriculture. Moreover, informal gemstone mining occurs in some areas of the zone but does not absorb much of the local population. Industrial laborers, particularly on sisal plantations, are paid between 100,000 and 200,000 MGA/month. Consequently, labor from zone 24 is drawn to seasonal rural migration, mostly between October and February. Destinations include the large cities of Toliara (Tuléar), Majunga, and Diego (rickshaw, selling water); ports; large colonial plantations (sisal); and industrial plants. During periods of seasonal migration, migrants from poor households send money to the families they left behind.

Zone 24: Seasonal calendar



Zone 24: Food access calendar for poor households

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Staple foods												
Cassava												
Maize												
Sweet potatoes												
Rice												
Cowpeas												
Income												
Crop sales												
Agricultural labor												
Poultry, small ruminants				peak						peak		
Firewood												
Labor migration												
Expenses												
Staple foods												
Education												
Social events												
Legend		production			market purchase				in kind			gathering

POPULATION BY ADMINISTRATIVE ZONE

Region	Male	Female	Population
Analamanga	1,501,394	1,512,720	3,014,120
Vakinankaratra	990,436	997,909	1,988,354
Itasy	391,180	394,130	785,311
Bongolava	204,468	206,010	410,476
Haute Matsiatra	683,009	688,160	1,371,170
Ihorombe	121,595	122,513	244,106
Atsimo Atsinanana	380,255	383,124	763,381
Vatovavy Fitovinany	658,479	663,447	1,321,930
Amoron i Mania	434,954	438,237	873,194
Atsinanana	668,467	673,510	1,341,983
Analanjirofo	520,001	523,924	1,043,934
Alaotra Mangoro	548,065	552,201	1,100,271
Boeny	336,642	339,179	675,820
Sofia	588,049	592,484	1,180,537
Betsiboka	150,071	151,205	301,279
Melaky	106,909	107,714	214,624
Atsimo Andrefana	633,890	638,673	1,272,567
Androy	295,665	297,895	593,565
Anosy	334,600	337,122	671,722
Menabe	240,503	242,319	482,822
Diana	304,437	306,735	611,178
Sava	493,038	496,553	939,800

Source: *Population Explorer*[13]

[13] http://www.populationexplorer.com/. Population Explorer is a satellite-based Web tool used to estimate population. It estimates the total population for local areas down to a scale of 1 km^2. It uses census data, road networks, satellite imagery, proximity to coastlines, land use, and slope and elevation, among other factors, to establish where people live.

LIST OF PARTICIPANTS

Antananarivo workshop, 16 to 19 April 2013

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