

# TIMOR-LESTE

## **CLEAR** | Consolidated Livelihood Exercise for Analysing Resilience

A special report prepared by the Ministry of Interior, the Ministry of Agriculture and Fisheries, the Ministry of Social Solidarity, the Ministry of State Administration, the Ministry of Commerce, Industry and Environment, the Ministry of Finance and the World Food Programme



**World Food  
Programme**





# ABOUT THIS REPORT

This special report is published jointly by the Ministry of Interior, the Ministry of Agriculture and Fisheries, the Ministry of Social Solidarity, the Ministry of State Administration, the Ministry of Commerce, Industry and Environment, the Ministry of Finance and the World Food Programme. The report examines climate impacts on livelihoods and is intended to be used as a tool to identify adaptation options for the most vulnerable livelihoods. A special section on the impacts of the 2015/2016 El Nino episode to support contingency planning and possible response efforts is included.

The production of this report has been made possible thanks to contributions of the Government of Sweden through C-ADAPT. C-ADAPT is a strategic global initiative that aims to strengthen the capacity of WFP and partners to deliver climate services to the most vulnerable and food insecure communities and build resilience to climate-related risks through effective climate risk analysis, adaptation planning, and risk management. C-ADAPT is funded by the Government of Sweden's fast-track climate finance.

For more information, visit: [www.wfp.org/c-adapt](http://www.wfp.org/c-adapt)

Photos | Pages 5, 11 and 21: WFP/Amy Chong; all others: WFP/Krishna Krishnamurthy

Map disclaimer: The boundaries and names shown on the maps in this report do not imply official endorsement or acceptance by United Nations.



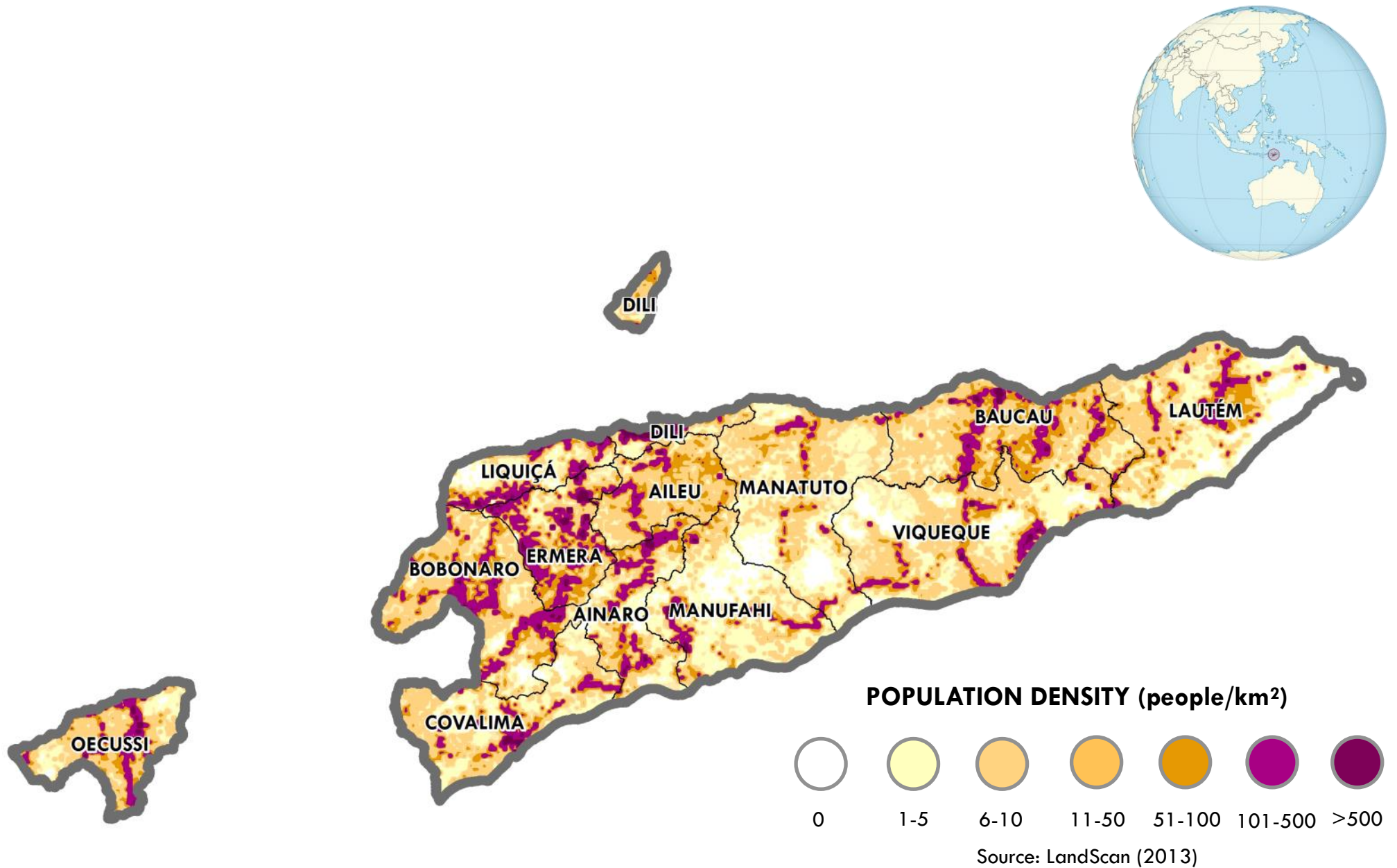
World Food Programme

FUNDED BY:





# TIMOR LESTE: Reference map



# FOREWORD

The El Niño phenomenon and the subsequent significant delays in the 2015-16 rainy season have resulted in widespread drought in Timor-Leste. In response, the Council of Ministries nominated the Ministry of Interior to coordinate line ministries for the necessary preparation, mitigation and interventions to support vulnerable affected communities. The Ministry of Interior, with support of World Food Programme, initiated a comprehensive and cross-sectorial needs assessment in early February 2016 in preparation for a coordinated response to the drought. A Consolidated Livelihood Exercise for Analysing Resilience was conducted which mapped community livelihoods across the country, recognizing 22 different livelihood zones, and assessed their resilience to natural shocks including drought.

The report highlights the current impact El Niño is having on the livelihoods of communities particularly those in Lautem, Viqueque, Baucau, Covalima and Oecussi where the consequences are most severe. In these Municipalities, over 120,000 people are facing hardships and their livelihoods are at risk. Households in these locations are resorting to coping mechanisms to manage the challenges faced and the Government recognises the need to support these households and is taking action to respond.

This report also considers how climate change is expected to develop in the future and what impact it will have on communities. The key findings predict that climate change will impact Timor Leste over the coming thirty years resulting in dryer and warmer conditions. The forecast, using the data available from the Intergovernmental Panel on Climate Change, of which Timor-Leste is a member, raises concerns about the suitability of key crops such as rainfed paddy, coffee, maize and cassava.

This report is published jointly by the Ministry of Interior and the UN World Food Programme recognising the important contributions from the Ministry of Agriculture and Fisheries, the Ministry of Social Solidarity, the Ministry of State Administration, the Ministry of Commerce, Industry and Environment, the Ministry of Finance and warmest thanks to the contributions of the Government of Sweden through C-ADAPT.

Longuinhos Monteiro

# contents



Key messages



1 Livelihood zones



3 El Niño  
A key climate risk



5 El Niño  
Livelihood impacts



7 Resilience profile



9 Income & poverty





27

## Annexes

Method | Livelihood profiles



25

## Climate analysis

Crop suitability



23

## Climate analysis

Future climate



21

## Climate analysis

Start of season



19

## Climate analysis

Rainfall trends



17

## Climate analysis

Rainfall climatology



15

## El Niño impact scenario



13

## Climate sensitivity

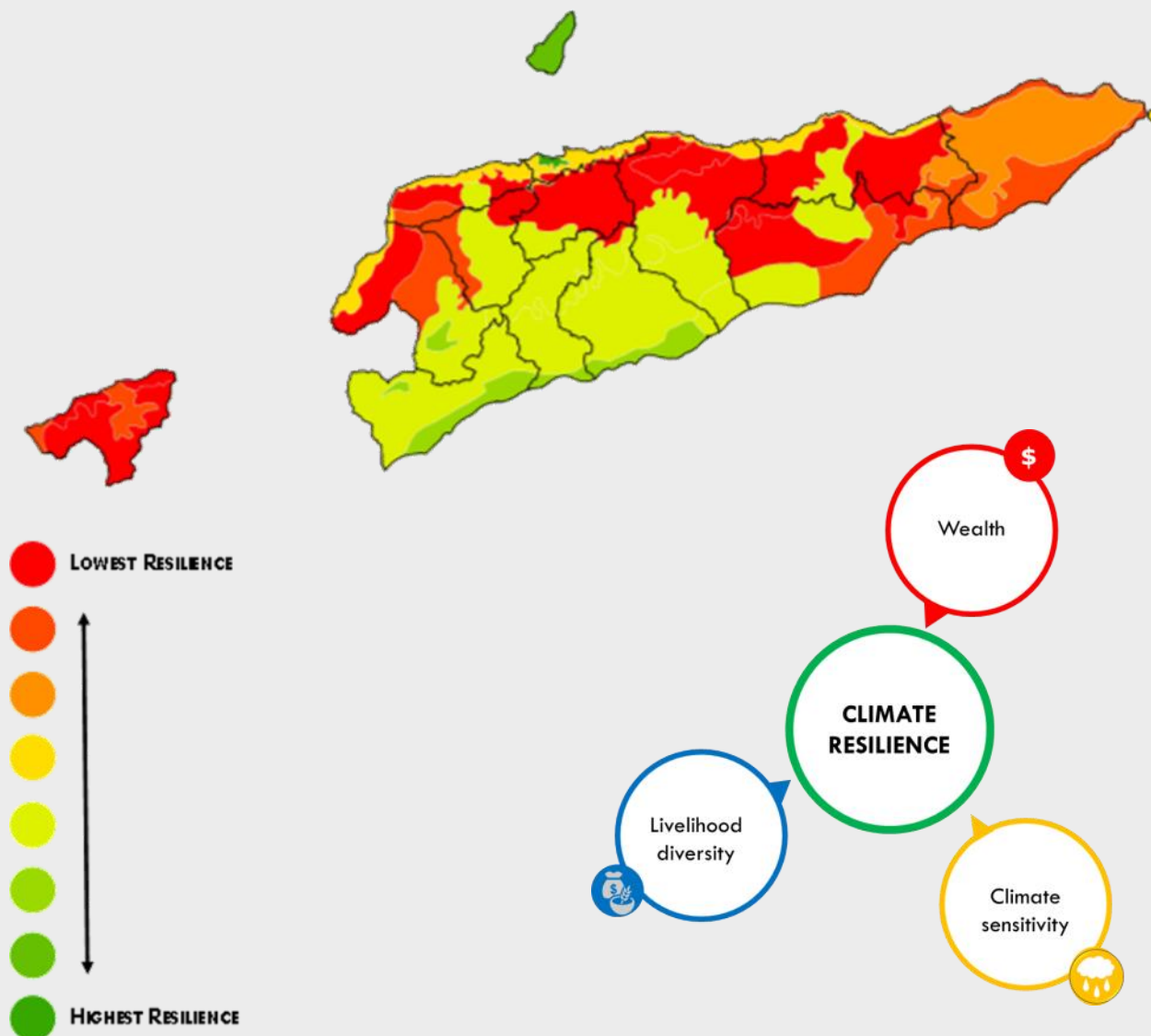


11

## Livelihood diversity

# KEY MESSAGES

- Despite being a relatively small country, livelihoods in Timor-Leste are diverse owing to a complex topography and the bimodal rainfall pattern in the southern coast.
- The livelihoods with greatest climate resilience are those with sufficient access to financial capital, those which are highly diversified, and those which rely on less climate-sensitive crops.
- Generally, livelihoods in the eastern, northern and Oecussi zones have the lowest climate resilience (due to a combination of low income levels, low livelihood diversification, and high sensitivity to rainfall changes) while those in Dili, Atauro and the southern coast have greater access to diverse livelihood options and are therefore more resilient to climatic shocks.
- Climate change is one of the key challenges threatening livelihood stability. Projected changes in rainfall and temperature offer risks as well as opportunities for diversifying livelihoods into more resilient systems.





# EL NIÑO | RECOMMENDATIONS



Severe impact on livelihoods was particularly identified in the eastern zones, where communities have reported multiple crop failures and severe livestock impact (including livestock death). However, this has not yet translated into a food security crisis. Livelihood interventions should focus on provision of maize seeds, ensuring availability of water and livestock support. Scale up of existing social protection structures may be considered as an additional support measure.



An in-depth multi-sectoral household assessments leading up to the harvest season in the eastern areas (April-May) should be considered. In these months, some households may run out of food stocks and priorities will be better identified.

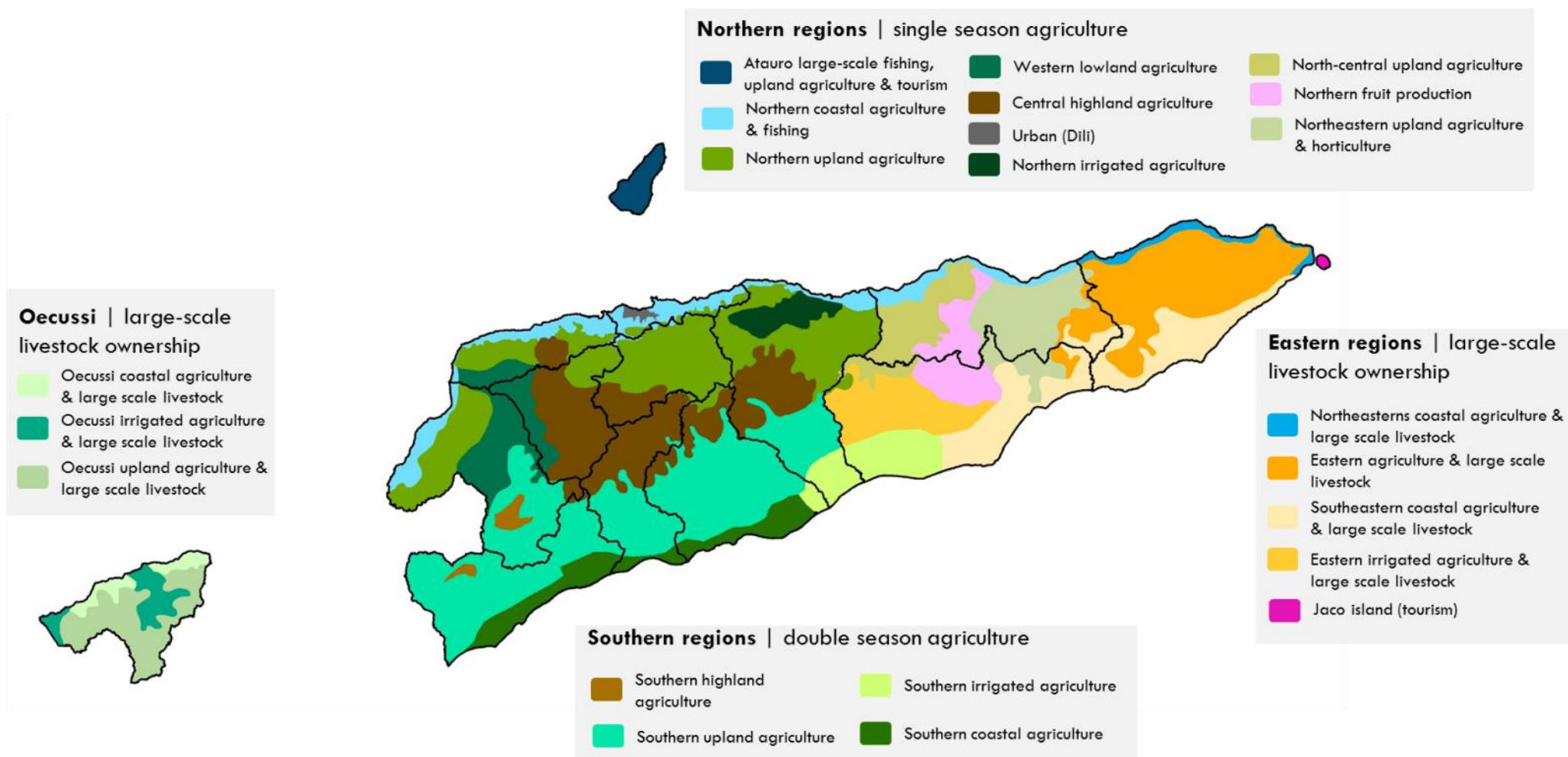


The situation is changing rapidly on the ground. As the El Nino is expected to have passed its peak, it is likely that the remainder of the season will experience neutral or near-neutral conditions. However, rainfall patterns and household food security conditions should be monitored closely in case conditions deteriorate.



A number of assessments are taking place simultaneously. Coordination of all information will be essential to ensure appropriate information flows.

# LIVELIHOOD ZONES



22 livelihood zones were identified | Detailed profiles are included as an annex

---

Rural livelihoods in Timor-Leste provide an income to around 70 percent of the population. These livelihood patterns closely follow topography, elevation, and rainfall patterns. Production of staple food crops, maize and paddy, dominate the agricultural systems and livelihoods in the uplands and lowlands respectively. The most common crop grown in the country is maize (approximately 30,000 ha) followed by paddy (18,000 ha) and cassava (10,000 ha)<sup>1</sup>. Maize and paddy are both important staple food crops, with rice being the preferred food item in Timorese diets. However, land suitable for paddy production is limited due to the topography of the country, and maize is more widely grown in the uplands including hillsides. Irrigation water in many of the irrigated rice areas are available only when river water level from the source has increased to the level of the intake of the irrigation systems.

Around 81 percent of the country's population is engaged in maize production. Yields are relatively low, at around 1 mt/ha. Use of poor quality seeds, and relatively poor soil condition are the main causes of low yields. The main maize-growing areas are located in the eastern agriculture & large-scale livestock zone and the northern uplands where paddy farming would be unproductive. Maize is often grown in combination with cassava<sup>2</sup>.

Around 39 percent of the population is involved in paddy farming, primarily in the western and northern lowlands, though paddy is grown in all municipalities. Paddy farming is also common along the rivers of the southeastern coastal agriculture & large-scale livestock area. Upland paddy is far less common, and is primarily practiced in the Oecussi upland agriculture zone. Overall, yield per hectare of paddy is about 2.5-3mt/ha, which is lower than the yields achieved in other Asian countries<sup>1</sup>. This is largely because of limited access to improved technologies including use of quality seeds, fertilizer, as well as the limited supply of irrigation water. A second paddy crop is only grown in around 20 percent of the irrigated areas.

The most common commercial agricultural products is coffee, which is grown in the central highlands and in the mountainous areas of the southern coast. In the central highlands, coffee is mainly grown together with maize, cassava and taro, through some communities—particularly in the eastern parts—also grow

avocado and fruit trees. A smaller coffee zone exists in the southern part of the country, where communities also engage in production of cash crops during the second rainy season<sup>1</sup>.

Seasonally, there are two major patterns which influence livelihoods: in the north, unimodal (single season) rainfall limits crop production to key staple or cash crops whereas in the south, bimodal (double season) rainfall allows for longer-duration crops, a second crop, and production of root crops (sweet potato and taro) or more profitable cash crops (watermelon, banana, squash, kidney beans, soybeans, mung bean, and peanut)<sup>1</sup>.

Approximately 80 percent of households engage in livestock rearing, alongside the main cropping activities. Major livestock zones are found in the easternmost regions and in Oecussi, where livestock sales provide the main source of income for approximately six months a year<sup>2</sup>.

Although fruits are grown across all municipalities, a major fruit-producing zone exists in Baucau and Viqueque where communities engage in production of jackfruit, breadfruit, banana, and other fruits, in addition to maize farming<sup>1</sup>.

Fishing is a key livelihood activity in Atauro Island, where fishing communities traditionally sell their catch in Dili for a significant profit. Communities along the northern coast also engage in fishing together with small-scale maize production. Fishing is less common in the southern coast where stronger waves limit fishing potential.

Tourism is an important supplementary source of income in the islands (Atauro, north of Dili, and Jaco, in the easternmost part of the country). In Atauro, communities also rely fishing and maize farming, whereas in Jaco Island, tourism is the only source of income.

---

<sup>1</sup> Ministry of Agriculture and Fisheries (2015) 2014 Agricultural Production Statistics. Dili: MAF.

<sup>2</sup> NSD and UNFPA (2011) Population and Housing Census of Timor-Leste, 2010



# EL NIÑO | A KEY CLIMATE RISK



Climate risks pose a major threat to food security in Timor-Leste, given the high sensitivity of livelihoods across the country (see Pages 13 and 14). The 2015/2016 season was marked by below-average rainfall due to the El Niño phenomenon.

Temporally, the rainfall patterns reveal significant trends between November and December: a delay in the onset of the season, consistently below-average rainfall, and interrupted rains which affect livelihoods and food security in inter-related ways. Rainfall in November was significantly below average with most regions receiving only a third of the rainfall they normally receive. In effect, this translates to a one-month delay in the onset of the rainy season and a subsequent delay in planting of key crops.

December saw an improvement in the rains with near-normal rains in most of the central highlands and western lowland plains. Some parts of the country, particularly in the northern, eastern, southwestern, and westernmost regions, experienced a continuation of below average rainfall. Continued below average rainfall in parts of the country affected water availability for livestock and both irrigated and rainfed agriculture.

In January, rainfall was low compared to the long-term average, with the entire country receiving less than 70 percent of the rainfall that is normally received. This trend indicates erratic rainfall and interrupted precipitation patterns which can have a detrimental effect on crop development (especially during key growth stages).

Spatially, most of the country experienced below-average rainfall, with most of Oecussi, the northern coast, the eastern regions, and the southwestern coast receiving below-average rainfall consecutively for three months.

These patterns are consistent with the trends reported by communities during consultations carried out in February 2016 (see Annex 1 for details on Method).

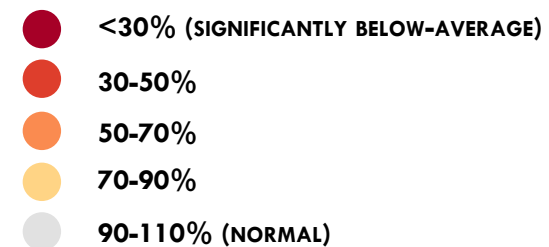
**NOVEMBER 2015**



**DECEMBER 2015**

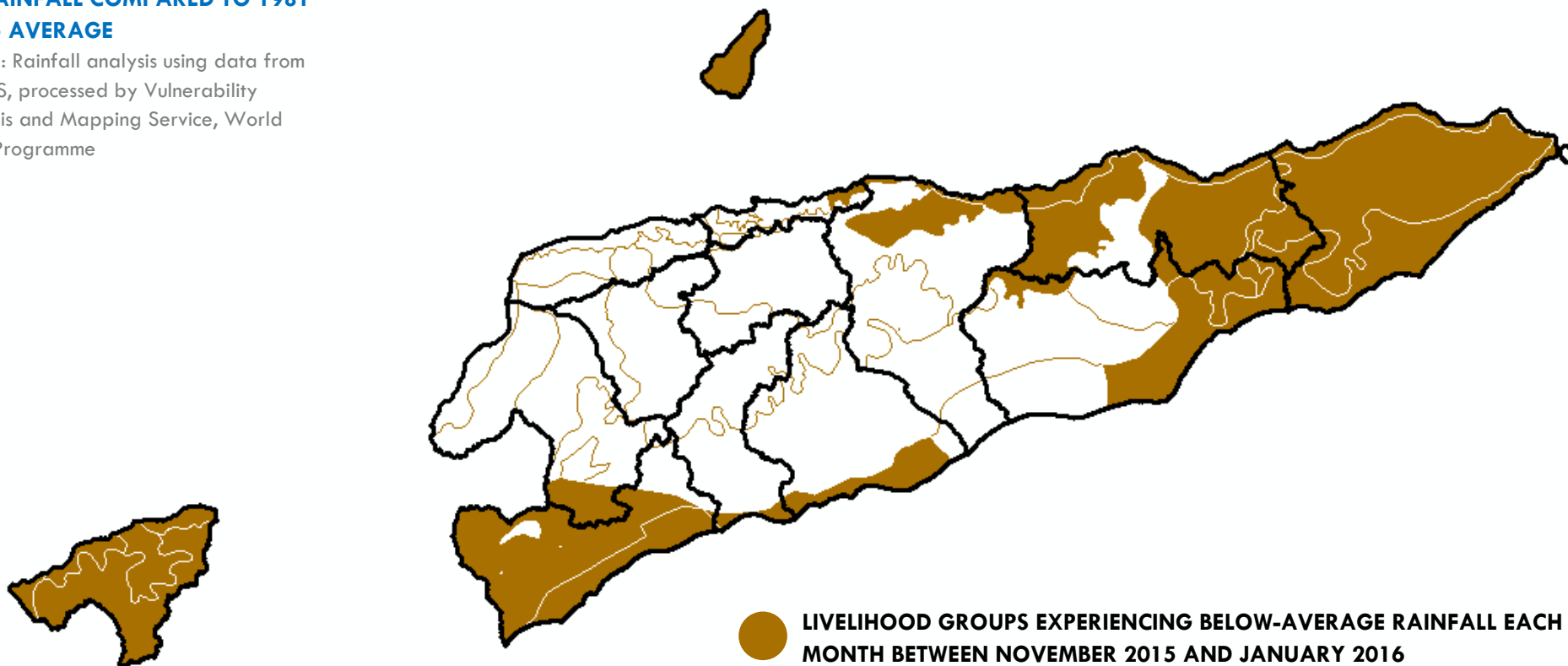


**JANUARY 2016**



**RAINFALL ANOMALY (NOVEMBER 2015 -JANUARY 2016), PERCENT OF RAINFALL COMPARED TO 1981 -2015 AVERAGE**

Source: Rainfall analysis using data from CHIRPS, processed by Vulnerability Analysis and Mapping Service, World Food Programme



# EL NIÑO | LIVELIHOOD IMPACTS



The 2015/2016 rainy season has been marked by a strong El Niño episode. Three manifestations of the weather phenomenon have been felt across the country: a delay in the onset of the rainy season, overall lower rainfall volumes, and interruption of rains—all of which have significant implications for livelihoods which are primarily dependent on agricultural activities.

Across the entire country, communities reported negative impacts on crops, income and water availability. Significant crop impacts were reported in the easternmost zones where below average rainfall in the growing stages of maize and paddy resulted in multiple failed crops. In the western lowland areas, and the irrigated zones along the northern coast and in Oecussi, impacts were also reported to be significant due to the high climate sensitivity of paddy. Communities in these areas report at least one failed crop.

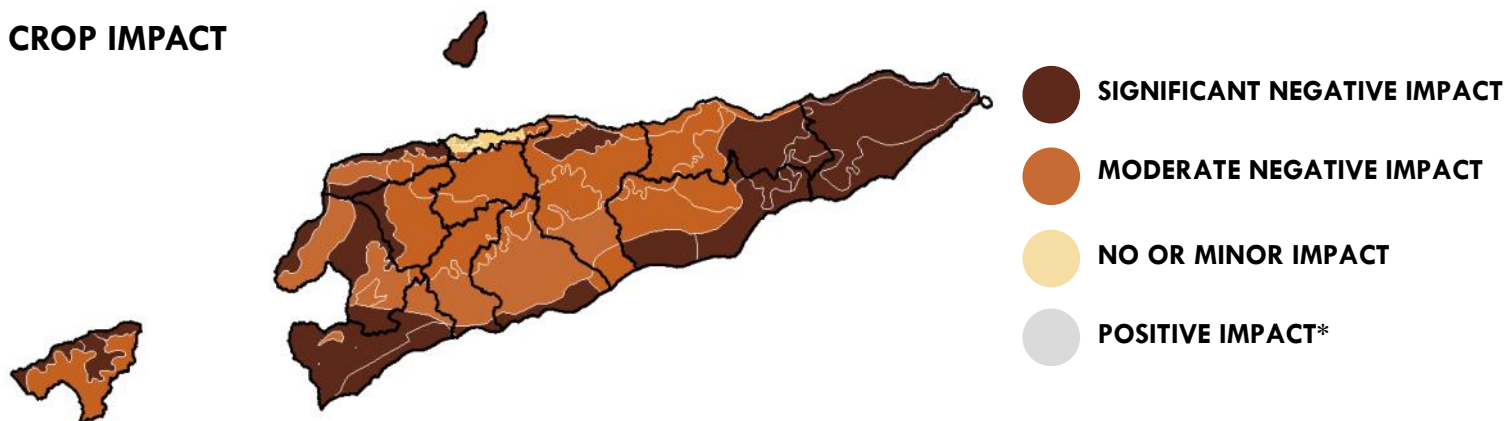
Impact on income closely follows the pattern of crop impact except in areas where a secondary crop (such as maize or cassava in lieu of paddy) or alternative livelihoods (mainly fishing) are readily available.

Water availability was reportedly affected throughout most of the country except in the northern highlands and the western lowlands. Significant impacts were reported in the eastern zones, large parts of the southern coast and the upland areas in Oecussi. Communities in these zones report damage to irrigation infrastructure and lack of water in traditional sources (springs, rivers, lakes) leading to problems in accessing water.

In Dili and the immediate vicinity of the capital city, impacts on crops, income, and water availability were reportedly minor.



## CROP IMPACT

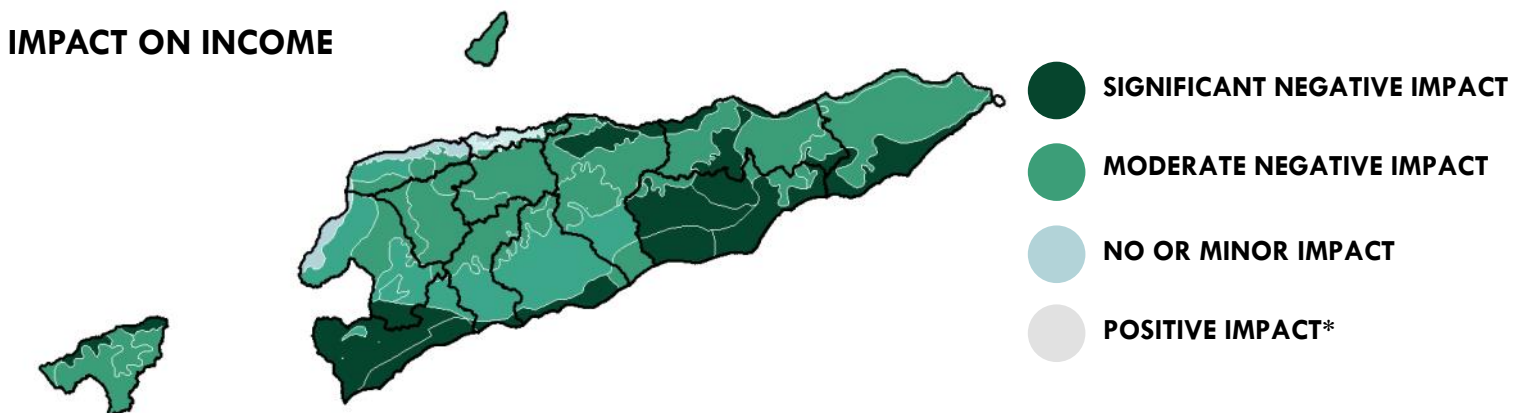


## REPORTED IMPACTS ON CROP, INCOME AND WATER AVAILABILITY

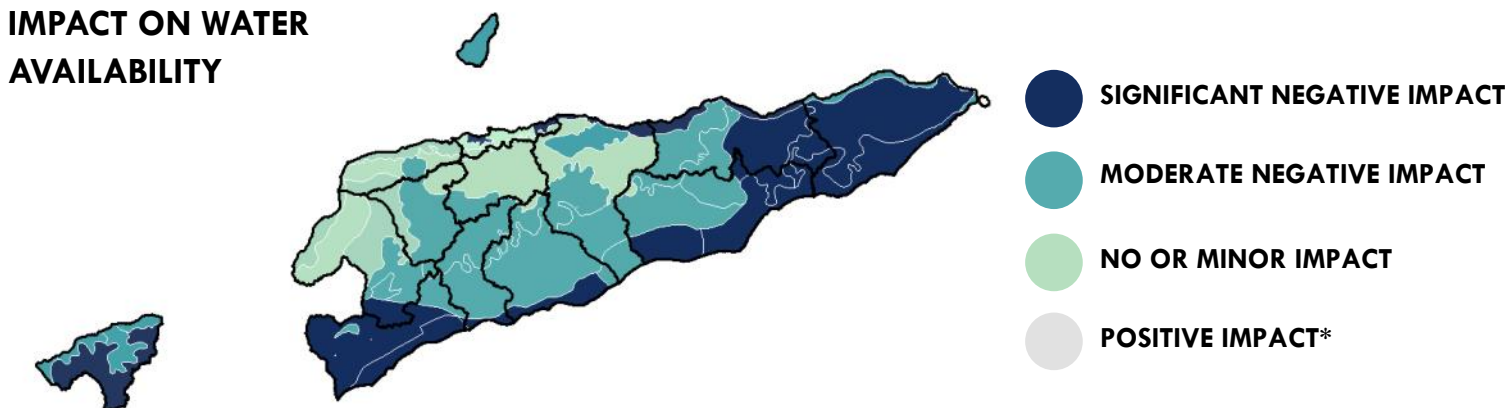
Most common response by livelihood group based on a rapid assessment carried out between 2-11 February, 2016.

\*No positive impacts were reported.

## IMPACT ON INCOME



## IMPACT ON WATER AVAILABILITY



# RESILIENCE PROFILE



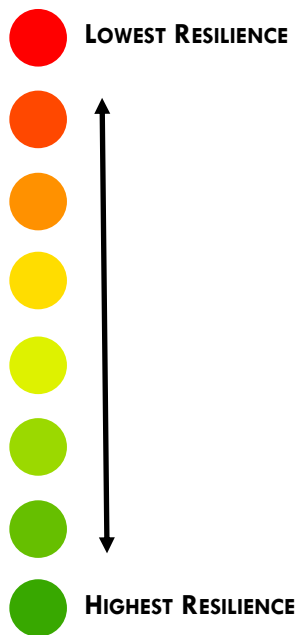
Ultimately how livelihoods are affected by a climatic shock also depends on their resilience capacity. This section describes climate resilience to better understand potential food security outcomes of El Niño. Climate resilience in Timor-Leste is influenced by three key factors<sup>3</sup>, namely wealth (access to income), livelihood diversity (to better manage shocks), and climate-sensitivity of income (reliance on climate-sensitive cropping systems renders households less resilient to climate variability). Resilience patterns can therefore be mapped by aggregating these indicators (Page 8).

Livelihoods in Timor-Leste have geographically distinct patterns of resilience. Urban areas and fishing communities in Atauro, where households have access to financial flows from small industrial activities and tourism, enjoy some of the highest levels of climate resilience. This is the result of high incomes, combined with diversified livelihoods, and reliance on activities that do not depend on rainfall patterns.

Communities in the central highlands and the southern parts of the country also have comparatively higher resilience levels as a result of diversified agricultural practices and engagement in production of cash crops.

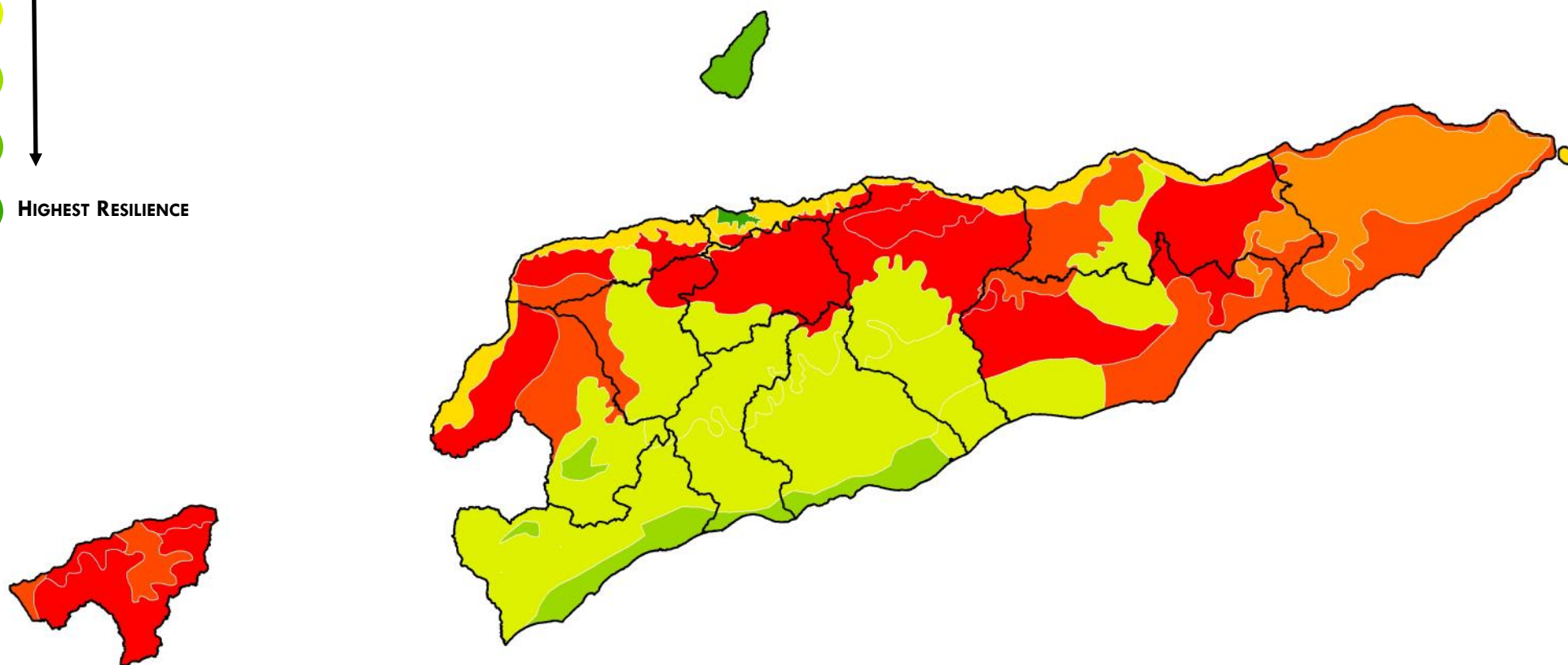
Conversely, the least resilient livelihoods are those relying on a few key activities (such as paddy and maize in the western lowlands, and maize and cassava in the northern uplands) as well as the major livestock zones of Oecussi and the eastern region where communities depend on a few number of highly climate-sensitive agricultural activities and do not have sufficient access to income.

<sup>3</sup> Based on community discussions (see Annex I for a description of the method)



### RESILIENCE BY LIVELIHOOD ZONE

Source: based on poverty, land availability, livelihood diversity and climate-sensitivity of income. Individual maps are presented in subsequent chapters.





# INCOME & POVERTY



Income is an important factor influencing resilience levels. Availability of financial capital determines the ability of households to invest in different assets and withstand climate-related shocks. Income also allows communities to purchase food when agricultural production is not sufficient.

In Timor-Leste income is closely linked to connectivity to markets. Communities that are well connected to Dili and major towns fare better than those in more remote communities.

There is still a significant income gap between urban and rural populations: in urban areas, the average monthly household income is approximately five times greater than the income in rural communities. As a result, poverty levels are lowest in urban areas, where industrial activity bring in financial resources. In Atauro Island, too, large-scale fishing and tourism together with greater connectivity to Dili allow for substantial income.<sup>4</sup>

Household income derived from crop sales is lower (\$57) than the income derived from sales of fish, livestock, and cash crops (\$70). This national pattern explains the higher income levels in the northern coastal areas, the eastern livestock and agriculture zone, the coffee producing areas of the central highlands, and the southern coast.<sup>4</sup>

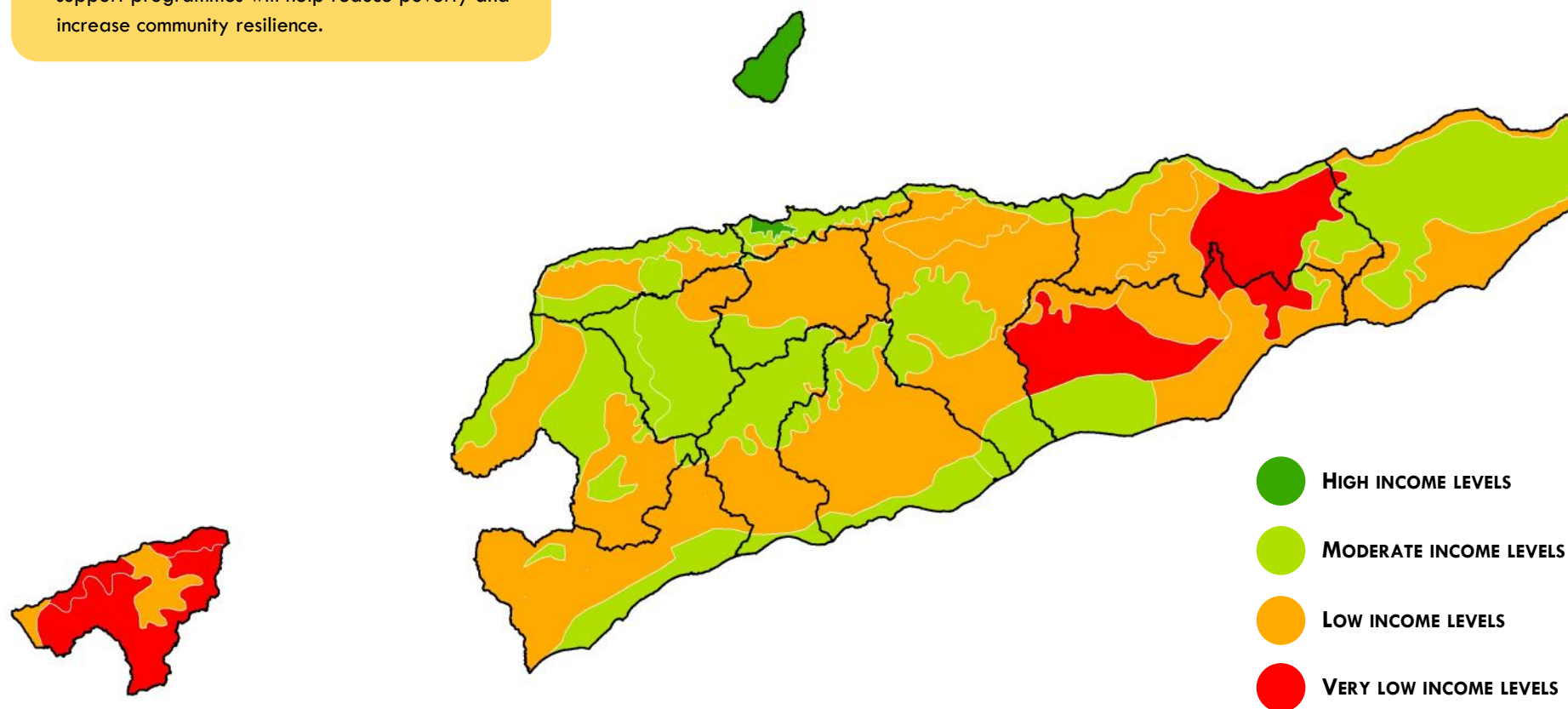
The lowest income levels are found in Oecussi, where poverty rates are above 60 percent (the highest in the country) as well as the northeastern upland agriculture zone and the irrigated agriculture & large-scale livestock zone where limited connectivity to markets reduces access to income.<sup>4</sup>

<sup>4</sup> Timor-Leste Household Income and Expenditure Survey (2011) Dili: National Statistics Directorate/Ministry of Finance.

Poverty trends are likely to change in the coming decades with livelihood diversification (including more revenue from oil, tourism, and higher diversification of livelihoods) reducing poverty to some extent. Recent investments in the Special Economic Zone of Oecussi (ZEEMS) will also influence changes in poverty. The poorest areas are among the most remote and have limited access to assets, . Assistance through livelihood support programmes will help reduce poverty and increase community resilience.

### POVERTY BY LIVELIHOOD ZONE

Source: Based on the Timor-Leste Household Income and Expenditure Survey (2011) Dili: National Statistics Directorate/ Ministry of Finance.



# LIVELIHOOD DIVERSITY



Diversification of livelihood activities is a key strategy for enhancing resilience: households with diverse livelihood profiles are more capable of responding to shocks in case the primary activity is affected by a significant shock. Diversification away from single or double-crop production is especially significant as it allows households to increase dietary diversity (for example, higher consumption of animal products) as well as the number of income sources.

Outside of urban areas, livelihoods in Timor-Leste are heavily reliant on maize and cassava with over 88 percent and 81 percent of households growing these crops respectively at the national level.<sup>5</sup> Often these crops are grown in combination with each other.

Households across the entire country depend heavily on livestock rearing, with 80 percent of the population owning at least some livestock.<sup>5</sup> In Oecussi and in the Eastern zones, livestock rearing is a significant livelihood as communities sell their livestock to purchase food.

More diversified livelihoods are found in the Central highlands where communities engage in coffee production along with maize and cassava cultivation. Some communities also cultivate vegetables, and fruit and avocado trees to increase the number of income sources.

The southern trade winds, which bring in a second rainy season between May and July, also allow for greater livelihood diversification in the southern coast—ranging from a second paddy or maize crop to root crops and more profitable cultivars such as watermelons, red beans, mung beans and soybeans.

---

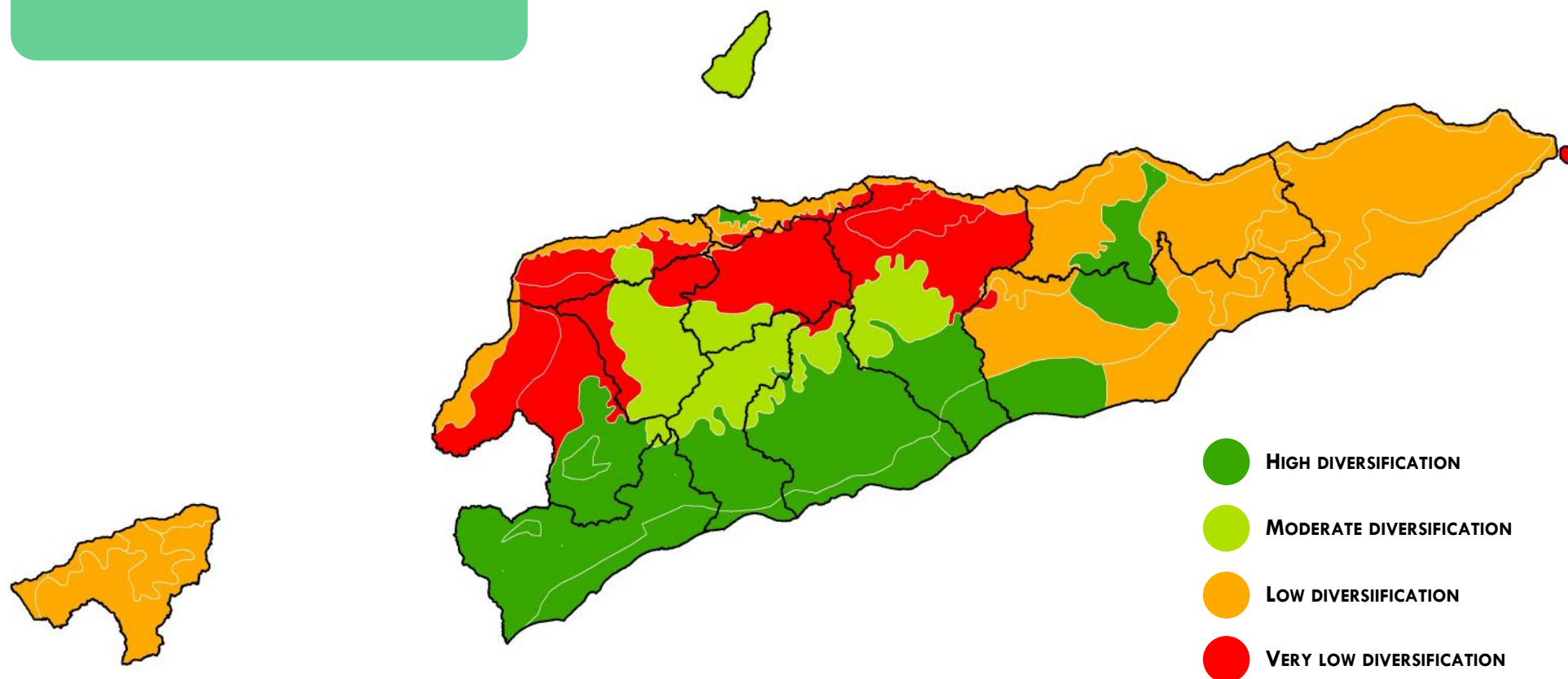
<sup>5</sup> NSD and UNFPA (2011) Population and Housing Census of Timor-Leste, 2010



Despite being heavily reliant on agricultural activities, livelihoods in Timor-Leste are quite diversified thanks to the complex topography and climate of the country. To date, the main drivers of diversification are urbanization and tourism. Commercial and cash crops, such as candlenut, beans, and fruits provide additional livelihood diversity but further diversification is needed to enhance resilience.

### LIVELIHOOD DIVERSITY BY LIVELIHOOD ZONE

Source: Based on filed consultations (2016) and the Timor-Leste population census (2010)





# CLIMATE SENSITIVITY



Changes in climatic patterns, both long-term and seasonal, have a detrimental effect on livelihoods that depend on climate-sensitive income, such as agricultural labour, sale of rain-fed crops, and fishing.

Extreme weather events such as floods, droughts, and storms can have significant impacts on livelihoods and food security outcomes by reducing availability of food for home consumption, reducing production for sales or damaging livelihood productive assets.

Income is particularly sensitive for farmers dependent on rainfed paddy, which requires regular rainfall in order. Irrigated paddy—limited, around rivers. Maize and cassava crops are more tolerant to irregular rainfall but are still affected by low rainfall. Root crops such as sweet potato and taro are slightly less sensitive to rainfall. In Timor-Leste, the combination of *samtuco* trees and coffee plantations ensures lower sensitivity as the tall trees provide shade and protection.<sup>6</sup>

More diversified, non-crop based livelihoods such as fishing are less sensitive to climate variability and can be carried out both during the dry and wet seasons.

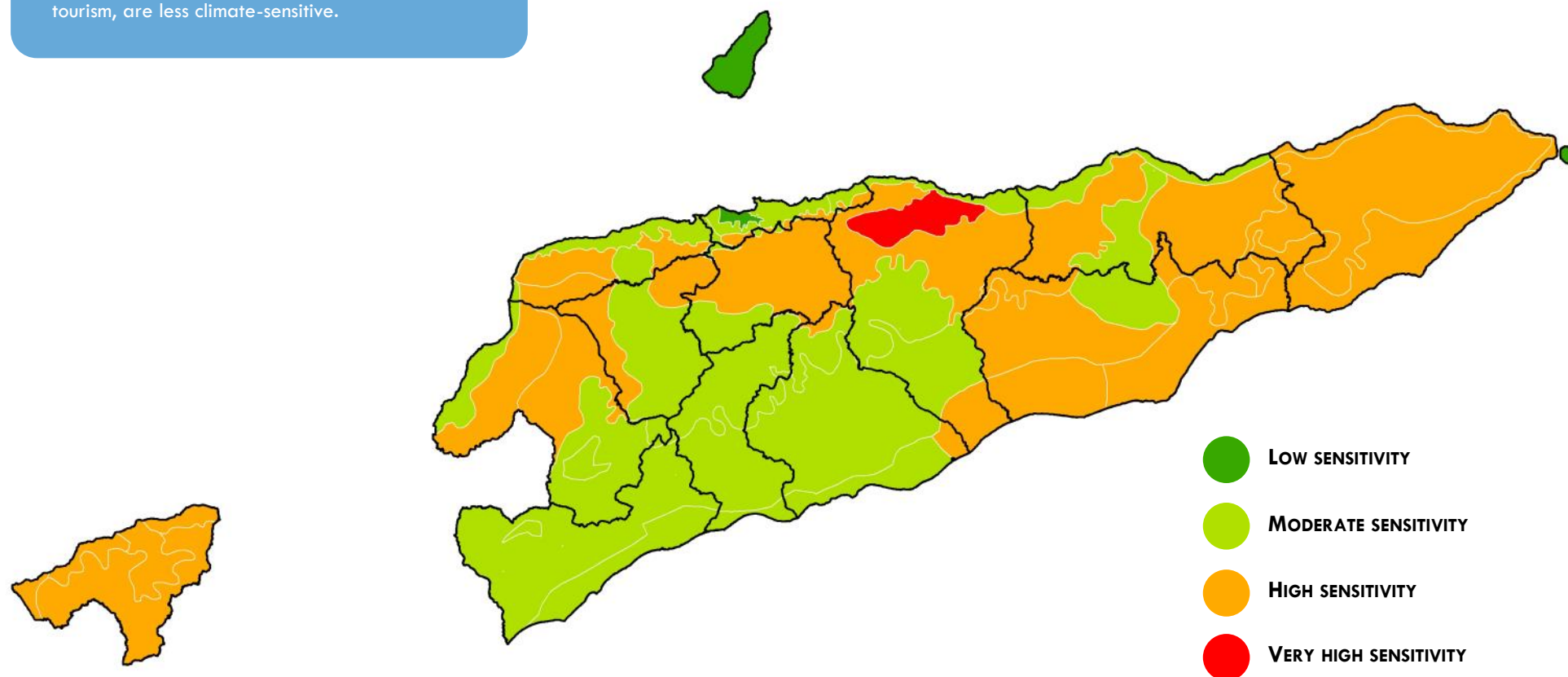
Households relying on tourism-based activities and urban activities are among the least sensitive to variations in climate given the relative stability and predictability of income sources. For these communities, other shocks such as price volatility, may be more significant threats to overall resilience.

<sup>6</sup> IIASA and FAO (2012) [Global Agro-ecological Zones](#). GAEZ3.0

Limited access to irrigation means that livelihoods are generally sensitive to the effects of climate variability: delays in the onset of the rainy season can affect key stages of crop growth thereby affecting yields leading to food and income losses. Diversification towards less sensitive crops such as sweet potato and coffee reduces climate sensitivity. Households engages in activities that do not depend on rainfall, such as tourism, are less climate-sensitive.

### CLIMATE SENSITIVITY OF INCOME BY LIVELIHOOD ZONE

Source: Based on analysis of crop sensitivity by IIASA and FAO (2012)  
Global Agro-ecological Zones. GAEZ3.0



# EL NIÑO IMPACT SCENARIO



Forecasts indicate a transition to weaker El Niño conditions and a neutral weather pattern over spring and summer<sup>7</sup>. Neutral conditions would see an improvement in rainfall towards the end of the harvest period and average rainfall during the second season. These conditions would influence harvests and ultimately food security. However, the impact will likely be felt differently across livelihood groups according to their unique resilience levels.

Based on the livelihood resilience profiles presented earlier, greater livelihood diversity—particularly in the southern zones—is likely to allow communities to better manage impacts associated with El Niño. The second season, which is likely to be unaffected by El Niño, will provide an opportunity to compensate for some of the production losses in the main season, particularly through production of root crops and second-season cash crops.

The main areas of concern remain in the eastern region, where significant crop losses including multiple crop failures combined with loss of livestock have already affected communities severely. Food and seed stock losses are reportedly high, and communities may run out of food stocks in the months leading to the harvest period.

The coffee-producing regions in the highlands are expected to be among the least affected in both scenarios due to near-normal rainfall. Urban activities in Dili are less likely to be affected. Atauro and Jaco Islands are also likely to experience minor livelihood impact due to the availability of income from non-agricultural sources.

---

<sup>7</sup> Based on the ENSO Alert System (NOAA/NCEP/NWS/IRI, February 11, 2016)

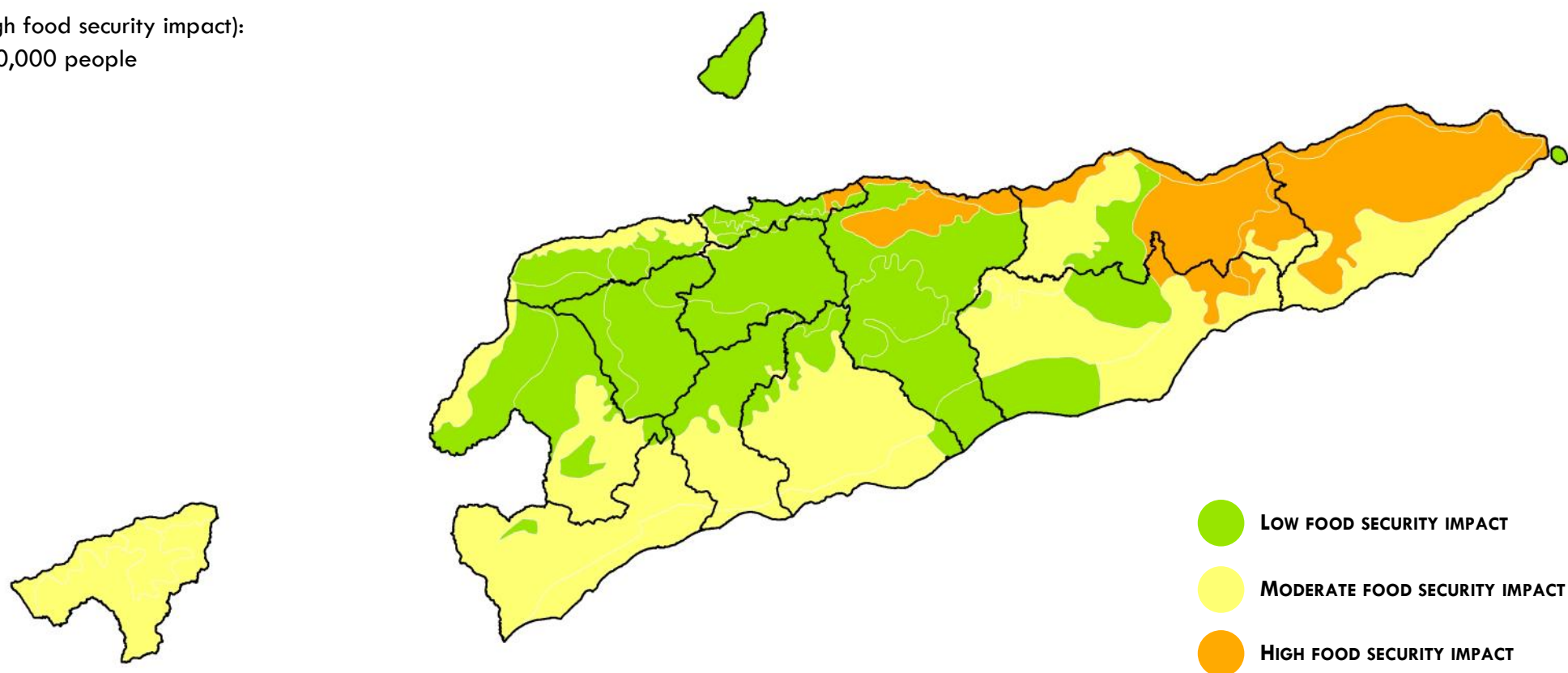


## BEST GUESS SCENARIO

Based on seasonal forecasts provided by NOAA and ECMWF suggesting neutral rainfall conditions throughout most of Timor-Leste starting in April 2016.

SCENARIO: The second rainy season compensates some of the losses experienced during the main season, particularly along the southern coast.

ESTIMATED POPULATION AT RISK  
(high food security impact):  
150,000 people





# RAINFALL CLIMATOLOGY



The average annual rainfall varies across Timor-Leste from around 2,800mm in the peaks of the Central Highlands of Ermera, Aileu and Ainaro down to less than 1,000mm on the northern coastal areas. Topography plays a major role in shaping the spatial pattern of annual rainfall as high values follow the mountain ridges that extend along the center of the country. A smaller annual rainfall peak occurs towards Mount Matebian—the second highest mountain in the country. The southern coast is considerably wetter than the north owing to the southern trade winds which result in a second rainy season.

Rainfall patterns are closely linked to crop choices and livelihoods. Cooler and wetter regions in the Central highlands depend on coffee, corn and cassava and receive the largest amount of rainfall. In the southern regions, the relatively higher rainfall volumes allow for production of profitable crops such as watermelon, red beans, mung beans, and soybeans.

Livelihood zones which receive, on average, the least amount of rainfall are located in the northern coast and Atauro Island, where fishing is a key source of income and where agricultural activities are limited to small-scale maize production. The irrigated zone in the northern coast also receives limited rainfall (<1,000mm/year) but the extensive river network allows for paddy farming.

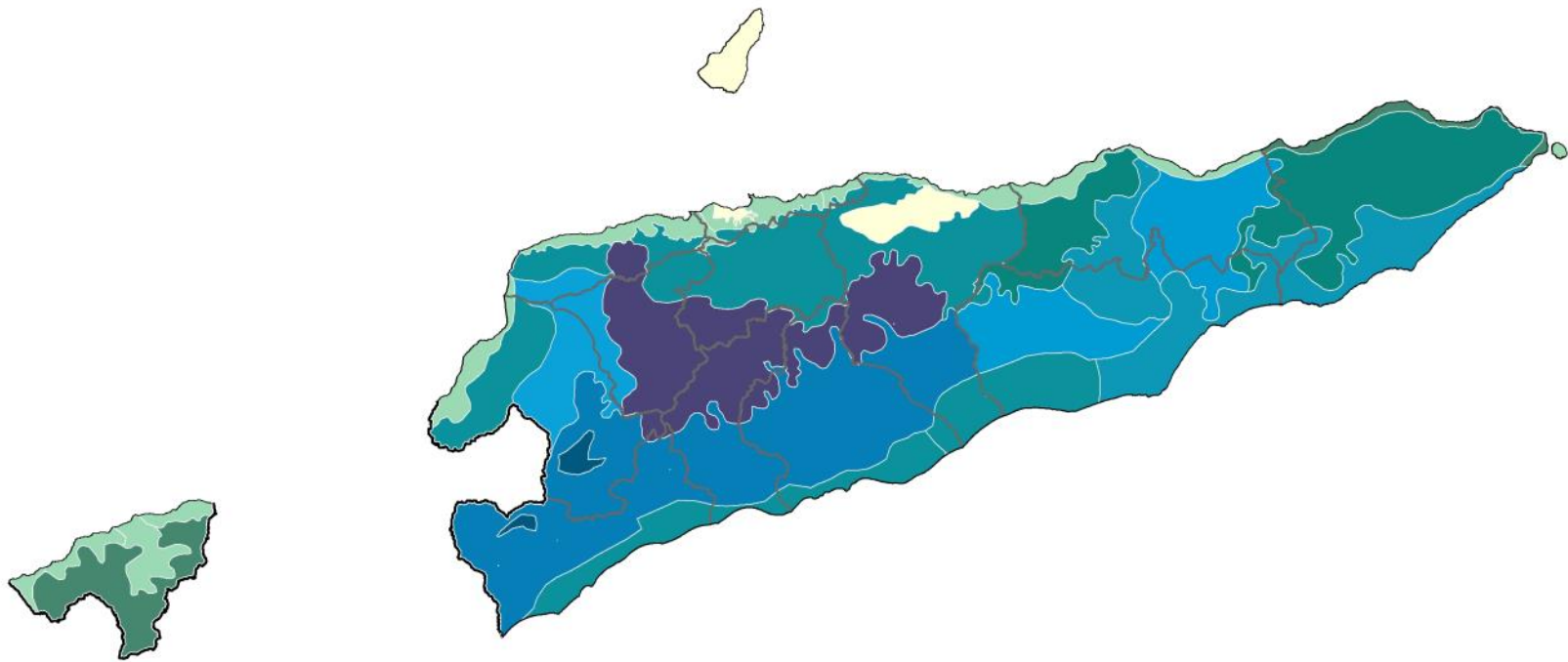
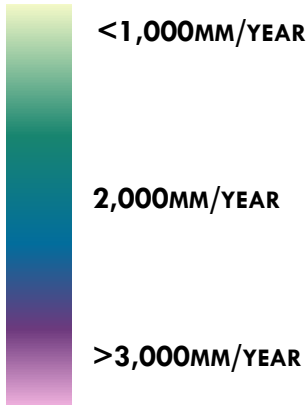
The northern highlands and the eastern zones receive comparatively lower rainfall and grow crops that are more drought-tolerant, namely maize and cassava. Relatively low rainfall volumes are also noticed in Oecussi and the easternmost zones, where livestock rearing is a key source of income.



**RAINFALL CLIMATOLOGY  
(1985-2014)**

**RAINFALL CLIMATOLOGY BY  
LIVELIHOOD ZONE (1982-2014)**

Source: Rainfall analysis using data from  
CHIRPS, processed by OSZAF  
(Vulnerability Analysis and Mapping  
Service, World Food Programme)



# RAINFALL TRENDS



Overall, precipitation has increased throughout the country since 1985. Historical data indicate a predominant pattern of increasing rainfall which is quite pronounced in the westernmost areas and easternmost areas of the country (darker blue shades). In central areas (particularly towards the northern coast), trends are more moderate.

In the period 1995-2015, the broad patterns of rainfall trend remains the same though there is a stronger increase in seasonal rainfall in the eastern and south-central with some areas experiencing increases of more than 10 millimetres per year. A continuation of this trend would result in an increase of approximately 15 percent over 20 years.

All livelihood groups have experienced an increase in overall rainfall during the last 30 years, . Higher rainfall volumes, to a degree, are beneficial to paddy production while they can be detrimental to maize and cassava through waterlogging effects. A significant increase in rainfall can also increase landslide risk, potentially affecting areas dependent on coffee as well.

Overall, the livelihood zones experiencing the greatest increases of rainfall are those in the eastern region. Continuing increases of rainfall in these zones would allow for greater diversification of agricultural activities. Atauro Island is also experiencing large increases of rainfall, potentially allowing for great agricultural production in the upland areas. Elsewhere, there are at least moderate increases in rainfall of at least 4 millimeters every year.

Despite a trend of increasing rainfall, there is significant inter-annual variability with some years experiencing major decreases in rainfall. Efforts to prepare for years with lower and higher rainfall should therefore be prioritized.



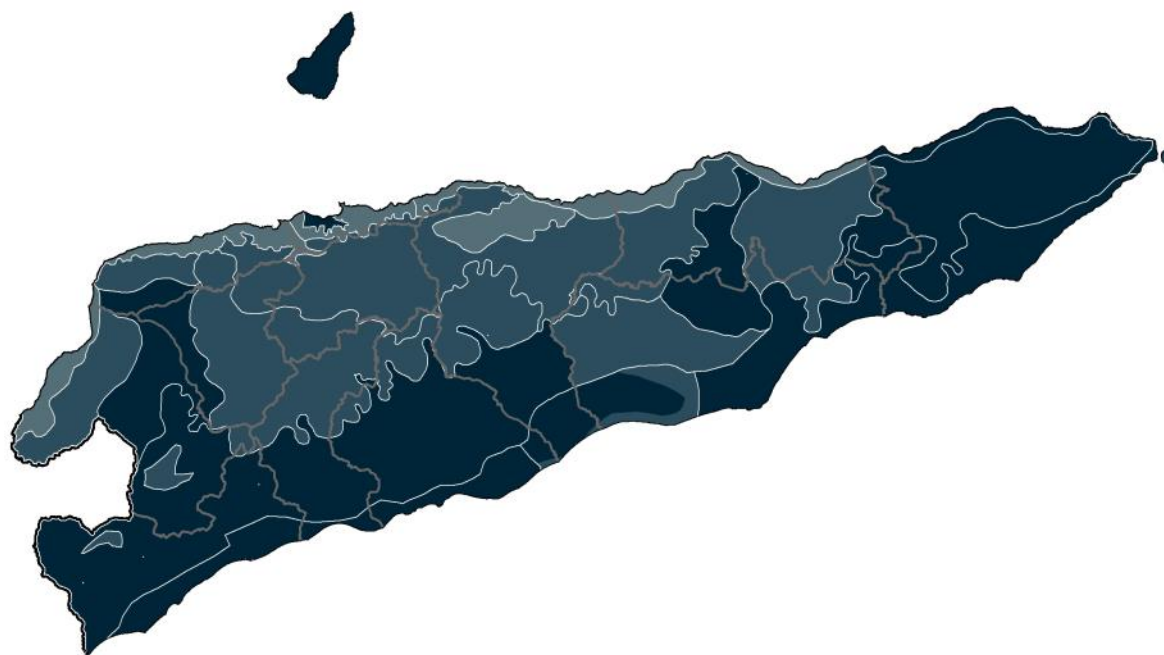
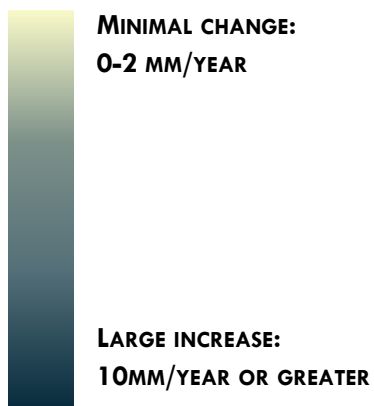
**RAINFALL TRENDS  
(1985-2014)**



**RAINFALL TRENDS  
(1995-2014)**

### RAINFALL TREND BY LIVELIHOOD ZONE (1995-2014)

Source: Rainfall analysis using data from  
CHIRPS, processed by OSZAF  
(Vulnerability Analysis and Mapping  
Service, World Food Programme)





# START OF SEASON

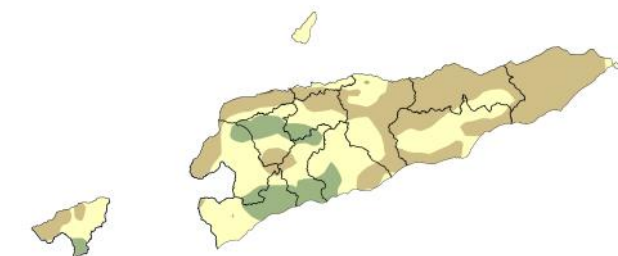


The growing season trend over a 30-year period (1985-2014) shows a pattern of moderately later onsets of season in the eastern and coastal areas of the country. Some small areas in the west and south coast have a moderate tendency for earlier onsets. The trend is stronger over the more recent 20-year period (1995-2014) with the western regions of the country experiencing earlier onsets of the rains.

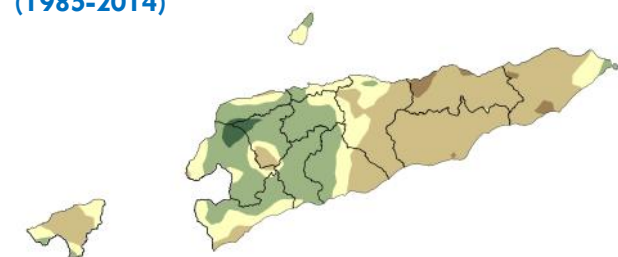
The broad pattern of either no change or moderate tendency for later onsets appears to contradict the well defined trends of increasing seasonal rainfall (Page 21). This can be clarified through an analysis of monthly rainfall trends. There is evidence that November has become drier over the past 30 years, particularly in the eastern parts of the country – this leads to progressively later onsets of season since November is the typical month when the season starts. Increasing dryness would tend to push the onset of the season towards December, resulting in a shorter season. The increase in seasonal rainfall occurs due to increases in rainfall volume at later stages of the season.

The only livelihood zones experiencing earlier onset of the rainy season are in the western and central parts of the country, including the western lowlands (where earlier onsets and potentially longer rainy seasons may benefit paddy and maize production), the central highlands (where maize and cassava production may see an increase in productivity) and the southern upland agricultural areas (where the first season crop may benefit).

In Oecussi and the eastern zones, there is a large tendency for later onsets of the rains which is associated with shorter, more intense rainy seasons. In these regions, the traditional dates for planting may no longer be feasible and livelihoods may benefit by diversifying to shorter cycle crops. The larger rainfall volumes at later stages of the season would allow for such livelihood diversification.



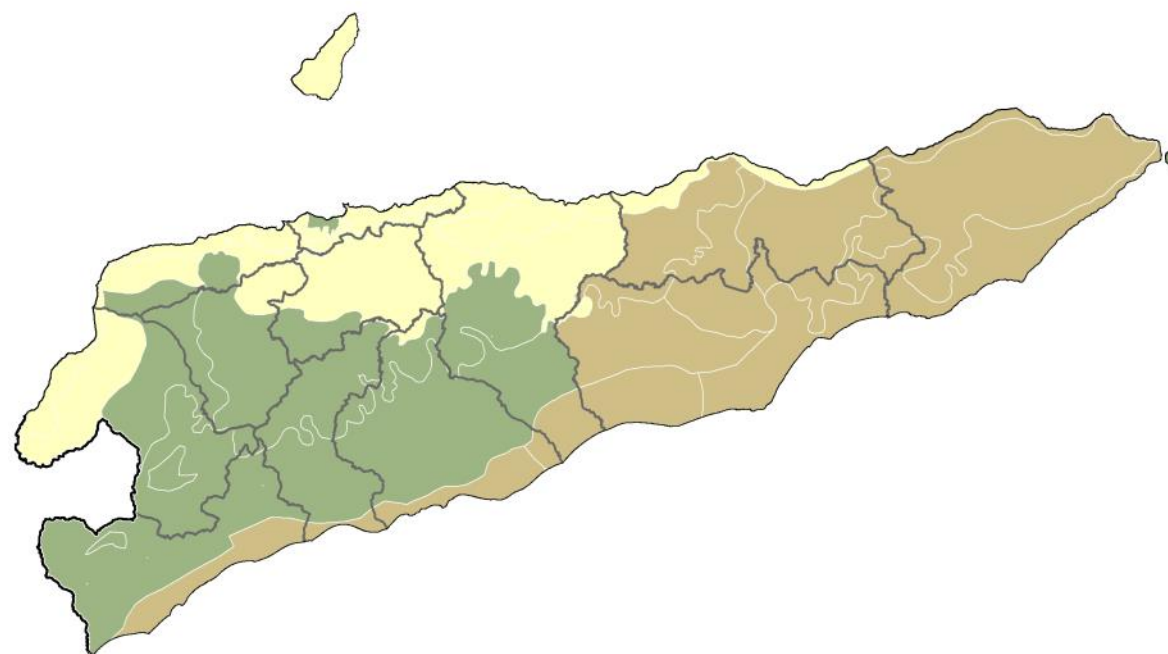
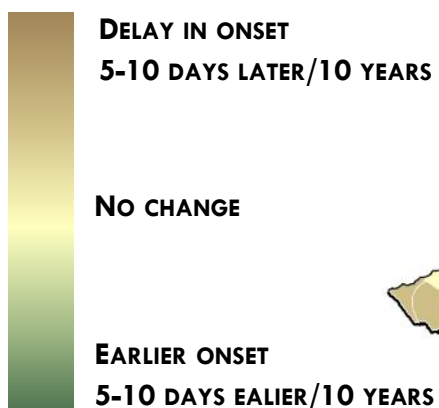
**START OF SEASON TRENDS  
(1985-2014)**



**START OF SEASON TRENDS  
(1995-2014)**

**START OF SEASON TREND BY  
LIVELIHOOD ZONE (1995-2014)**

Source: Seasonality analysis using data from CHIRPS, processed by OSZAF (Vulnerability Analysis and Mapping Service, World Food Programme)



# FUTURE CLIMATE



Projections of future climate change in Timor-Leste are associated with large uncertainties due to lack of historical data and the highly complex topography. However, in general climate models show that Timor-Leste will experience major increases in both temperature and rainfall which could have significant implications for livelihoods and food security.<sup>8</sup>

Key trends under a changing climate include:

- ✓ Large decreases in rainfall over most of the country except in Oecussi and the westernmost parts of Bobonaro leading to potentially more intense droughts and higher water stress. This trend highlights the need to identify shorter-season crops to ensure livelihood security. Projections suggest potential decreases in rainfall in the southwestern coast which may be linked to shifts in rainfall patterns during the second rainy season, potentially resulting in lower productivity of crops grown during the second season.
- ✓ More frequent large rainfall events over the western coast and coastal Oecussi, likely associated with more severe flooding.
- ✓ Increases in maximum temperature of approximately 1 to 2 degrees Celsius, especially in the southern regions. This will be accompanied by an increased in average daily temperatures. A combination of higher average and extreme could also affect crop health and livestock.

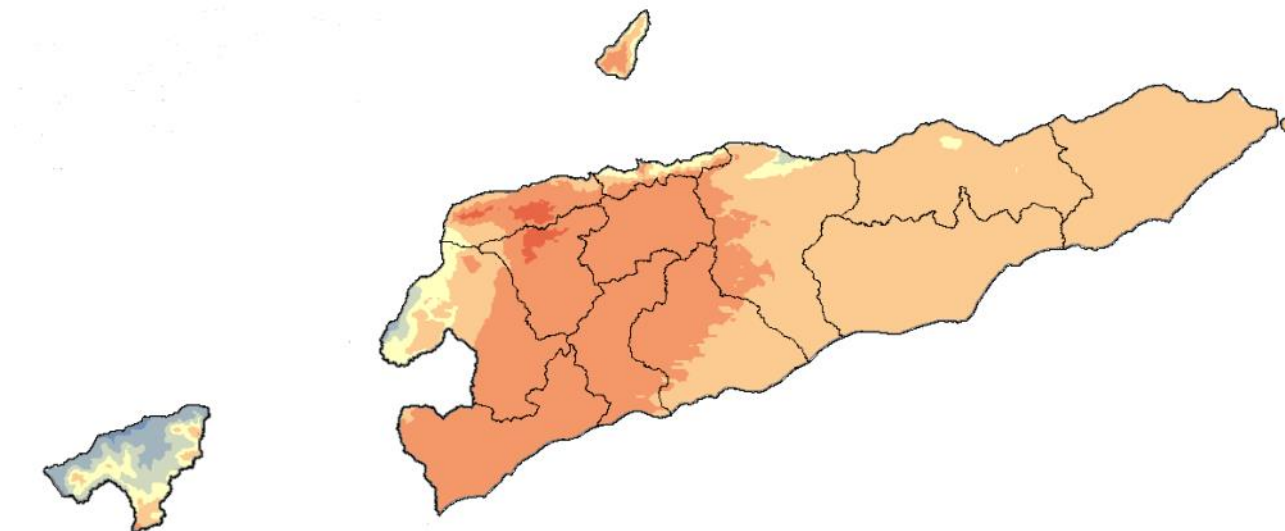
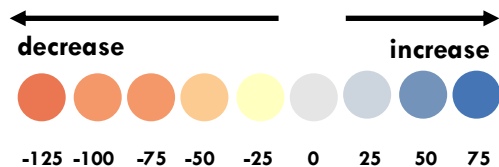
The combination of these trends will also have an effect on the magnitude of droughts (with more intense, longer droughts) and floods (more severe floods occurring during the monsoon months).

<sup>8</sup> IPCC (2013) Fifth Assessment Report. Cambridge: Cambridge University Press.



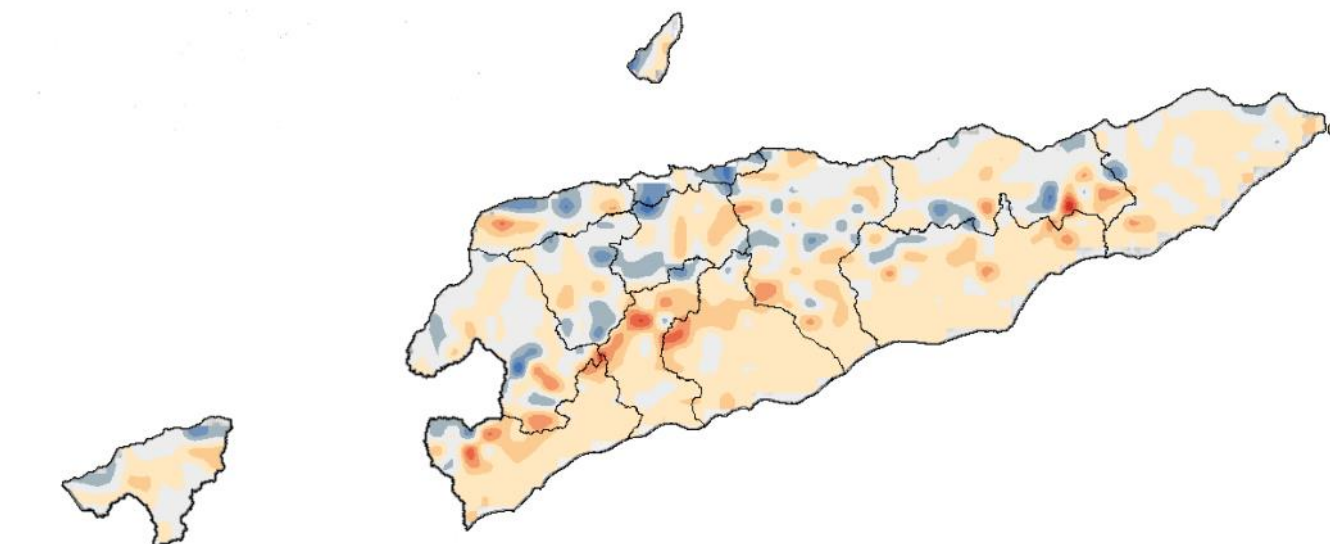
## PROJECTED CHANGES IN RAINFALL (2050, MILLIMETERS)

Source: Based on IPCC Fifth Assessment Report WGI findings. Data available from WorldClim.



## PROJECTED CHANGES IN TEMPERATURE (2050, DEGREES CELSIUS)

Source: Based on IPCC Fifth Assessment Report WGI findings. Data available from WorldClim.





# CROP SUITABILITY



Changes in temperature and rainfall will also affect the suitability of key crops—particularly rainfed paddy, coffee, maize, and cassava.<sup>9</sup>

Paddy practices in Timor-Leste are diverse with some communities depending exclusively on rainfall, while others depend on irrigation from major rivers and other water bodies, and others plant it on sloping lands. It is therefore difficult to assess with certainty the potential impacts of climate change on paddy production. However, model evaluations suggest that increases in precipitation would be largely beneficial to paddy production, especially in Oecussi. In other parts of the country, changes in the onset of the rainy season would affect suitability for traditional paddy varieties, especially in the western lowlands, the northern irrigated zone, and most of the southern coastal areas.

Increases in both temperature and rainfall would reduce suitability for coffee production in the Central Highlands and the southern coffee producing zones. As coffee production is the primary livelihood and a key economic driver in the region, decreases in suitability would have significant impacts on populations.

Suitability in maize will likely be compromised in the western regions, where the greatest decreases in rainfall are projected. In the absence of adaptation measures, maize production would be affected by extremely dry conditions.

Cassava, a key source of food and income for communities across the country will likely be affected by increases in temperature, particularly in the southern lowland zones.

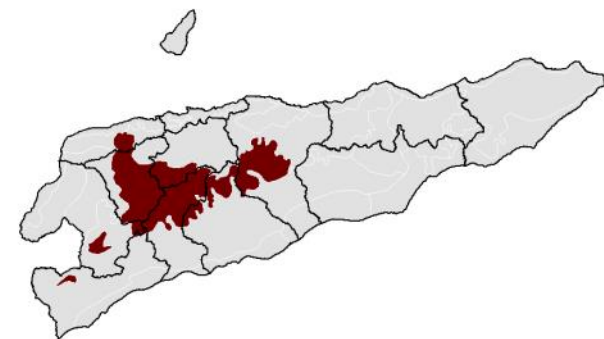
---

<sup>9</sup> IIASA/FAO (2012) [Global Agro-Ecological Zoning, GAEZ3.0](#). Laxenburg/Rome: IIASA/FAO.

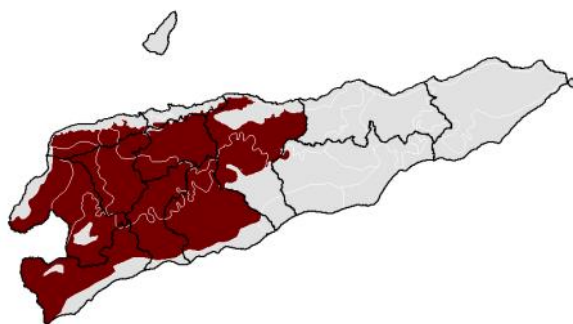
## PADDY



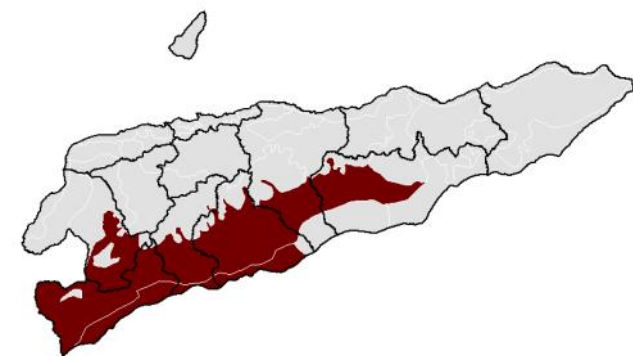
## COFFEE



## MAIZE



## ROOT CROPS



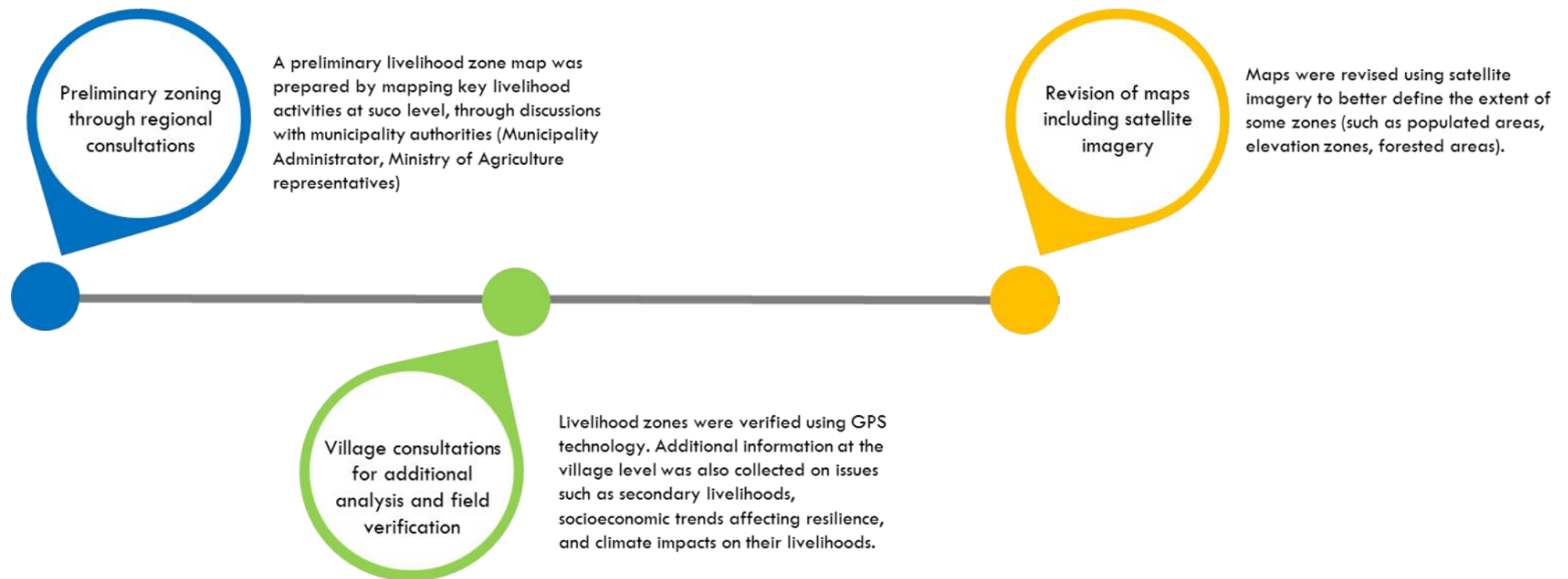
**LIVELIHOOD ZONE CURRENTLY  
ENGAGING IN CROP PRODUCTION  
WHICH MAY EXPERIENCE DECLINES IN  
CROP SUITABILITY, BY CROP TYPE**



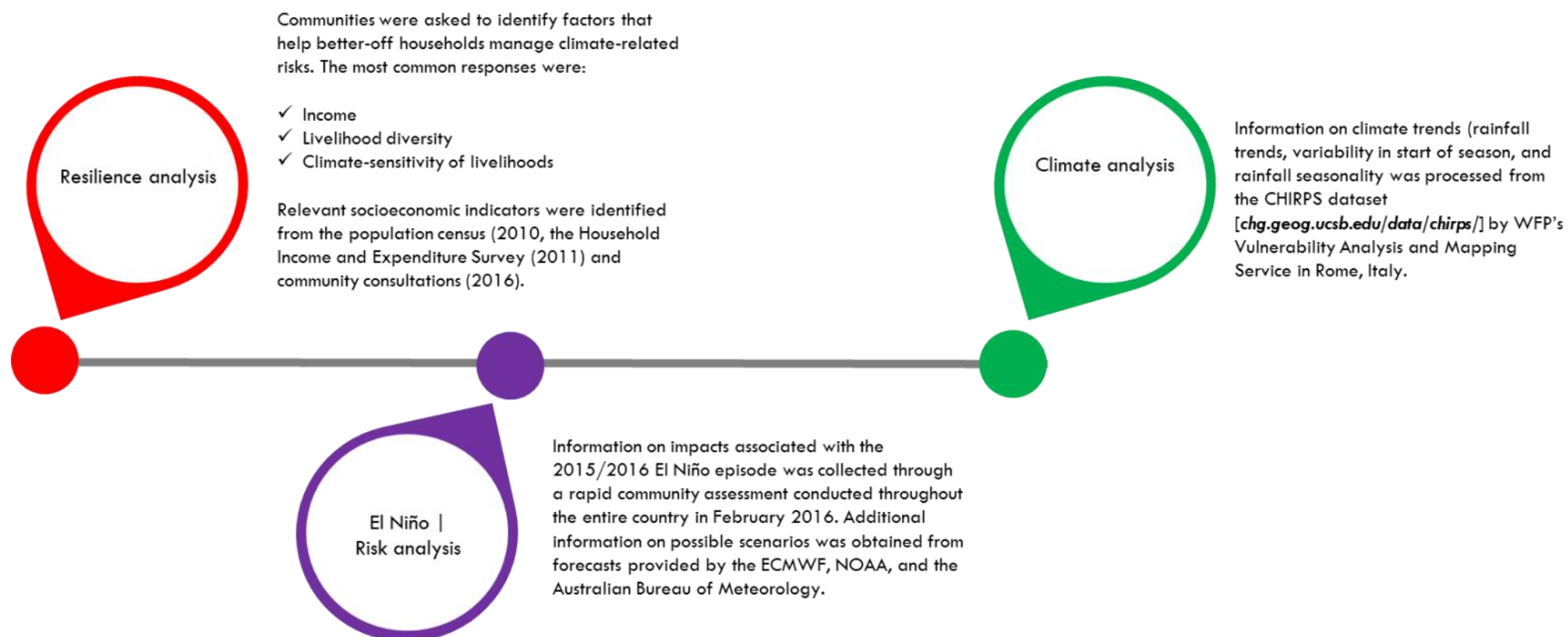
**LIVELIHOOD ZONE CURRENTLY  
ENGAGING IN CROP PRODUCTION  
WHICH MAY EXPERIENCE INCREASES IN  
CROP SUITABILITY, BY CROP TYPE**

Source: Based on the Land Use Suitability  
Evaluation Tool (LUSET) developed by IRRI

# ANNEX | METHOD: Livelihood mapping



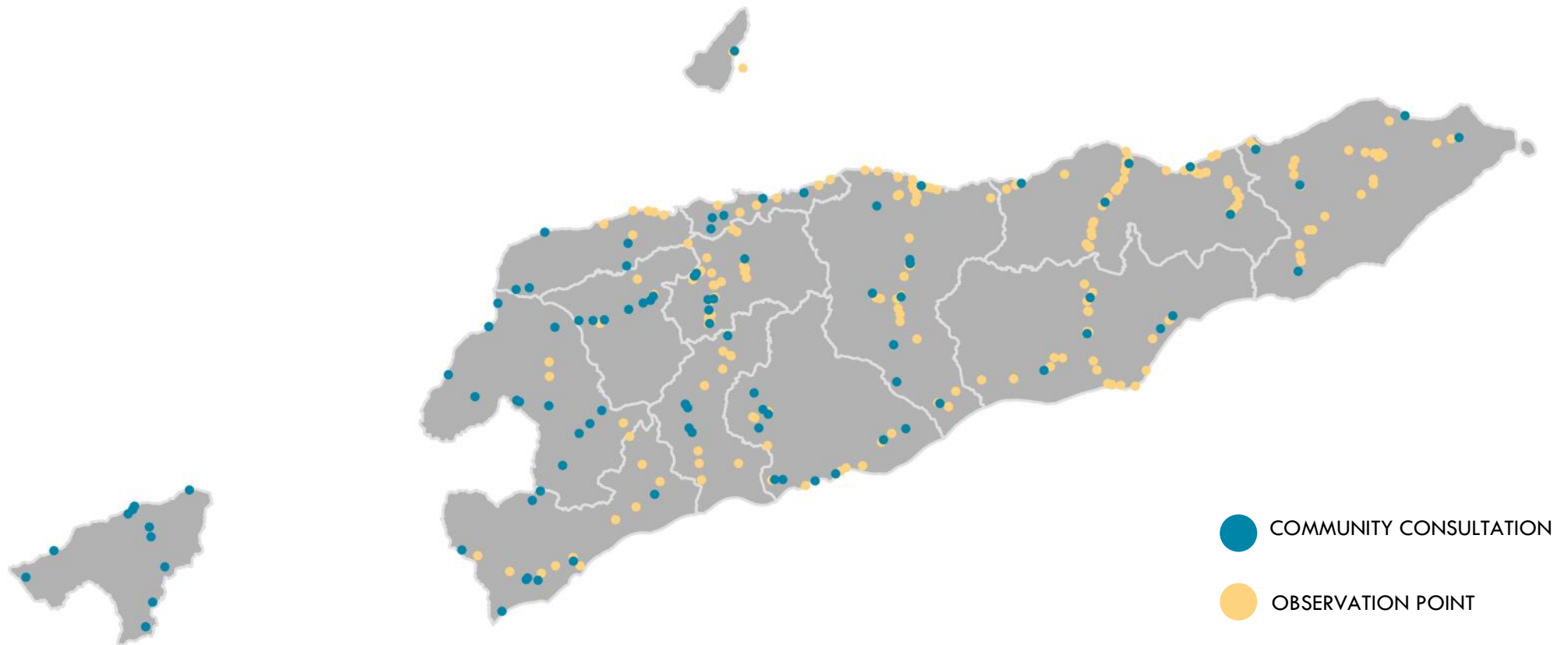
# ANNEX | METHOD: Analysis



\* Software used for the mapping exercise: ArcGIS 10.2.2



# ANNEX | METHOD: Areas sampled



\* Sampling: 98 village consultations carried out and 267 observation points collected. Villages were sampled based on topographical differences, proximity to rivers and other geographical features, and different remoteness to capture as much diversity as possible.

# ANNEX | METHOD: Resilience analysis



**INCOME** | Data from the 2011 Household Income and Expenditure Survey were used to map income patterns across livelihood groups. The analysis was corroborated by information from the 2013 ADB Least Developed Sucos project. Information from these two sources was aggregated at livelihood zone level to identify livelihood zones with greatest and lowest incomes. Ranking from 1 (lowest income) to 4 was allocated based on quartiles of mean income levels.



**LIVELIHOOD DIVERSITY** | Livelihood diversity was quantified based on field observations and corroborated by agricultural production statistics from the 2010 population census. The livelihood diversity maps indicate the overall trend for the zone: within a zone there may be communities that engage in more—or less—diverse livelihoods. Ranking from 1 (least diverse) to 4 was allocated based on the average number of activities households engage in.



**CLIMATE SENSITIVITY** | Climate sensitivity was mapped according to crop sensitivity to climate variability (changes in rainfall and/or temperature conditions) according to the Global Agro-ecological Zones (GAEZ3.0) analysis prepared by IIASA and FAO. Ranking from 1 to 4 is as follows, from most sensitive to least: paddy, maize, cassava, sweet potato, other root crops, coffee, fruits (see below).



Paddy



Maize  
Cassava



Sweet potato  
Other root crops  
Coffee  
Fruits  
Livestock



Tourism  
Urban activities



**CLIMATE RESILIENCE** | Climate resilience is calculated by adding the ranking values of each indicator.

# ANNEX | LIVELIHOOD PROFILES

## ATAURO LARGE-SCALE FISHING, AGRICULTURE & TOURISM



**KEY ACTIVITIES** | Fishing, upland agriculture (maize, cassava) and tourism

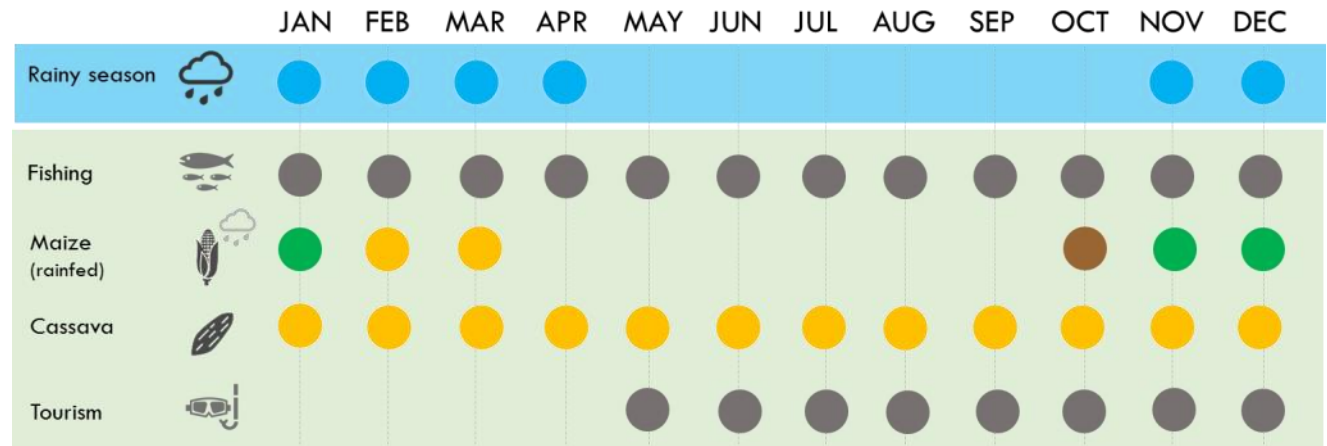
**POPULATION (APPROXIMATE)** | 7,500

The communities of Atauro Island are known for their fishing skills, and fish sales (particularly in Dili and areas surrounding the capital city) are the main source of income in this zone.

Communities also engage in small-scale maize and cassava production to supplement their diets. Agricultural activities are primarily confined to the upland areas.

An increasingly important source of revenue is tourism, mostly as day-trips from Dili. Though tourism is possible in different parts of the year, the peak season coincides with the dry months and the dolphin and whale migration in the Wetar Strait.

## SEASONAL CALENDAR



planting



growing



harvest



other non-agricultural activities

## KEY HAZARDS



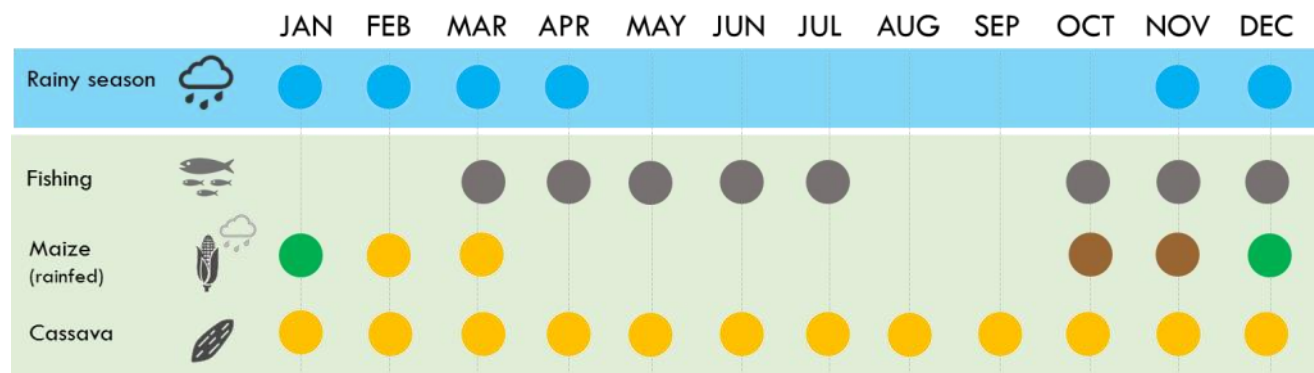
Landslides (impact on maize production)

# LIVELIHOOD PROFILES

## NORTHERN COASTAL AGRICULTURE & FISHING



## SEASONAL CALENDAR



**KEY ACTIVITIES** | Maize, cassava, fishing

**POPULATION (APPROXIMATE)** | 105,000

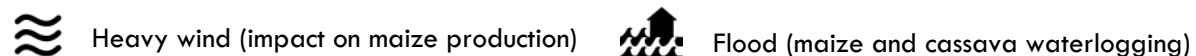
Along the northern coastal areas of the country, communities engage in small-scale agricultural production, primarily producing maize and cassava, and fishing. Fishing provides the bulk of household income, allowing households to procure more preferred food items, such as rice and vegetables.

Maize and cassava production is limited. The crops are mostly produced to supplement diets and are consumed by the households.

Given the proximity to Dili, some communities engage in temporary construction work, including roads and other infrastructure.



## KEY HAZARDS





# LIVELIHOOD PROFILES

## CENTRAL HIGHLANDS



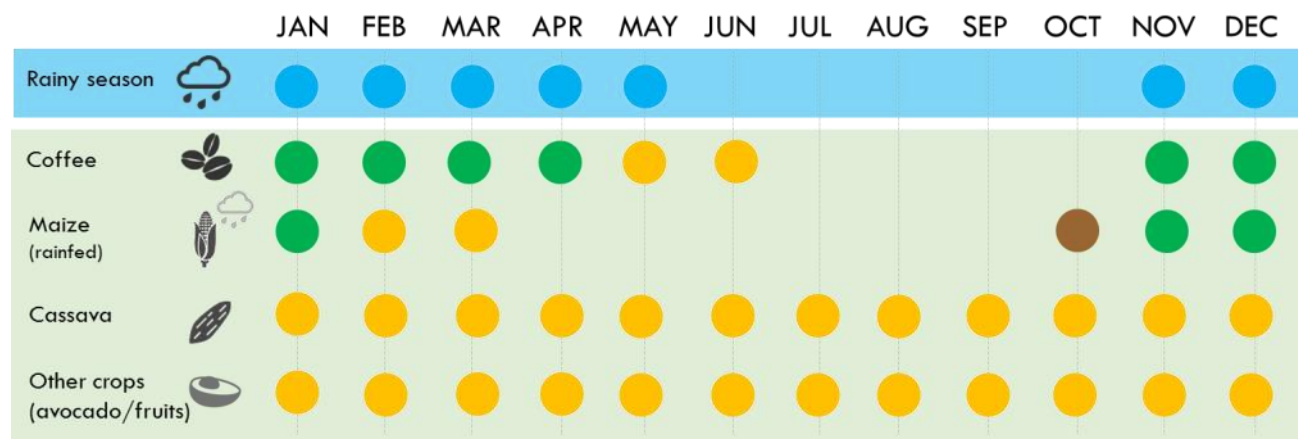
**KEY ACTIVITIES** | Coffee, maize, cassava; more diversified households also grow avocado and fruit.

**POPULATION (APPROXIMATE)** | 140,000

Coffee production is one of the key cash crops in the country, and the dominant livelihood activity for communities living in the Central Highlands, where the cooler climate benefits coffee plantations. To ensure quality, communities have also planted *samtuco* trees which offer shade and protection from the sun. This area is also the main coffee producing region of the country, though minor coffee-producing zones are found elsewhere.

In addition to coffee, communities often supplement their livelihoods with maize and cassava cultivations. Some communities, particularly in the eastern part of the zone also grow avocados and fruits to supplement their income.

## SEASONAL CALENDAR



 planting

 growing

 harvest

## KEY HAZARDS



Landslides (impact on maize production and on coffee plantations)

# LIVELIHOOD PROFILES

## SOUTHERN COFFEE



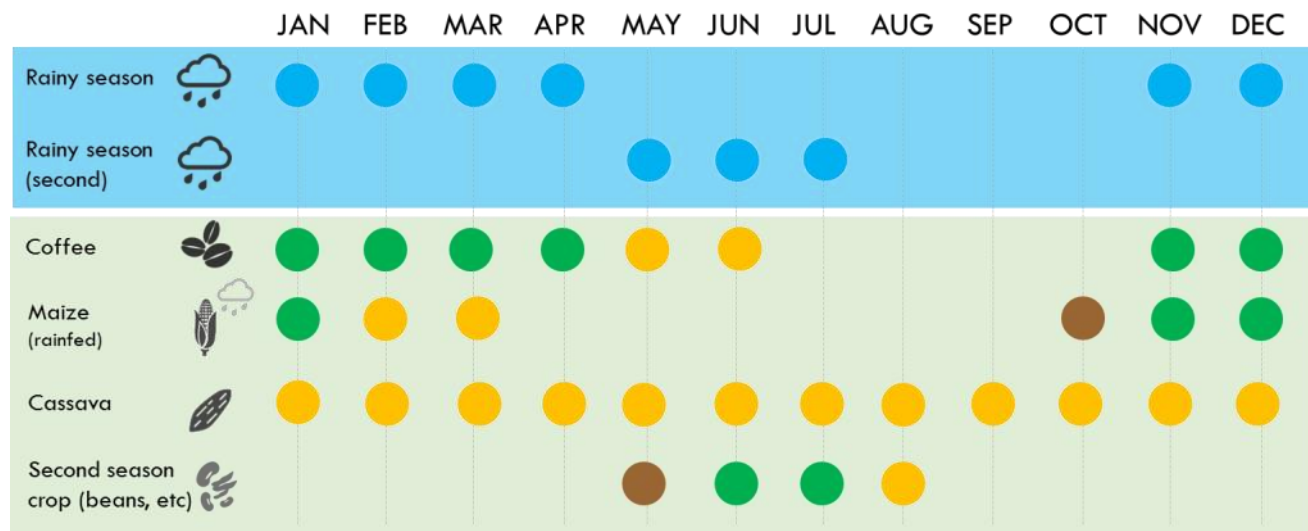
**KEY ACTIVITIES** | Coffee, maize, cassava, beans and other second season crops

**POPULATION (APPROXIMATE)** | 4,000

A second, smaller coffee-producing region is located in the highlands of the southern region where cooler climates allow for coffee production. As with the large coffee producing zone of the Central Highlands, *samtuco* trees provide shade and protection to ensure good quality production. Coffee, the main source of income in this zone, is grown in combination with maize and cassava.

The key difference between the Central Highlands and the southern coffee zone is the second wet season which allows for the production of cash crops, primarily red beans and kidney beans, in the latter zone.

## SEASONAL CALENDAR



planting



growing



harvest

## KEY HAZARDS



Landslides (impact on maize production)

# LIVELIHOOD PROFILES

## NORTHERN UPLAND AGRICULTURE



**KEY ACTIVITIES** | Maize, cassava

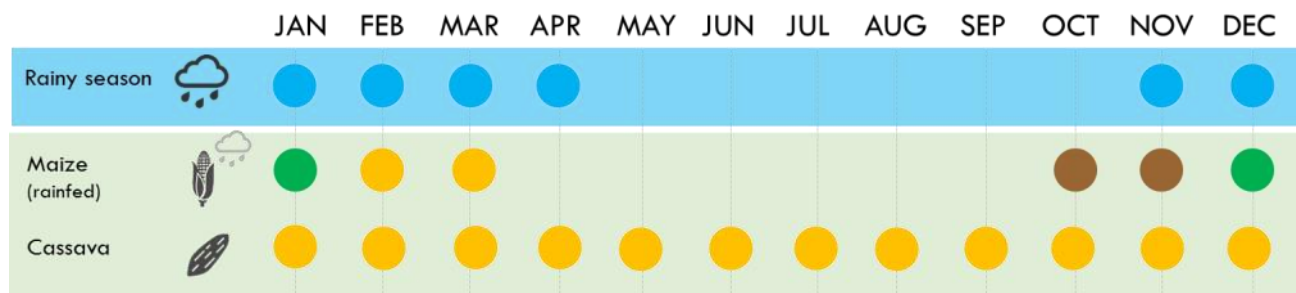
**POPULATION (APPROXIMATE)** | 110,000

The northern upland agriculture zone is located in the transition between the northern coastal areas and the Central Highlands.

Home to over 110,000 people, this zone is among the least diversified in Timor-Leste, mainly engaging in maize and cassava production.

Production of other crops is limited given the rugged terrain and acidic, sandy clay soils which can prevent crop growth. However, a limited number of communities have diversified their livelihoods through bean and peanut production or through casual labour.

## SEASONAL CALENDAR



planting



growing



harvest

## KEY HAZARDS



Flood (maize and cassava waterlogging)

# LIVELIHOOD PROFILES

## WESTERN LOWLAND AGRICULTURE



**KEY ACTIVITIES** | Paddy, maize

**POPULATION (APPROXIMATE)** | 90,000

Comprising the Nunura Plains in the municipality of Bobonaro and surrounding areas, the western lowland agriculture zone is the main paddy producing zone in the country. This zone is among the least diversified but flat lands and fertile soils result in higher productivity than in other parts of the country.

In addition to paddy, communities also grow maize. Traditionally, the beginning of maize production coincides with the rainy season whereas paddy production occurs towards the end of the rainy season when fields are inundated, allowing for paddy production. Access to irrigation (from rivers) is comparatively better than in other regions, allowing some communities to grow a second maize crop after the paddy harvest.

## SEASONAL CALENDAR



planting



growing



harvest

## KEY HAZARDS



Flood (destruction of irrigation canals, waterlogging of maize)



# LIVELIHOOD PROFILES

## NORTHERN IRRIGATED AGRICULTURE



**KEY ACTIVITIES** | Paddy, maize

**POPULATION (APPROXIMATE)** | 15,000

The main irrigated agriculture area in the northern part of the country, this area is one of the key paddy zones (along with the western lowland agriculture zone). Good access to irrigation water (from rivers) and relatively flat land provide ideal conditions for two paddy crops: the first coinciding with the rainy period, and the second immediately thereafter.

Maize production, especially in sloping lands, also supplement livelihoods in this area.

In the absence of rainwater, water available from rivers may not be sufficient to sustain agriculture, whereas excessive rainfall may damage the basic irrigation canal systems.

## SEASONAL CALENDAR



● planting

● growing

● harvest

## KEY HAZARDS



Flood (destruction of irrigation canals, waterlogging of maize)



Dry conditions (impact on water availability for agriculture)

# LIVELIHOOD PROFILES

## NORTH-CENTRAL UPLAND AGRICULTURE



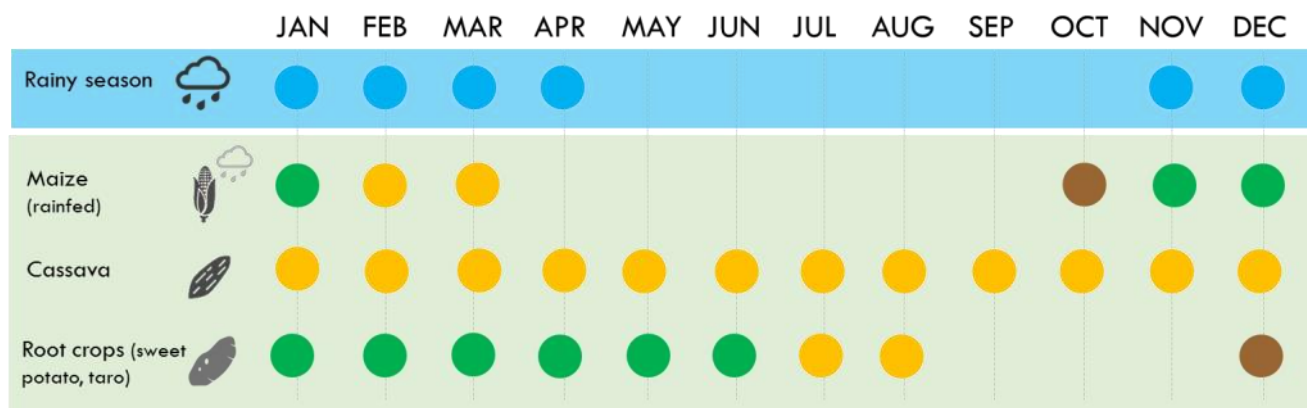
**KEY ACTIVITIES** | Maize, cassava, and root crops (sweet potato, taro)

**POPULATION (APPROXIMATE)** | 15,000

The north-central upland agriculture zone is slightly more diversified than other upland agricultural areas due to the cultivation of root crops – primarily sweet potato and taro – which supplement rice– and corn-based diets. Root crops also provide additional income.

Maize and cassava are the main cultivars. Maize is primarily grown throughout the wet season while cassava is harvested throughout the entire year as a result of innovative root management techniques (communities harvest most of the starchy root but keep some in the ground so it can be harvested in later months. In the dry months and in stress periods, some communities collect wild foods (*kumbili*) to complement starchy meals.

## SEASONAL CALENDAR



planting

growing

harvest

## KEY HAZARDS

Landslides (impact on maize production)

# LIVELIHOOD PROFILES

## NORTHERN FRUIT PRODUCTION



**KEY ACTIVITIES** | Fruit production (jackfruit, breadfruit, pineapple), maize; other cash crops include tobacco, peanuts and candlenut

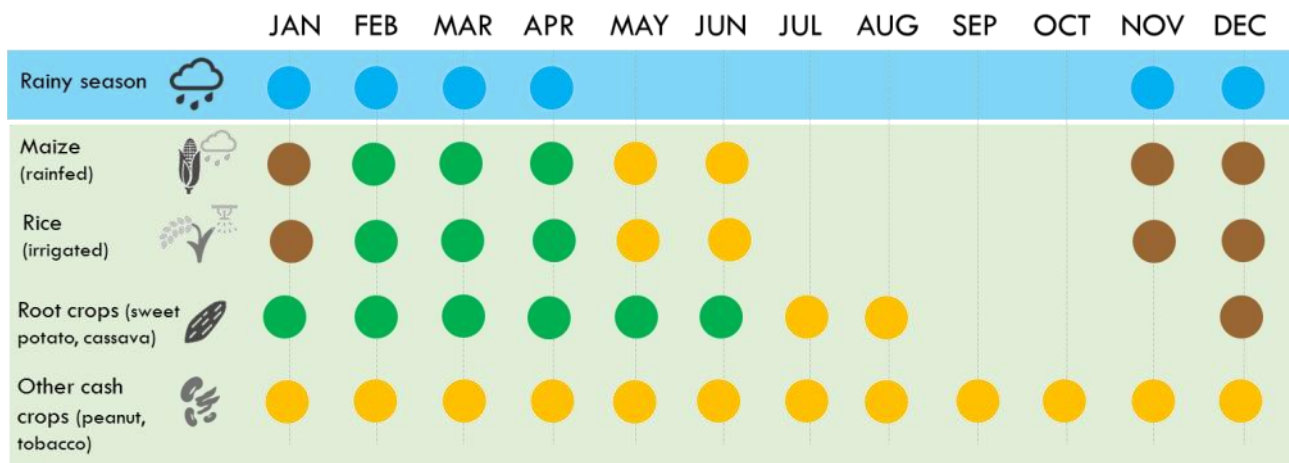
**POPULATION (APPROXIMATE)** | 56,000

The northern fruit production zone mainly consists of fertile clay soils, and receives good rains. The cooler and wetter conditions in the uplands are favourable for fruit production (jackfruit, breadfruit, pineapple), which provide the main source of income for several communities.

Maize is the main subsistence crop along with cassava. Irrigated paddy, along with coconuts and palms can be found in the lowlands.

Some communities also supplement their income with cash crops such as tobacco, candlenut, and peanut production in the higher areas.

## SEASONAL CALENDAR



● planting

● growing

● harvest

## KEY HAZARDS



Flood (maize and cassava waterlogging)



Landslides (impact on maize production)

# LIVELIHOOD PROFILES

## NORTHEASTERN UPLAND AGRICULTURE & HORTICULTURE



**KEY ACTIVITIES** | Maize, cassava, horticultural crops including pumpkins and tomatoes

**POPULATION (APPROXIMATE)** | 46,000

The northeastern upland agriculture zone is characterized by fertile soils which allow for horticulture in the higher areas. The key defining livelihood activity in this zone is the higher reliance on horticultural crops such as pumpkins and tomatoes which can be produced throughout the whole year.

Other key livelihood activities include maize and cassava production which mostly contribute to household consumption.

This zone is in the transition between primarily crop-based livelihood zones and predominantly livestock-oriented zones.

## SEASONAL CALENDAR



planting



growing



harvest

## KEY HAZARDS



Flood (destruction of irrigation canals, waterlogging of maize)

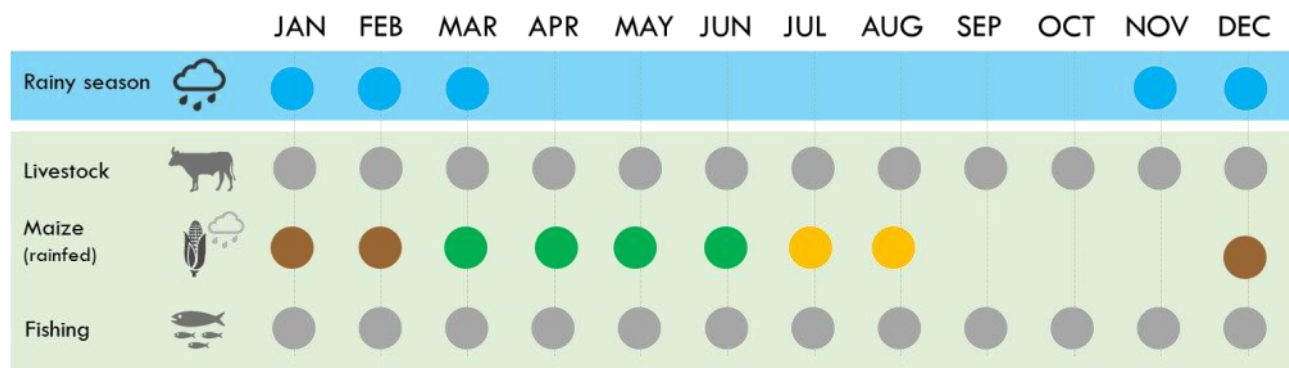


# LIVELIHOOD PROFILES

## NORTHEASTERN COASTAL AGRICULTURE & LARGE-SCALE LIVESTOCK



## SEASONAL CALENDAR



**KEY ACTIVITIES** | Livestock rearing, maize, fishing

**POPULATION (APPROXIMATE)** | 2,000

The dominant characteristic of the eastern livelihood zones is the high reliance on livestock sales. Similar to Oecussi, livestock ownership is much higher than in other parts of Timor-Leste, and the main source of income is often from livestock sales. Key livestock include buffalo and goats. Buffalo, in particular, are highly sensitive to heat and water scarcity.

The northeastern coastal agriculture & large-scale livestock zone comprises a relatively small area and consists of the northern coastal strip in Lautem. The key livelihood activities are livestock rearing – which occurs throughout the year, maize – which is grown during the rainy months, and fishing.



planting



growing



harvest



other agricultural activities

## KEY HAZARDS



Flood (maize waterlogging)



Dry conditions (impact on water availability for livestock)

# LIVELIHOOD PROFILES

## EASTERN AGRICULTURE & LARGE SCALE LIVESTOCK



**KEY ACTIVITIES** | Livestock rearing, maize

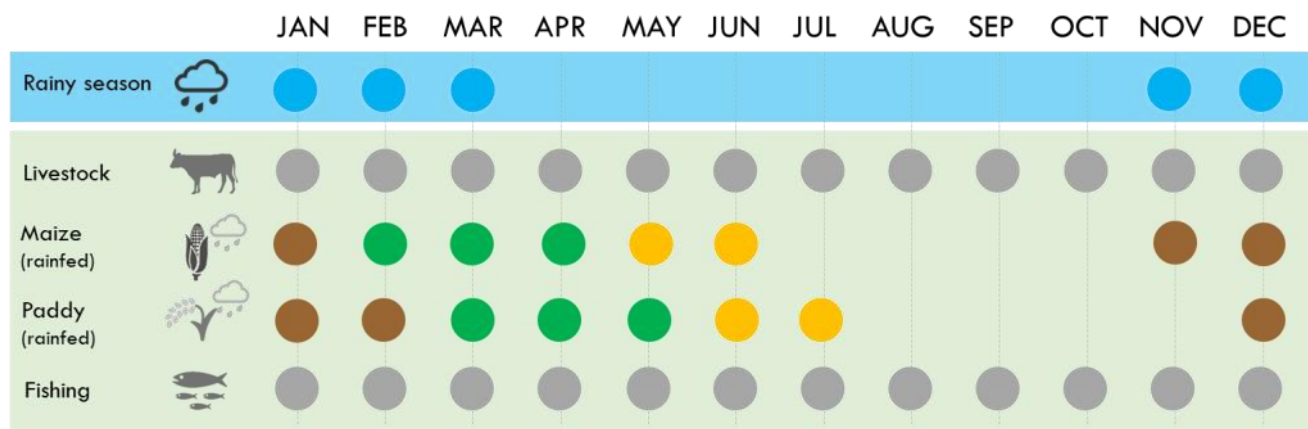
**POPULATION (APPROXIMATE)** | 66,000

The eastern agriculture & large-scale livestock zone contains predominantly acidic soils limiting agricultural production. Livestock rearing is the main activity in this zone, providing the majority of income. Livestock mainly consist of buffalo and pigs.

However, the relatively good rains in this area (together with an increase in rainfall in recent years) and the flat lands allow for maize production. This is the main maize-producing region in the country with households owning, on average, up to five times more land for maize than households in other parts of the country.

Small-scale fishing is possible in the lake near Mehara, but only a few communities engage in this practice.

## SEASONAL CALENDAR



planting



growing



harvest



other agricultural activities

## KEY HAZARDS



Flood (destruction of irrigation canals, waterlogging of maize)

# LIVELIHOOD PROFILES

## SOUTHEASTERN COASTAL AGRICULTURE & LARGE SCALE LIVESTOCK



**KEY ACTIVITIES** | Livestock rearing, irrigated paddy, maize. Some communities engage in small-scale fishing.

**POPULATION (APPROXIMATE)** | 45,000

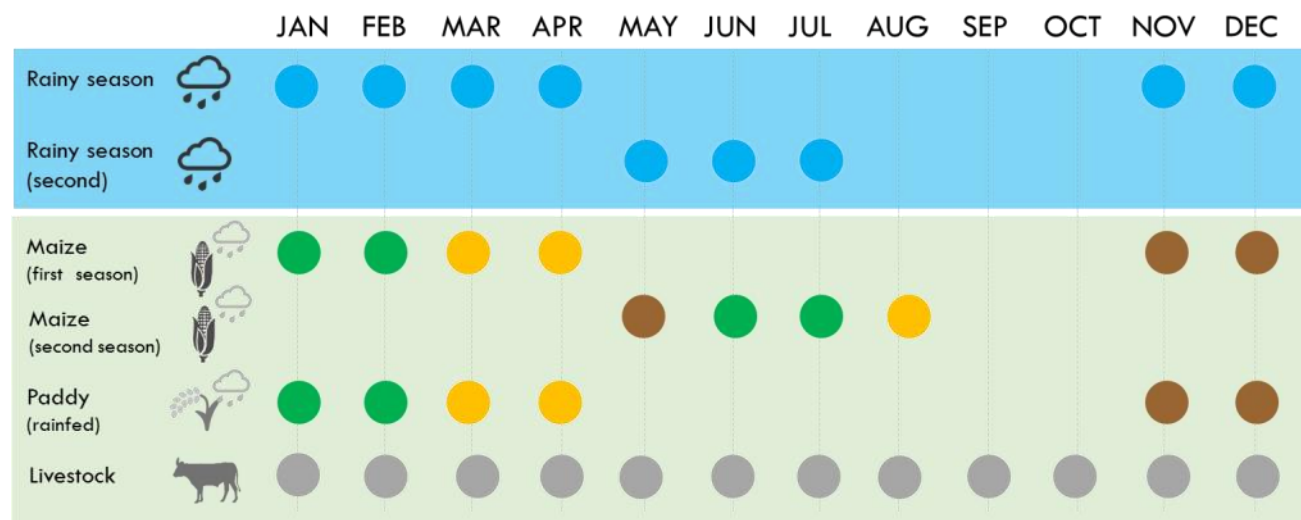
The southeastern coastal agriculture zone is characterized by relatively poor soils. Two maize crops are possible as a result of the second rainy season.

A large network of rivers also facilitates localized irrigated paddy production.

Livestock rearing is a key livelihood activity and provides income throughout the year.

This is one of the few zones in the country that experiences heavy wind damage from tropical cyclones.

## SEASONAL CALENDAR



● planting

● growing

● harvest

● other agricultural activities

## KEY HAZARDS



Flood (maize and cassava waterlogging)



Cyclones (damage to maize)

# LIVELIHOOD PROFILES

## SOUTHEASTERN AGRICULTURE & LARGE SCALE LIVESTOCK



**KEY ACTIVITIES** | Livestock rearing, maize, cassava, beans, pumpkins

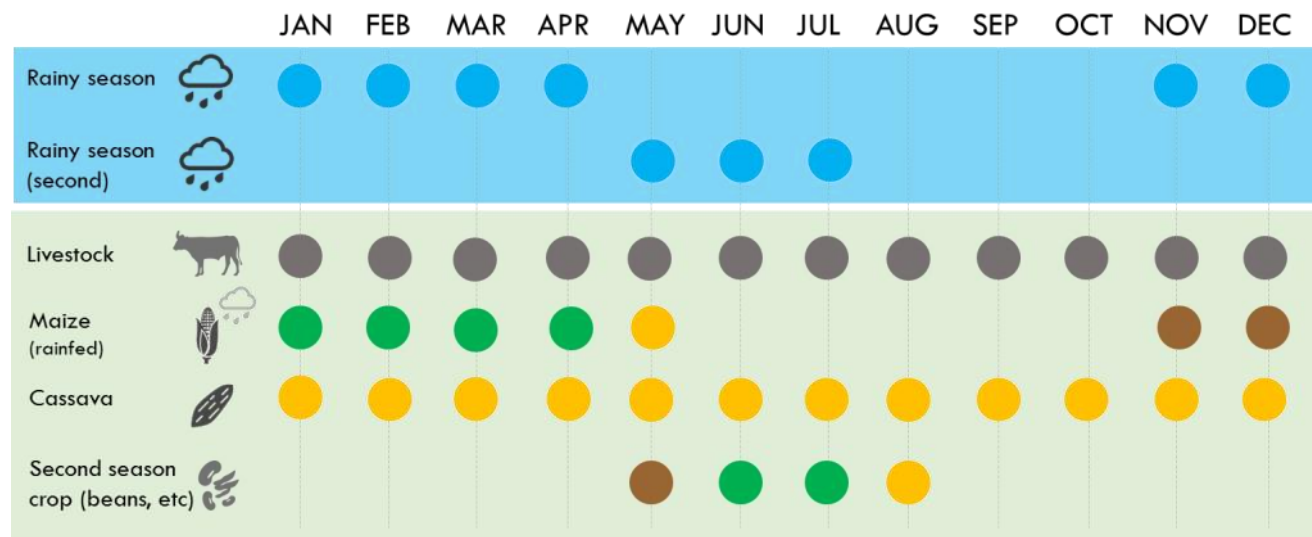
**POPULATION (APPROXIMATE)** | 11,000

As with other eastern regions, livestock rearing is the dominant activity in the southeastern agriculture & large-scale livestock zone.

The zone, consisting mostly of limestone acidic soils, was traditionally a paddy-producing region. Increasingly limited water availability has forced communities to shift their primary crop, from paddy to maize. Cassava is also grown throughout the year.

Communities supplement their livelihoods by cultivating vegetables, pumpkins and beans, which not only increase dietary diversity but also provide additional income.

## SEASONAL CALENDAR



planting



growing



harvest



other agricultural activities

## KEY HAZARDS



Dry conditions (impact on water availability for crops and livestock)



# LIVELIHOOD PROFILES

## SOUTHERN COASTAL AGRICULTURE



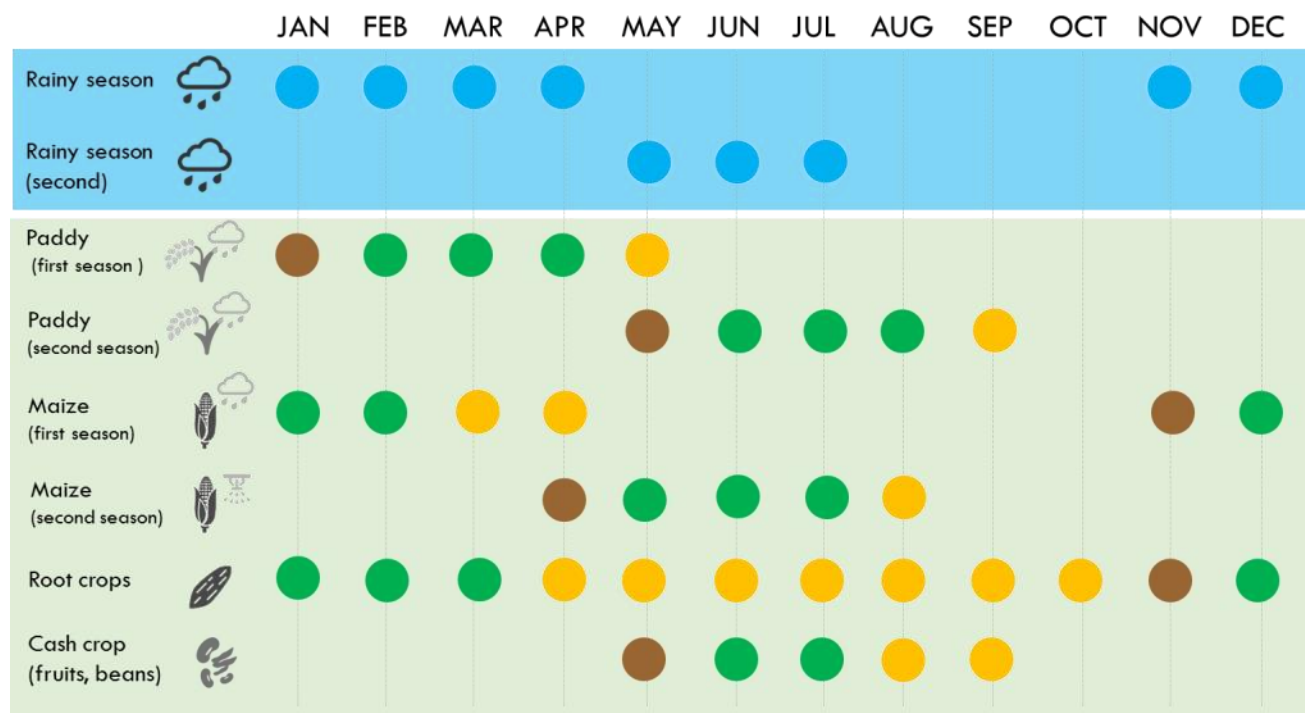
**KEY ACTIVITIES** | Maize, paddy, cassava, second season crops (beans, fruits), small-scale fishing

**POPULATION (APPROXIMATE)** | 40,000

Southern zones are generally more diversified than those in the northern parts of the country as the second wet season provides water until July, allowing for production of other crops.

In the southern coastal agriculture zone, the main crops are the staple crops of maize, paddy, and cassava. Two crops of maize and cassava are typically grown. Households also grow a cash crop in the second wet season including, for instance, watermelons (particularly in the Tilomar region) and beans. These provide a substantial source of income to communities. A small number of communities also engage in fishing, though the strong waves in the southern coast limit fishing potential.

## SEASONAL CALENDAR



● planting

● growing

● harvest

## KEY HAZARDS



Flood (maize and cassava waterlogging)

# LIVELIHOOD PROFILES

## SOUTHERN UPLAND AGRICULTURE



**KEY ACTIVITIES** | Paddy, maize, root crops, cash crops (beans, fruits), industrial crops (candle nut)

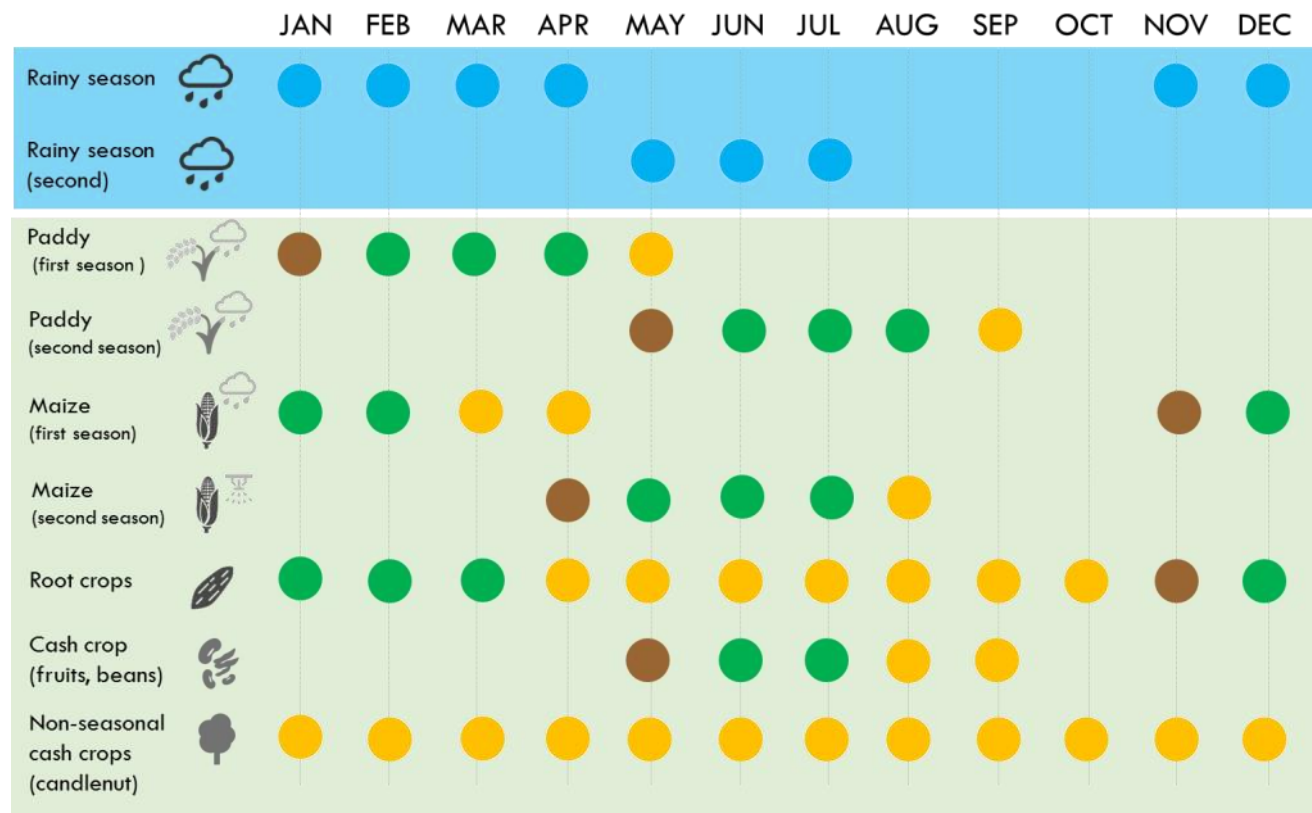
**POPULATION (APPROXIMATE)** | 130,000

The southern upland agriculture zone is one of the most diverse, with communities engaging in a number of activities. Households primarily engage in paddy (mainly in flatter areas) and maize production, and diversify their agricultural activities by growing cassava and other root crops (such as sweet potato, taro and sago).

During the second season season, communities also engage in production of cash crops—primarily mung and kidney beans—as well as fruits.

In some communities, non-seasonal cash crops are also grown due to fertile soils and high rainwater availability. Chimeri (candlenut) trees are relatively common in this zone.

## SEASONAL CALENDAR



● planting

● growing

● harvest

## KEY HAZARDS



Flood (destruction of irrigation canals, waterlogging of maize)



Landslides (impact on maize production)

# LIVELIHOOD PROFILES

## SOUTHERN IRRIGATED AGRICULTURE



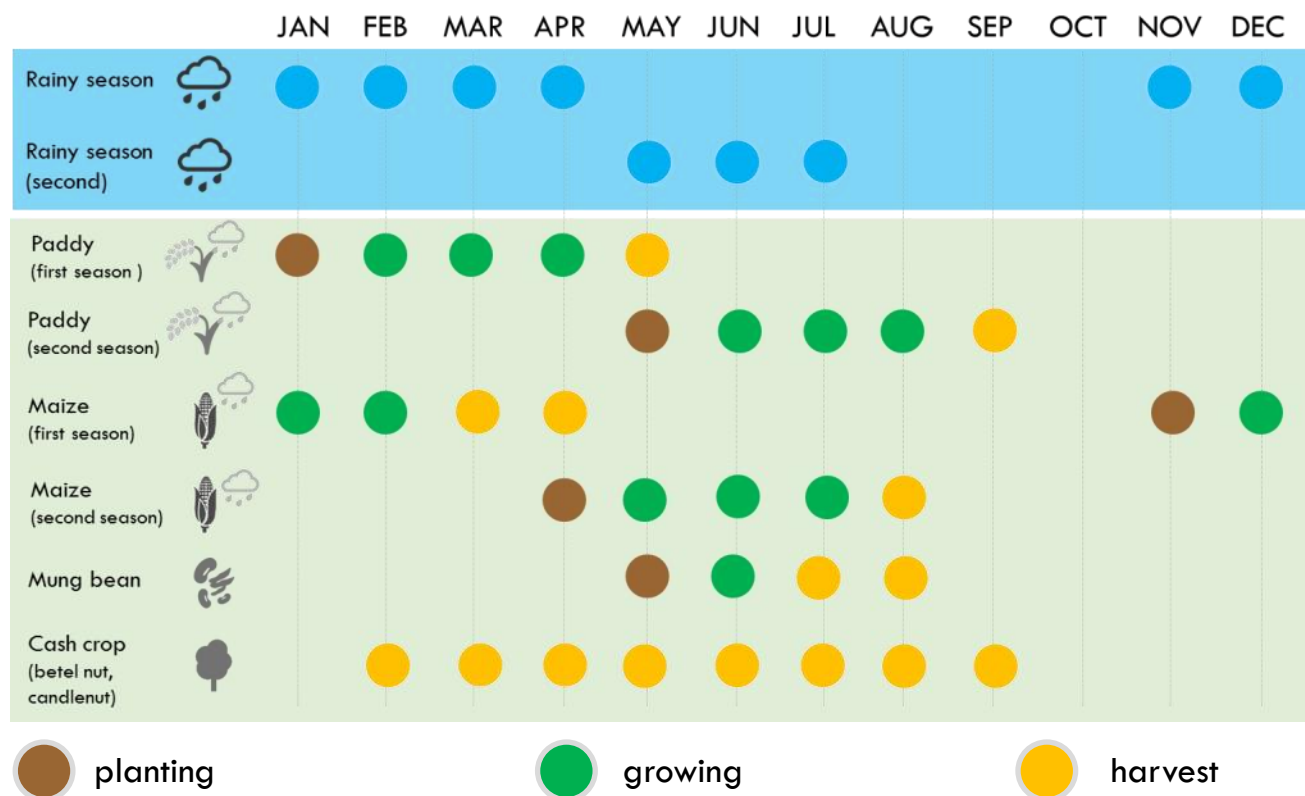
**KEY ACTIVITIES** | Paddy, maize, mung bean, industrial crops (betel nut, candlenut)

**POPULATION (APPROXIMATE)** | 20,000

Fertile, deep and well-watered soils with an extensive river network and two seasons allow for two cropping seasons in the southern irrigated agriculture zone. This zone has high groundwater extraction potential and is suitable for well irrigation, which some communities practice.

Main agricultural activities include paddy and maize production (two crops per year). Communities also produce mung bean, especially during the second rainy season. Increasingly communities are also engaging in production of cash crops such as betel nut and chimeri (candlenut) to supplement their income.

## SEASONAL CALENDAR



## KEY HAZARDS



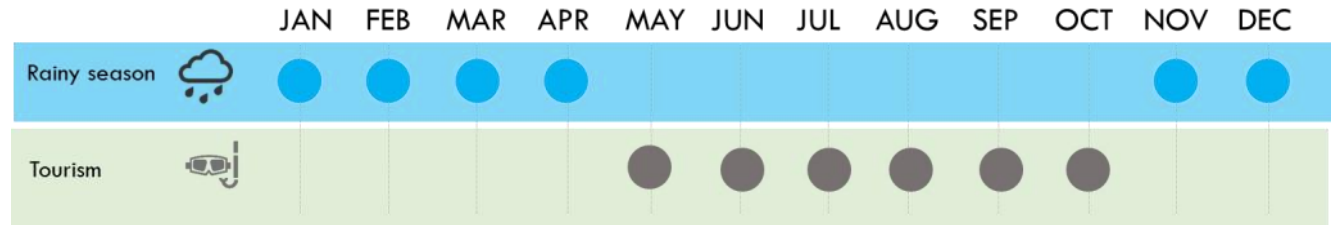
Flood (maize and cassava waterlogging, destruction of irrigation canals)


# LIVELIHOOD PROFILES

## JACO ISLAND TOURISM



## SEASONAL CALENDAR



 peak tourism season

### KEY ACTIVITIES | Tourism

### POPULATION (APPROXIMATE) | 10

Income for this zone, which has no permanent inhabitants, is mainly derived from tourists arriving from Com for day trips to Jaco Island. Fishermen obtain income by transporting tourists. Though tourism is feasible throughout most of the year, the main tourist season coincides with the dry period (May-October).

As no permanent inhabitation is allowed, agricultural activities are non-existent.

### KEY HAZARDS

N/A



# LIVELIHOOD PROFILES

## OECUSSI COASTAL AGRICULTURE & LARGE-SCALE LIVESTOCK



**KEY ACTIVITIES** | Livestock sales, paddy, maize. Some communities engage in small-scale fishing.

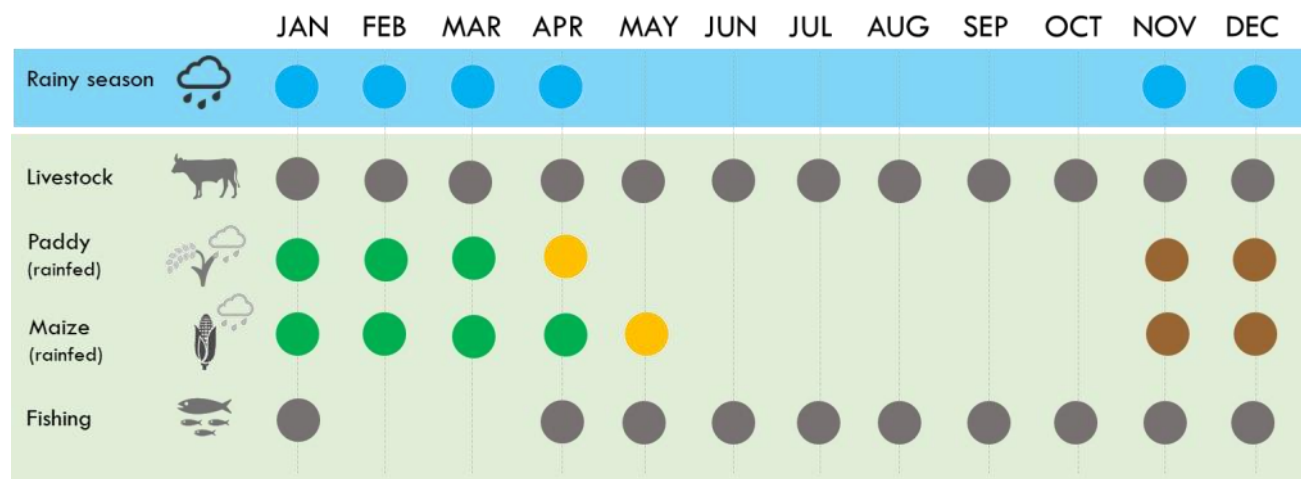
**POPULATION (APPROXIMATE)** | 8,500

Large-scale livestock ownership defines livelihood systems in Oecussi. Poorer households own approximately five cows (compared to two or three in mainland Timor-Leste) whereas wealthier households own around fifty cows. Livestock sales are an important source of income, and allow communities to afford expensive food items imported from Dili or West Timor in Indonesia.

The main agricultural activities revolve around paddy and maize. Irrigation is extremely limited so communities rely on reliable rainfall for their crop production.

Increasingly, communities are resorting to fishing in order to diversify their livelihoods. This, however, is still limited.

## SEASONAL CALENDAR



● planting

● growing

● harvest

● other agricultural activities

## KEY HAZARDS



Flood (maize waterlogging)

# LIVELIHOOD PROFILES

## OECUSSI IRRIGATED AGRICULTURE & LARGE SCALE LIVESTOCK



**KEY ACTIVITIES |** Paddy, maize

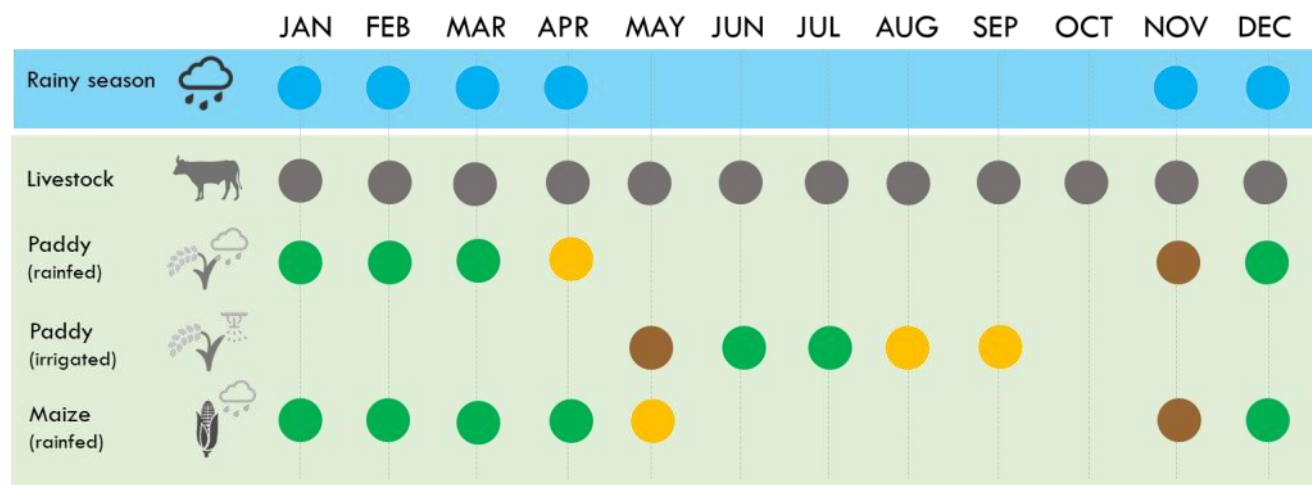
**POPULATION (APPROXIMATE) |** 30,000

The Oecussi irrigated paddy & large-scale livestock zone, located in the irrigated plains, is the most populous zone in Oecussi. Livestock sales are the main source of income.

Access to irrigation water also means that communities spend considerably longer on agricultural activities. Two paddy crops are typically grown: one during the main rainy season, and the second one immediately after when the fields are still flooded. Maize is also widely practiced by communities in this zone.

After receiving the status of Special Economic Zone, large investments have gone into Oecussi. Some of the projects currently being funded include modernization of the irrigation infrastructure which may especially benefit communities in this zone.

## SEASONAL CALENDAR



planting



growing



harvest



other agricultural activities

## KEY HAZARDS



Flood (destruction of irrigation canals, waterlogging of maize)

# LIVELIHOOD PROFILES

## OECUSSI UPLAND AGRICULTURE & LARGE SCALE LIVESTOCK



**KEY ACTIVITIES** | Livestock sales, upland paddy, maize, cassava

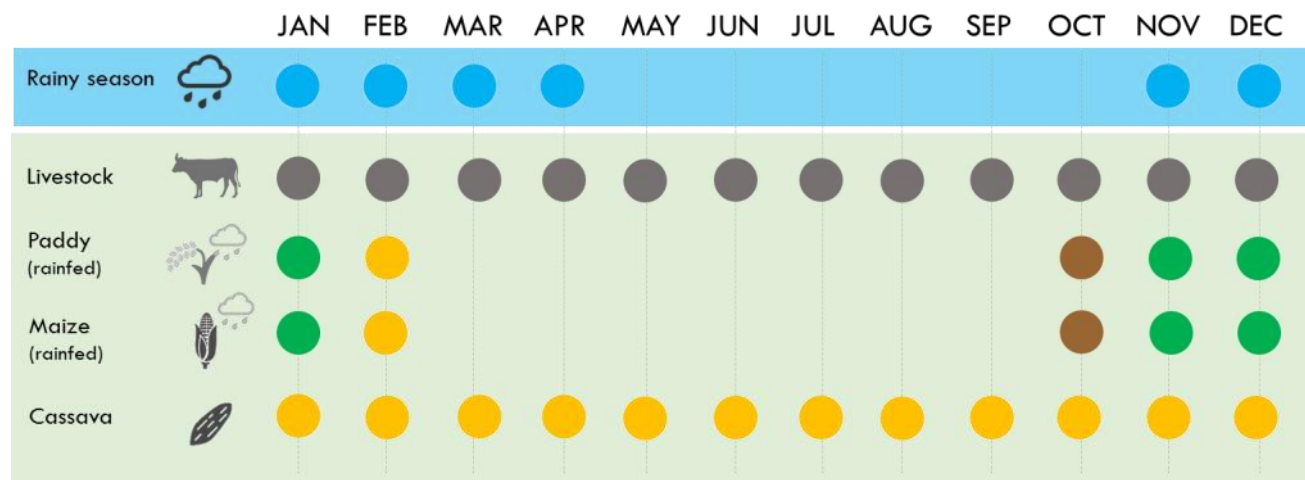
**POPULATION (APPROXIMATE)** | 30,000

Communities in the upland areas of Oecussi typically engage in paddy and maize farming. Along with paddy and maize, cassava is an important food security, providing food for two or three months a year.

This is one of few zones where upland paddy farming is widespread. Upland paddy is less productive than lowland paddy given limited land.

As with the other zones in Oecussi, livestock sales are an important source of income, and ensure that communities are able to purchase food throughout the year. A major shock to livestock (diseases or lack of water) may significantly affect food security in this zone.

## SEASONAL CALENDAR



planting



growing



harvest



other agricultural activities

## KEY HAZARDS



Landslides (impact on maize production)



Dry conditions (impact on water availability for livestock)





# C-ADAPT



## Climate Resilience for Food Security: **ANALYSES, INNOVATIONS & STANDARDS**

The production of this special report has been made possible through the generous contribution of the Government of Sweden through C-ADAPT. The Climate Adaptation Management and Innovation Initiative (C-ADAPT) is an initiative funded by the Government of Sweden's fast-track climate finance that allows WFP and partners to explore innovative climate-induced food insecurity analyses, programmes and best practices, with the goal to help individuals, communities and governments meet their food and nutrition needs under a changing climate.



Made possible through the  
generous contribution of:



**World Food  
Programme**

