



FUNDING PROPOSAL TO THE GREEN CLIMATE FUND

-IRES-CUBA-

**INCREASED CLIMATE RESILIENCE OF RURAL HOUSEHOLDS AND
COMMUNITIES THROUGH THE REHABILITATION OF PRODUCTIVE
AGROFORESTRY LANDSCAPES IN SELECTED LOCALITIES OF THE
REPUBLIC OF CUBA**

APPENDIX 2.5 Socioeconomic Characterization of Implementation Zones

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Glossary

ACPA	Cuban Association of Animal Production
ACTAF	Asociación Cubana de Técnicos Agrícolas y Forestales
AMPP	Municipal Assembly of Popular Power
AMP	Marine Protected Area
ANAP	National Association of Small Farmers
AUSU	Urban and Sub-Urban Agriculture
CAI	Agro Industrial Complex
CAM	Council of Municipal Administration
CCS	Coopertives of Services and Credit
CP	Popular Council
CPA	Cooperative of Animal Production
CREE	Center for the Reproduction of Entomophages and Entomopathogens
EMNDC	National General Staff of Civil Defense
ENPPFF	National Company for the Protection of Flora and Fauna
FMC	Cuban Women Federation
ha	Hectare
INHR	National Institute of Hydraulic Resources
INSMET	Institute of Meteorology
kg	Kilogram
km	Kilometer
LABIOFAM	Biopharmaceutical Laboratories
m	Meter
m²	Square Meter
m³	Cubic Meter
Mm³	Thousands of cubic meters
MINAG	Ministry of Agriculture
OACE	Organizations of the Central State Administration
ONEI	National Office of Statistics and Information
OSDE	Superior Body of Economic Management
PCC	Communist Party of Cuba
RF	Wildlife Refuge
SNAP	National System of Protected Areas
t	Ton
TCP	Own Account Work
UBPC	Basic Units of Cooperative Production

Executive Summary

This report collects the general characteristics of the two areas where the project is intended to be implemented, North Zone of Villa Clara/Matanzas, made up of Corralillo, Quemado de Güines, Santo Domingo and Los Arabos municipality of Matanzas province. The South Zone of Las Tunas conformed by the municipalities of Amancio Rodríguez, Colombia and Jobabo, all located in the south of the province. Specificities of each of the seven municipalities are also described according to the variables defined for the formulation of the project. This document, also, aims to serve as input for the design of the project from the information raised. The socioeconomic characterization was based on exchanges and interviews held with different municipal and provincial actors during the visits made to the territories; also, the documents review and the experts' criteria contributed to the compilation of all the information that is shared here.

Summarizing the key variables for both areas where the project is intended to be implemented, we can point out the following:

The population residing in these two geographical zones gather a total of 238 474 people, of which 51.2% are women. Of the 55 total CPs (29 CPs in the Central Zone and 26 in the Eastern Zone), 10 PCs are in the category of very vulnerable, 18 PCs in the vulnerable category and 12 CP average vulnerability. All of the foregoing defines 34 346 vulnerable households in both areas as direct beneficiaries and therefore places a population of 102 938 as vulnerable, of which 49% are women.

It is important to note that in both areas female and male population is balanced in most municipalities, 49% and 51% of the total population respectively. The working age of both areas is 132 046 people. Both territories are classified as aged. These aging characteristics are closely related to the birth rate. Although the percentage values of aging may seem low (between 17% and 22% respecting the total population), as they relate to low birth rates, they put these territories at the front of a labor force deficit and these aged agricultural workers in a position of vulnerability to assume the territory's productive tasks with limited to no access to climate resilient technologies and productive models.

Regarding the use of land, the data obtained shows that there is a productive potential and a change in use in the areas covered with marabú, which together, rise up to 87,421 hectares. The southern zone of Las Tunas is the most covered area with this specie. (See more details throughout the report). The Northern Zone of Villa Clara/Matanzas together with the Southern Zone of Las Tunas, have 197 agricultural cooperative entities that are dedicated to agriculture as fundamental activity in each of the territories where the project will be implemented. These cooperatives gather 18 614 members of which 15% are women.

Regarding the state entities of agriculture, in both areas there are more than 40 agricultural institutions or Basic Business Units with more than 4 000 workers of which 25% are women.

Based on the climatic characterization carried out by the team, these two zones clearly show effects due to the climate change that has been affecting Cuba. In summary, they are as follows: a) increase of the air surface temperature, it is considered that there is a stabilization around a very high average value; b) greater frequency of long and severe droughts, especially in summer, putting crops and rural livelihoods under severe water stress; c) increase of rainfall totals associated with heavy rainfall events in winter;

d) there is a tendency to increase the accumulated water balance in the dry season of the year; e) increase in the occurrence of moderate and strong floods for the coasts of Cuba; f) increase in saline intrusion as a consequence of the elevation of the mean sea level; g) the greater frequency of drought events and hurricanes that affect the country has contributed to making climate more extreme.

On the general characteristics of the Northern Zone of Villa Clara

The three municipalities of the north of Villa Clara settle their fundamental economic activity in the sugar industry and agricultural work (livestock and various crops). The first under the influence of the deterioration of the sector with the closure of sugar mills in some of these municipalities, where there were 2 plants, today there is only one. Corralillo, Quemado de Güines and Santo Domingo have a productive history of grains, mainly beans, which has been affected by the permanent rains after Hurricane Irma, as they are usually mostly dry. The food production in this area is mainly based on grains, meats, fruit, citrus and vegetables, milk, eggs and meats; all of them complemented with the development of urban and sub-urban agriculture programs where vegetables and vegetables are grown.

When referring to the access and availability of food, they recognize that in this zone what is produced is eaten, although some products for the basic basket also come from other provinces. The livestock productions in the private sector stand out. As in the whole country these foods are available in state markets and/or in non-state squares, highlighting the proliferation of so-called "forklifts". The stability or not of the prices is related to the offers in the state markets that force the rest to maintain attractive prices, when the first one is out of supply the products turn more expensive, in the classic supply-demand relationship. The commercialization circuits found in the specific and municipal roads are not in good condition. In this territory families have found a common way to subsist socially and economically, these socio-economic strategies are fundamentally based on the pig and poultry farming and to a lesser extent, families with patios produce food for self- consumption.

External migration the three territories are large emitters of people to the United States with the perception that almost all urban populations have at least one family member in this country in a large percentage young people. Regarding internal migration, people from this area migrate to Santa Clara, the head of the province and a large percentage, mostly young, to Matanzas, Varadero, Cárdenas, municipalities that constitute a tourism hub and there are well-paid job offers. There is also a population movement from the most rural areas to the urban areas of each municipality.

In all the municipalities that make up this area, from the Energy Revolution, a process established in Cuba with a vision to saving energy, in approximately 82 to 95% of the houses people cook with electricity, and between 3 and 7% do it with firewood. However, many families, due to their low incomes, must save their electricity consumption and maintain coal or wood stoves in the backyards of households, thus alternating the use of energy to cook food.

In the northern part of Villa Clara/Matanzas, 19 911 people receive water by pipes during periods of drought. From a gender perspective, women are the most affected by lack of water. For this reason, they claim access to potable water as one of their basic needs, which is visibly connected with the stereotypes and traditional roles they assume within the home. (see table 10). This area has 47 267 homes. The houses in poor condition are located mainly in the rural part of the municipalities of this area, which in turn is located mainly south of each municipality. Typologies III and IV of the housing in

rural areas prevail, rendering them more vulnerable to natural disasters, especially hurricanes, strong winds and heavy rains. This typology responds to construction materials

General characteristics of the South Zone of Las Tunas

The three municipalities of south of Las Tunas bases their fundamental economic activity on the sugar industry and agricultural work. There is a sugar mill in each of the municipalities in which it will be worked. In the case of Colombia, the economy is also based on tobacco and forestry, as well as the food industry, construction materials and shrimp farming. Jobabo also has a tobacco and handicraft factory based in Yarey. Amancio, Colombia and Jobabo have a productive history, in addition to sugarcane, producing corn and viands such as plantain and yucca. They recognize that the production of food in this area is based mainly on yucca, corn, plantain, sweet potato, rice, beans, vegetables such as carrots, okra, and snap beans fostered by urban agriculture.

As in the Northern Zone of Villa Clara/Matanzas the food prices are accessible when they are from the state squares. “forklifts” have a price system established by the municipal administration; they are more affordable prices than in other territories. After Hurricane Irma these municipalities have had to fully self-sustain through contracts with the different productive forms of the territory (CCS and CPA). However, there are problems with the food transportation and although the marketing circuits are close, but storage does not have all the conditions to move the agreed products. The prices behave in the same way as in the North Zone of Villa Clara. In the area families have found a common way to stay socially and economically, these socio-economic strategies are fundamentally based on pig and poultry farming and, to a lesser extent, families with patios produce food for self- consumption. In Jobabo, it is perceived that accepting Law 250 and 300 to acquire land is one of the most prolific family strategies in the rural areas of this municipality.

There has been an exodus of people if analyzed in historical logic. With the disappearance of the sugar mill, many people linked to the plant in both sugarcane and industrial agriculture moved to the urban area. There are rural communities that have disappeared.

In the three municipalities that make up this area since the Energy Revolution, a process established in Cuba with a view to saving energy, between 57 and 82% of the houses are cooking with electricity, on the other hand, 10 to 26% in the rural area cook with firewood.

In this area, a total of 19,429 people are supplied by pipes in time of drought and as in the Northern Zone of Villa Clara/Matanzas women are the most affected by the lack of water, they say that they feel stressed by the lack of liquid because they are the ones who carry the burden of the domestic responsibilities (see table 16).

This area has 41 223 homes. The houses in poor condition are located mainly in the rural part of the municipalities. Typologies III, IV (in a lower percentage) and V, of the housing fund in rural areas prevail, rendering them more vulnerable to natural disasters, especially hurricanes, strong winds and heavy rains.

Socioeconomic characterization of the areas proposed by the project.

Introduction.

The purpose of this document is to serve as an input for the design of the project based on the information gathered. The socioeconomic characterization that was presented was based on exchanges and interviews held with different municipal and provincial actors during the visits made to the territories; also, the documentary review and the experts' criteria contributed to the compilation of all the information shared here.

1.1 From the national context and the intervention areas

The Republic of Cuba is located in the Caribbean Sea, at the entrance to the Gulf of Mexico and constitutes the westernmost portion of the Greater Antilles. The territorial extension of the archipelago is 109 886 km². The main island, Cuba, represents with its 104 556 km² 95% of the total area of the country.

Cuba is characterized by its long and narrow configuration, extending 1 256 km longitudinally from Punta de Maisí, at its eastern end, to the Cabo de San Antonio, at its western end. Its maximum width is 191 km, from Tararaco beach (Camagüey province) to Punta Camarón Grande (province of Granma). The minimum width is 31 km, from the Bay of Mariel, to the Ensenada de Majana in the province of Havana. Approximately 5 746 km of the country are coasts.

Territorial organization of Cuba: Political-administrative division

Cuba is divided into 15 provinces and a Special Municipality (Isla de la Juventud) of national subordination. The provinces, in turn, are subdivided into municipalities for a total of 168 municipalities.

The most recent changes were approved by the National Assembly in August in 2010 (effective as of January 1, 2011), which consisted of the creation of two new provinces: Artemisa and Mayabeque from the segmentation of the Province of Havana, along with the transfer of 3 eastern municipalities of Pinar del Río. The municipality of Varadero in the Province of Matanzas was also abolished. The previous organization in 14 provinces and 169 municipalities dated from 1976.

The provinces and municipalities have legal personality for all purposes of the law. They have their own representative assemblies and government structures, albeit with a close dependence on central authorities.

In each province and municipality of the country there is a Committee of the Communist Party of Cuba (PCC), which as the leading force of society and the Cuban State, exercises the same function at the local level. The first provincial and municipal secretaries are the main local political authority.

The Municipal Assembly of Popular Power is the highest municipal representative body. It is composed of delegates elected in each electoral district from candidates proposed in popular assemblies. The municipalities are divided, in order to facilitate relations with the electors, in Popular Councils (PC) composed of the delegates themselves and chaired by one of them.

General population data

Next, a socio-economic and gender characterization of the areas in which the project intends to work is offered. Various dimensions will be addressed with the interest of offering relevant information in a specific way in the possible cases and in a tendential manner; characterizations of variables with common behaviors for the different zones are also presented. All of the above will contribute to the decision making for the project's actions being carried out strategically and taking into account territorial specificities.

The Central Zone includes three municipalities of this province (Corralillo, Quemado de Güines and Santo Domingo) and a municipality of the Matanzas province (Los Arabos) located in the same geographical area. Meanwhile, the Eastern Zone includes the municipalities of Amancio Rodríguez, Colombia and Jobabo.

The population residing in these two geographical areas totals 238,474 people, of which 51.2% are women. Of the total population residing in these territories, 34% live in the rural area (80 952 people of them 37 221 women). the distribution can be seen in Table 1. The project would be intervening in a total territorial surface area of 8 182 km².

Table 1. Rural and urban population of the two geographical zones of intervention

Zone/ Municipality	Total Municipal Population	Rural Population	Male Rural Zone	Female Rural Zone	% Female	Urban Population	Male Urban Zone	Female Urban Zone	% Female
Corralillo	26 393	6 908	3 688	3 220	47	19 485	9 707	9 778	50
Quemado de Güines	21 689	7 626	4 089	3 537	46	14 063	7 040	7 023	50
Santo Domingo	50 514	13 635	7 314	6 321	46	36 879	18 252	18 627	51
Los Arabos	24 416	9 558	5 039	4 519	47	14 858	7 391	7 467	50
Total Zona Norte VC/Matz.	123 012	37 727	20 130	17 597	47	85 285	42 390	42 895	50
Amancio	38 714	10 471	5 795	4 676	45	28 243	14 033	14 210	50
Colombia	32 537	9 412	5 082	4 330	46	23 125	11 471	11 654	50
Jobabo	44 211	23 342	12 724	10 618	45	20 869	10 480	10 389	50
Total Zona Sur Tunas	115 462	43 225	23 601	19 624	45	72 237	35 984	36 253	50
Total Both zones	238 474	80 952	43 731	37 221	46	157 522	78 374	79 148	50

Source: 2015 ONEI Statistical Yearbook, 2016 edition

It is important to note that in both areas the representation of the female and male population is balanced, with the former representing 49% and the latter representing 51% of the total population in most municipalities.

Both areas have 132 046 people of working age¹ (Table 2). For the municipalities of Villa Clara, the working age population represents 12.5% of the total population in this condition, while in the municipality of Los Arabos, this population represents 3.4% of the total population of the province of Matanzas. In the case of the municipalities of Las Tunas, the working-age population represents 15.7% of the total population of Las Tunas province.

Table 2. Summary of working-age population of the two regions

Region	Working age population	Male	Female
Central	77 506	41 244	36 262
Eastern	54 540	40 397	35 143
Total	132 046	81 641	71 405

Source: 2015 ONEI Statistical Yearbook, 2016 edition



* Población en edad laboral: Para el año 2015 corresponde a la población masculina de 17 a 64 años y a la femenina de 17 a 59 años.

** La población económicamente activa abarca a todas las personas que reúnen los requisitos para ser incluidas entre las personas ocupadas o las personas desocupadas. Se refiere a los ocupados y a los desocupados en el período fijado como referencia para la investigación.

*** Ocupados: Se considera como ocupada a toda persona de 17 años o más de edad y las de 15 y 16 años que excepcionalmente hayan sido autorizadas a trabajar por las autoridades competentes, que en el día de cierre de la información mantenían vínculo laboral formalizado con un empleo asalariado en metálico o en especie, o un empleo independiente (los ocupados que no reciben un salario).

Source: Prepared by the authors based on national and provincial statistical yearbooks. ONEI 2015, 2016 edition.

Of the most representative economic activities, 18.5% of the population at the national level is engaged in agriculture, livestock, forestry and fishing; while in Villa Clara is 23.4% (primary sector of the economy)². In Las Tunas 3.4%, this last figure in correspondence with the high percentage of idle land

¹According to the 2015 National Statistical Yearbook, 2016 edition, for Cuba, the population of working age for 2015 corresponds to the male population from 17 to 64 years of age and the female population from 17 to 59 years.

The manufacturing industry³ (secondary sector), in the case of Las Tunas occupies 40% of the population while in Villa Clara it accounts for 12.6%; economic activity that at national level does not reach 10% of the population employed in this activity.

Other activities that also play a significant role in the occupation of the population are, in the case of Villa Clara, commerce, hotels and restaurants (tertiary sector) with 14.3% of the population, while for Las Tunas, 11, 8 of the population is engaged in electricity, gas and water supply.

This analysis does not include persons employed in Public Health and Education, priority sectors of the country which admit a significant number of employees.

Population aging

Since the early twentieth century, the population of Cuba began the process of demographic transition and is currently in a process of population aging. The most relevant aspects of the demographic transition, according to the specialists of the Center for Population and Development Studies of the National Bureau of Statistics, are:

- Low or slow rate growth of the population: In the decade of the 90s the growth rate was slow and continues in the present century. The specialists forecast the same trend up to year 2025.
- Severe decline in fertility: In the mid-twentieth century the Cuban woman had an average of 4 children. This average dropped to 1.60 in 2001. The crude reproduction rate (average number of daughters per woman) is 0.78, less than 1 since 1978. Few countries have experienced such rapid declines. Cuba is among the 35 countries with birth rates between 10 and 14 live births per 1 000 inhabitants.
- Cuba is the second oldest country in Latin America and by 2050 it will be one of the 10 oldest countries in the world.
- Projections of the birth rate do not foresee these numbers rising above the replacement level, since the group of people 60 years and older is superior to the group of 14 years and less, the number of deaths will be greater than the number of births, Cuba is expected to lose up to 2.2 million inhabitants by 2050, and from 4 to 7 million by the end of the century.
- The fertility behavior corresponds to the current cultural reproduction patterns that include having few children at an older age. At socioeconomic levels, the incorporation of women into the labor market and their higher education are influential factors. The low fertility contributes directly to the aging of the territory of Las Tunas, which are mostly covered by marabou. The causes of the decline are traced in a complex plot where the sociocultural pattern make the reversibility of the situation very difficult.
- The population projections show that, as a trend, the number of those who reach working age

³ The manufacturing industry sector in Cuba is related to the steel industry, the steel derivatives industries, the mechanical industry, the production of containers and packaging, recycling of raw materials, manufacture of electronic equipment and appliances, chemical production and its derivatives, medical equipment, textiles, apparel and accessories, hygiene products, perfumery and cosmetics.

will continue to decline, while that of retirement will rise until 2033, when it will begin to fall until 2045.

These characteristics of aging related to the birth rate are present in the two Zones in which the project is intended to be implemented, although the percentage values of aging may seem low (between 17% and 22% with respect to the total population), as it relates to the low birth rates put in a position of vulnerability to these territories that face labor force deficits or agricultural workers who are aging to assume the productive tasks of the territory with few technologies, resources and inputs (existing technologies are often obsolete or in poor condition).

The table and graphs presented below show the distribution of land use based on general indicators. The data show that there is a productive potential and a change in use in the areas covered by marabou, which, between both Zones, totals 87.12.77 hectares, with the Eastern Zone presenting the most covered areas.

Table 3. Quantity and use of land for agricultural purposes in both Zones (in hectares).

North Villa Clara / Matanzas

Municipality	Agricultural Land	With Marabou	Temporary Crops	Livestock	Sugar Cane	Forest	Total Area
Los Arabos	53 889.57	9 103.71	3 318.47	36 544.02	12 248	17 322.4	75 835
Corralillo	66 151.29	9 750.67	3 366.78	46 431.9	12 428.91	12 661.6	83 730
Quemado de Güines	29 207.29	210.14	1 818.04	14 083.06	11 248.03	1 883.17	33 282
Santo Domingo	73 845.73	9 302.84	7 993.22	40 447.96	19 779.18	9 443.73	87 807
Total	223 093.88	28 367.36	16 496.51	137 506.94	55 704.12	41 310.9	280 654

South of Las Tunas

Municipality	Agricultural Land	With Marabou	Temporary Crops	Livestock	Sugar Cane	Forest	Total Area
Amancio Rodríguez	54 212.5	16 246.27	2 174.41	31 003.01	20 674.3	28 829.4	85 253
Colombia	42 249.56	7 522.41	3 089.71	21 584.67	1 608.03	8 254.4	55 997
Jobabo	70 963.18	35 285.73	6 989.27	58 414.91	2 766.09	13 637.26	88 563
Total	167 425.24	59 054.41	12 253.39	111 002.59	25 048.42	50 721.06	229 813

Sources: Data offered by Municipal and Provincial Delegations of Agriculture and MINAG 2016

The previous tables show in each case, extensive areas devoted to specific crops, forestry and livestock, which constitutes a latent vulnerability to the effects of climate change more visible, such as the seasonality of the drought and rainfall in a systematic way, impacting the levels of productivity. The implementation of the modules proposed by the project will contribute to diversify the mosaic of land use, while increasing the adaptability and resilience of production systems.

The Central Zone together with the Eastern Zone have 197 agricultural cooperative entities that are dedicated to the fundamental activities of this type in each of the territories where the project will be implemented, for this reason these beneficiary entities will also be involved. These groups include 18 614 members, where 15% represent women (Table 4).

One potential that Cuba has regarding the smallholder farmers sector is the fact that it is completely

supported by an institutional framework; a group through the National Association of Smallholder Farmers⁴, whereby farmers associated with the Credit and Service Cooperatives (CCS) and the Agricultural Production Cooperatives (CPA) are grouped. For its part, the Ministry of Agriculture (MINAG) supports and represents the farmers who work in the Basic Units of Cooperative Production (UBPC) and the workers of the state entities (farms, basic business units, among others).

Types of cooperatives and other agricultural and forestry organizations in Cuba

The Constitution of the Republic, in its article 20, recognizes the right of small farmers to associate with each other, both for the purposes of agricultural production as well as for obtaining credits and state services and instructs the law to regulate the exercise of that right.

Cooperatives have objectives and aims of a social nature aimed at improving the living conditions of cooperatives and their families, as well as contributing to the social development of the country, the territory and the communities in which they are located.

The Cooperative of Agricultural Production (CPA) is an economic entity that represents an advanced and efficient form of socialist production with its own patrimony and legal personality, constituted with land and other goods contributed by small farmers, to which other people are integrated, to achieve sustainable agricultural production.

The CPA has among its fundamental purposes the following:

- Develop economic efficiency in sustainable agricultural production, in response to the interests of the national economy, the community and the cooperative itself;
- Rationally use the agricultural land, property or usufruct of the cooperative and the other agricultural goods and productive resources they have;
- Steadily increase the quantity and quality of managerial productions and promote their rapid commercialization, and
- Develop other agricultural and forestry productions, as well as provide agricultural services that have been authorized in their corporate purpose.

For its part, the Credit and Services Cooperative (CCS) is the voluntary association of small farmers who have the property or usufruct of their respective lands and other means of production, as well as the production they obtain. It is a form of agrarian cooperation through which the technical, financial and material assistance that the State provides to increase the production of farmers is made and made viable. Small and facilitate its commercialization. It has its own legal personality and responds to its actions with its assets.

Among the purposes pursued are:

- Plan, contract, buy, sell and use in an organized and rational way the necessary resources and services for its members and the cooperative, due to agricultural production;
- Manage, process and collaborate in the control, utilization and recovery of the necessary bank loans for its members and the cooperative itself, destined to agricultural production;

⁴ Smallholder Farmers Political Association is in charge of representing the smallholder farmers grouped in agricultural cooperatives (see document referring to Cuban norms and institutions)

- Plan and market the managerial productions of the members and the cooperative;
- Marketing other productions and authorized services in their corporate purpose, and
- Acquire, lease and collectively exploit agricultural and transport equipment and build the necessary facilities to improve efficiency in agricultural production and marketing, authorized in its corporate purpose.

For its part, the Basic Units of Cooperative Production (UBPC) are cooperative production units that emerged in September 1993. Assumed as an option to shovel the difficult situation of agriculture in Cuba during the Special Period. It is an integrated socio-economic community that responds to the concept of rural development. They are agricultural cooperatives where production is carried out in common, the ownership of the media being equally common. They use state land as usufruct. This transformation of property and production relations in the Cuban agricultural sector was carried out through the promulgation by the State Council of Decree Law No.142, which ordered the conversion of most of the state sugarcane production farms. sugar and other crops in UBPC. The emergence of UBPCs represented a significant structural change in the national agricultural sector. A large number of state lands went into the form of cooperative ownership, thus becoming the predominant form of Cuban agriculture.

Basic principles:

- The linking of producers to the area as a way to stimulate their interest in work and its concrete sense of individual and collective responsibility;
- The self-sufficiency of the collective of workers and their families with cooperative effort, as well as progressively improve housing conditions and other aspects related to the care of people;
- Rigorously associate the income of the workers to the production achieved;
- Extensively develop management autonomy. The production units that are proposed must manage their resources and become self-sufficient in the productive order.

Table 4. Summary of agricultural cooperative entities in both regions

Cooperative Type	Number Both Zones	Total Members	Female	Male
CCS	82	18614	2710	12755
CPA	45			
UBPC	70			
Total	197			

Source: Data offered by ANAP and Municipal and Provincial Delegations of Agriculture

In the case of the state activity and specifically forestry, the operating structure has as its starting point the Higher Economic Forestry Directorate (OSDE). The top management organization arises from a need of management that is based on: the separation of state functions from business, organizing companies in correspondence to state interests, technological and productive similarities, making management processes more flexible, achieving urgency in the solution of problems and the need for control. They are business organizations that must contribute with their management practical benefit to the companies that make it up. They have independent legal status. The financing of their expenses in national currency is carried out based on the contributions that the companies make, charged to

their general administrative expenses.

The Forestry OSDE subordinates the Provincial Forest Companies and to these the Base Business Units (UEB) at the municipal level. In each municipality there are forestry brigades with specific roles related to the activity.

Regarding the state entities of agriculture in both areas, there are more than 40 agricultural institutions or Basic Business Units with more than 4000 people working in them, of which 25% are women.

In addition, there is the Cuban Association of Agricultural and Forestry Technicians (ACTAF): It is a non-governmental association, registered in the registry of associations of the Republic of Cuba since 1987. With a functional structure disaggregated, in subsidiaries with its own legal personality, in the 14 provinces of the country. Its paradigm is to achieve the development of a sustainable agriculture on agroecological bases, for which it not only works in a wide process of training its associates and of the Cuban society as a whole but also in the development of a process of dissemination, promotion and recognition of all the successful experiences that individually or collectively effectively achieve and materialize the model of agriculture that as an organization advocates and defends. It has 24 978 affiliates, of which 38% are women, grouped in 1 929 Base Bodies and 2 441 Institutional Partners at the country level.

General Impacts of Climate Change within the Territory

Based on the climatic characterization carried out by the team, these two zones clearly show effects due to climate change that has been affecting Cuba⁵. In summary these are:

1. Increase in the surface temperature of the air, it is considered that there is a stabilization around a very high average value.
2. Increased frequency of long and severe droughts, especially in summer.
3. Increase in rainfall totals associated with heavy rainfall events in winter. There is a tendency to increase the accumulated in the dry season of the year.
4. There has been an increase in the occurrence of moderate and strong floods for the coasts of Cuba, independently of the meteorological events that generate them, although for tropical cyclones the trend is less pronounced.
5. Increase in saline intrusion as a consequence of the elevation of the mean sea level.
6. The greater frequency of drought events and hurricanes affecting the country has contributed to make the climate more extreme.

Regarding the drought specifically, it is noteworthy that it is an element that has placed the country in high vulnerability and in particular the territories in which it intends to intervene. An example of this was the drought from 2014 to 2017, characterized at that time by an explicit emergency in the face of the resurgence of the same and the alerts made by the national actors, especially for the eastern region of the country, considered the worst in the last 115 years. It was relieved by the National Civil Defense Staff (EMNDC) in August 2015. This situation led to measures taken at the national level taking into account the scientific information provided by related institutions such as the National

⁵ Information extracted from the Report on Climatic Vulnerabilities and baseline, presented for this project by Dr. José Somoza.

Institute of Hydraulic Resources (INRH) and the Institute of Meteorology (INSMET).

The fundamental facts of affectation were in:

- The drought affected more than one million people
- 258 sources of water supply in the country suffered from the impact
- The reservoirs that supply the population to 58% of their total capacity
- Month of July 2015 as the driest with record minimum rainfall for the fourth consecutive time since 1961
- 81% of the agricultural areas of the island had been affected

All of which put the country in unfavorable conditions against the risk of an outbreak of acute diarrheal diseases (especially among the most vulnerable groups, such as children, the elderly and women); a significant decrease in the productivity of crops and livestock, which affect food security. For these reasons, the statistical data presented on water supply per pipe are from this period until 2017.

Direct Beneficiaries

After the crossing of the four fundamental climatic threats that affect the Central and Eastern Zone (strong winds, flood by intense rains and sea penetration and drought). The proposal of direct beneficiaries focuses on those Popular Councils, households and the population with the greatest vulnerabilities to the aforementioned phenomena (See specific definition and mapped in the Baseline Study on Adaptation and Vulnerability).

Of the 55 CPCs in total (29 CPs in the Central Zone and 26 in the Eastern Zone), 10 CPs are in the category of very vulnerable, 18 CPs in the category of vulnerable and Medium vulnerability 12 CP. All of the above defined as direct beneficiaries 15 968 vulnerable households in both areas.

1.2. General Characterization of the Central Zone

As mentioned above, one of the Zones selected for the implementation of the project includes the municipalities of Corralillo, Quemado de Güines and Santo Domingo, all located north of the Province of Villa Clara and the municipality of Los Arabos in Matanzas.

After the documentary review and specifically the group interviews carried out in the territories, different variables have been selected that show similar characteristics and behaviors in the Area, in order to provide a territorial characterization or photograph, both specific and integrative. The variables that have a common behavior are the following:

- Fundamental or relevant economic activities
- Productive history
- Food production
- Number of households with individual courtyards (urban and sub-urban agriculture) and in cooperatives
- Access and availability of food
- Productive economic strategies at family level

- Internal and external migration
- Remittance entry to the territory
- Population aging
- Energy dependence, what is cooking with?
- Drinking water supply service
- Amount of rural housing and its state

The three municipalities of the north of Villa Clara base their fundamental economic activity on the sugar industry and agricultural work (livestock and various crops). The first under the influence of the deterioration of the sector with the closure of sugar mills in some of these municipalities, where there were two plants, today there is only one.

The municipality of Santo Domingo is distinguished by also having other economic activities relevant to its economy such as a brewery, a rum factory, a water bottling plant "Amaro", a canning factory, an ice factory and a tobacco factory. national subordination.

Corralillo, Quemado de Güines and Santo Domingo have a productive history of grains, mainly beans, which has been affected by the permanent rains after Hurricane Irma, as they are usually mostly dry. Recognize that the production of food in this Zone is based mainly on grains, meats, fruit, citrus and vegetables, milk, eggs and meats; all of them complemented in addition with the development of urban and sub urban agriculture programs (AUSU) dedicated mainly to the cultivation of vegetables and vegetables. In Quemado and Santo Domingo there is also an important apicultural production; in the first there are 24 apiaries, 18 belonging to a military farm and six to private producers, which together house 564 hives and in the second municipality there are 34 apiaries with about 740 honey bee colonies and 77 meliponas hives which is equivalent to seven hives per hectare, which together cover a pollination area of 241.5 ha. In a singular way in Santo Domingo there is a tradition of growing onions and garlic.

Table 5. Food production in the Central Zone

Crops	Central ZONE					
	Productions in tons in both sectors (state and non-state)					
	2010	2011	2012	2013	2014	2015
Sweet potato	892.5	1 629.5	2 108.6	2 693.5	3 179.0	5 520.1
Taro	1 377.8	740.5	892.5	717.2	1 233.6	1 180.1
Cassava	5 166.2	3 662.5	4 113.2	4 971.2	6 271	8 209.9
Plantain	26 241.4	3 562.1	4 033.3	3 705.6	3 744.5	3 764.4
Banana	1 110.5	892.6	928.5	931.7	988.8	840.1
Rice	1 782.6	2 243.2	1 991.2	1 932.8	3 386.8	3 955.3
Corn	2 202.9	1 504.5	1 563.9	2 550.7	3 317.6	2 520.7
Black-eyed peas	980.1	814.5	900.9	965.9	1 671.1	1 975.2

Source: Municipal statistical yearbooks 2015, 2016 edition

The previous table shows the historical series of the fundamental crops that are produced in the municipalities that make up the Zone. As it is observed, in the majority of the cases there is a variability in the productions with tendency to increase, except in the banana in its two typologies. In none of the

cases (increase or decrease of productions) can be affirmed that they are directly associated to climatic variables. An analysis of this type can be done by contrasting crop yields and climatic behavior in different territories (See Report Baseline study of adaptation and vulnerability where this topic is addressed in detail).

Table 6. Average yield series of the main crops produced in the Zone

CROPS	North Zone VC					
	Average Yield (t/ha)					
	2009	2010	2011	2012	2013	2014
Sweet Potato	4.6	4.4	4.9	4.6	5.0	7.2
Taro	8.4	8.4	6.9	10.7	7.9	12.2
Cassava	10.6	4.1	5.8	6.0	6.3	9.5
Plantain	5.0	142.3	33.7	27.8	22.3	24.9
Banana	17.2	10.7	12.1	27.0	22.8	36.4
Rice	1.6	11.4	7.0	2.9	2.5	3.2
Corn	1.8	1.8	1.9	1.8	2.5	2.9
Black beans	0.6	0.9	0.9	1.0	0.8	1.4

Source: Prepared by the authors based on data available in provincial and municipal statistical yearbooks (productions / harvests) ONEI 2015.

As in the historical series of the productions there is a variability in the productive results by crops, although the specialists refer that for some crops such as beans, taro, maize and rice, the temperature and rainfall variables impact these results in a positive or negative way. It is noteworthy that in 2008 there were four hurricanes (Fay, Gustav, Ike and Paloma) and in 2012 Hurricane Sandy, which could influence the productions and yields obtained in this stage.

As mentioned above, food production in the Zone is also based on urban and sub-urban agriculture programs. There is a potential for these patios, since there are a total of 2 individual and farm-level cooperatives. 036 patios in the Zone, which could be strengthened with the project, since they are subject to effects before the extreme events that affect the territory.

Table 7. Number of households with individual patios from the Urban and Suburban Agriculture Programs and Cooperatives Central Zone

Zone	Number of Households with patio	Total Zone
Corralillo	452	2 036
Quemado de Güines	375	
Santo Domingo	833	
Los Arabos	376	

Source: Information provided by the municipalities

When referring to the access and availability of food, they recognize that in this Zone what is produced

is eaten, although some products for the basic basket also come from other provinces⁶. The livestock productions in the private sector stand out. As in the whole country these foods are available in state markets and positions or non-state squares, highlighting the proliferation of so-called "forklifts"⁷. In a consensual manner, the people interviewed point out that the level of access to these, according to prices, is adequate in the state markets, since there are prices stuck; while in the other forms of marketing the prices are higher. The stability or not of the prices is related to the offers in the state markets that force the rest to maintain attractive prices, when the first one is out of supply, the products become more expensive, in the classic supply-demand relationship.

In this territory families have found a common way to stay socially and economically, these socio-economic strategies are based on the fundamentals of raising pigs and birds and, to a lesser extent, families with patios produce food for self-consumption. At the individual and family level, they would be in a position of vulnerability in the face of the variability of periods of drought and rain that affect their productions, and therefore their quality of life, increasing family spending on food purchases. In some municipalities contacted refer that it is a family strategy to decide that a young member of the family emigrate to help them financially.

In terms of external migration, the three territories are large emitters of people to the United States, with the perception that almost all urban populations have at least one relative in this country, mostly young people.

Regarding internal migration, people from this Zone migrate to Santa Clara, the province's head and a large percentage, mostly young, towards Matanzas, Varadero and Cárdena, municipalities that constitute a tourism hub and there are well-paid job offers. According to the people contacted, they consider that Corralillo is a major issuer, internally, mainly professionals who in many cases do not permanently migrate to Varadero, but go to work during the week and return on weekends. The women, in general, go to work in the houses of rent in Varadero. There is also a population movement from the most rural areas to the urban areas of each municipality.

An interesting variable analyzed and with a homogeneous behavior in the three municipalities is the one referring to entries of remittances in the territory. In no case do they have official statistical data, however, there is a perception that remittances to these locations are considerable, since there are many people who emigrated to the United States and maintain systematic contacts with their families.

This remittance entry is concentrated more in urban and northern areas than in rural areas. A fundamental variable in these central territories of the country and in direct relation with the previous variables of economic situation and migration is population aging. They are four aging municipalities with more than 22% of their population over 60 years (25 390).

Although the percentage may seem low, aging must be related to the number of annual births, a figure that has decreased since the 1990s as indicated above and which is related to structural and cultural factors.

⁶ In the Cuban case, the basic basket is totally subsidized by the state with the aim of reducing social inequalities and the level of nutrition and extreme poverty.

⁷ Self-employed workers (TCP) who sell agricultural products in a traveling way.

Table 8. Population of 60 years and older - Central Zone

Municipality	Municipal Population	Total Inhabit. 60 years and older	Female	Male	% Correlation Municipality Population
Corralillo	26 393	5930	2978	2952	22.46
Quemado de Güines	21 698	5113	2541	2572	23.56
Santo Domingo	50 514	11452	5655	5797	22.67
Los Arabos	24 516	2 895	2 518	2 646	11.80
Total	123 121	25 390	13 692	13 967	

Source: 2015 ONEI Statistical Yearbook, 2016 edition

The existing social services in the municipalities, related to population aging, are insufficient, which means that the family and specifically women are responsible for the care of older adults, an issue that limits them to access jobs and empower themselves economically and socially . Proof of this in Santo Domingo in the orientation houses of the Federation of Cuban Women (FMC)⁸, more and more cases are being attended by women who come to ask for help because they have elderly people at home and do not have anyone to help them.

Graph 1. Percentage of aging compared to the province



Energy Dependence: ¿How is cooking being done?

In all the municipalities that make up this Zone since the Energy Revolution, they cook with electricity, a process established in Cuba with a view to saving energy, a lower percentage in the rural area cook with firewood. However, many families, due to their low income, must save their electricity consumption and maintain wood stoves in the backyards of their homes, thus alternating the use of energy to cook their own food and the animals they raise.

Table 9. Energy dependence of households for cooking - Central Zone

⁸ The FMC is the association that nationally groups all women in Cuba from 14 years of age. It is the only women's organization in the country.

Country / Province / Municipality	Total Households	% Electricity of Total Households	% Gas	% Kerosene	% Firewood	%Total
Cuba	3788695	71	11	4	7	93
Villa Clara	279052	85	4	6	0.1	95
Corralillo	9568	92	0.8	2	4	98
Quemado de Güines	7634	82	0.8	12	3	97
Santo Domingo	18270	82	0.8	9	6	97
Los Arabos	10253	85	0.7	4	3	92

Source: ONEI Provincial, Las Tunas. Data of the Population and Housing Census 2012.

* The remaining percentage cooks with other fuels

Supply of drinking water by pipe during the drought

In the Villa Clara / Matanzas Zone 19 911 people (representing 16% of the total population of the Zone) receive water by pipes during periods of drought, a situation that extends or shortens depending on the time it takes to recover from the sources of supply (Table 10). From a gender perspective, women are the most affected by the lack of water, due to this they state that one of their basic needs is access to drinking water, visibly connected with the stereotypes and traditional roles they assume within the home⁹.

Table 10. Potential beneficiaries based on vulnerabilities due to water supply and drought. Central Zone

MUNICIPALITY	Corralillo	Quemado de Güines	Santo Domingo	Los Arabos	Total
Variable					% Average
Total population supplied with water by network	19 998	5 407	35 249	8 192	68 846
<i>% of total population</i>	76	25	70	34	51
Total population supplied permanently with water with pipes	398	790	1 231	1 488	3 907
<i>% of total population</i>	2	4	2	6	3
Total population supplied with water pipes during drought	388	2 692	11 623	5 208	19 911
<i>% of total population</i>	1	12	23	21	15
Total people supplied by wells from the territory		16 259	3 630	2 028	21 917
Total population supplied by individual wells	4 071	4 239	5 664		13 974
Population vulnerable to drought	24 855	29 387	57 397	16 916	128 555
Households vulnerable to drought	8 285	9 796	19 132	5 639	42 852

Source: Prepared by the authors based on data provided by the municipalities

Summary of number and condition of rural housing

This Zone has 47 267 homes. The houses in poor condition are located mainly in the rural part of the municipalities of this Zone which in turn is located mainly south of each municipality. Typologies of housing fund III and IV predominate in rural areas, making them more vulnerable to natural disasters,

⁹ See more details regarding this topic, in the section dedicated to each municipality.

especially hurricanes, strong winds and heavy rains. This typology responds to constructive materials.¹⁰

1.3. Characterization of the Eastern Zone

The second Zone selected for the implementation of the project includes the municipalities of Amancio Rodríguez, Colombia and Jobabo, all located south of Las Tunas Province.

For the characterization of the Eastern Zone, the same variables previously presented in the characterization of the Central Zone were selected.

The three municipalities of the south of the country base their fundamental economic activity on the sugar industry and on agricultural work. There is a central office in each of the municipalities in

which will be worked. In the case of Colombia, the economy is also based on tobacco and forestry, as well as the food industry, construction materials and shrimp farming. Jobabo also has a tobacco and handicraft factory based in Yarey.

Amancio, Colombia and Jobabo have a productive history, in addition to sugarcane, producing corn and viands such as plantain and yucca. They recognize that the production of food in this Zone is based mainly on cassava, corn, bananas, sweet potatoes, rice, beans, vegetables such as carrots, okra, and beans encouraged by AUSU agriculture.

Table 11. Food production in the Eastern Zone

CROPS	EASTERN ZONE					
	Productions in tons in both sectors (state and non-state)					
	2010	2011	2012	2013	2014	2015
Sweet Potato	947.7	793.9	977.5	1 151.6	1 620.4	1 318.2
Taro	34.6	2.3	-	3.8	2.2	7
Cassava	2 209.4	2 786.6	2 609.1	3 864.9	17 957.2	5 293.8
Plantain	2 013.1	1 621.1	2 010.8	2 199.2	2 033.2	2 275.1
Banana	60.4	97.4	120.4	91.5	131.8	94.1
Rice	235.1	298	288.4	382.2	351.8	432.4
Corn	2 420.6	2 328.2	2 876.1	3 139.4	4 152.2	2 425.4
Black beans	132.4	183.4	305.5	85	77.2	69

Source: Municipal statistical yearbooks 2015, 2016 edition.

In the south of Las Tunas, although in a variable way and with some productive peaks it can be observed, in the previous table, that the tendency is to increase the productive levels. In this case, it cannot be associated with elements of climate change. In the Baseline Study on Adaptation and Vulnerability where this issue is addressed in detail, the relationship between productive indices and climatic variables can be established, which would allow evaluating their impact. In the same way in the

¹⁰ Housing Type III: Concrete walls, masonry, bricks and blocks. Ceilings of beams and joists of wood or metal and corrugated plates of cement or metal abesto, gutters of cement abesto. Type IV Housing: Wooden walls sawn on board or plank. Ceilings of roofs of wooden beams and joists and tiles of clay; beams and joists of wood or metal metal

year 2008 there were four hurricanes (Fay, Gustav, Ike and Paloma) the last two affected all the territories of the South of Las Tunas; while in 2012 Hurricane Sandy, which could influence the productions and yields obtained in this stage.

It is important to highlight that the production of corn, plantain and cassava have an important weight in the territory's economy, which is why it is important to develop resilience strategies to reduce the impact of climate change on these crops and to develop strategies that allow its increase.

Table 12. Average yield series of the main crops produced in the Eastern Zone

South Zone of Las Tunas						
Average Yield (t/ha)						
CROPS	2010	2011	2012	2013	2014	2015
Sweet Potato	3.1	19.6	16.6	4.8	5.9	6.3
Cassava	5.1	10.3	21.3	7.5	8.0	8.9
Plantain	1.5	11.9	15.1	8.2	10.9	9.1
Banana	0.6	14.1	19.7	5.3	12.8	8.8
Rice	1.7	3.2	2.6	3.4	4.9	4.3
Corn	1.0	4.1	5.1	1.9	2.2	3.1
Black beans	0.5	0.7	0.6	0.9	0.9	1.0

Source: Prepared by the authors based on data available in provincial and municipal statistical yearbooks (productions / harvests) ONEI 2015.

When referring to the access and availability of food, they recognize that what is produced is eaten in this Zone. The prices of food are accessible when they are from the state squares. Operators have a price system established by the municipal administration, although sometimes they are violated, but they are more affordable prices than in other territories. After Hurricane Irma these municipalities have had to fully self-sustain through contracts with the different productive forms of the territory (CCS and CPA). They have a food production tracking system with the different actors involved.

However, there are problems with the transportation of food and although the marketing circuits are close, storage does not have all the conditions to move the agreed products; the deterioration of the technical state of the vials also hinders commercialization. For example, in Amancio they make reference that in the rainy season it is difficult and it is almost impossible to collect the milk, since most of the route is in poor condition.

The stability or not of the prices of food is related to the offers in the state markets that force the rest to maintain attractive prices. When the first one is out of supply, the products become more expensive, in the classic supply-demand relationship.

In the Zone, families have found a common way to stay socially and economically, these socio-economic strategies are based on the fundamentals of raising pigs and birds and, to a lesser extent, families with patios produce food for their own consumption. In Jobabo it is perceived that accepting Decree Law 259 and 300 to acquire land is one of the most prolific family strategies in the rural areas of this municipality.

Decree Law 259 "On the delivery of idle land in usufruct": Approved in July 2008. It allows the delivery of idle land in usufruct to natural and legal persons to increase agricultural performance and food production. The maximum limit to deliver to natural persons without land is 13.42 hectares. In the case of those who own land, in property or usufruct, they may increase it to 40.26 hectares).

In as much the Law 300/12 (Decree-Law 300 "On the delivery of idle state lands in usufruct": It repeals the Decree-Law 259. Approved in 2012. It extends the granted area up to 67.10 hectares (five **caballerias**) for natural persons who - linked to a State Farm with legal personality, UBPC and CPA - already own land, keep it in full production and comply with its legal and contractual obligations.

Table 13. Number of households with individual courtyards from the Urban and Suburban Agriculture Programs and Eastern Zone Cooperatives

Zone	Number of households with courtyards	Total Zone
Amancio Rodríguez	1 900	3 700
Colombia	800	
Jobabo	1 000	

Source: Information provided by municipalities

In relation to external migration, these territories are not large migrants to the United States or other

countries. Regarding internal migration, people from this Zone migrate to Havana, mainly for the municipalities of San Miguel del Padrón, El Cerro and Guanabacoa, in the case of the people of Amancio. There has been an exodus of people if analyzed in the historical logic of migration. With the disappearance of the center, many personnel linked to the plant, both in sugarcane and industrial agriculture, a large number of professionals from different branches emigrated. There is also an internal exodus towards the urban area, there are rural communities that have disappeared, since they had life when there was cane; in the case of Jobabo, around four or five communities.

An interesting variable analyzed and with a homogeneous behavior in the three municipalities is the one referring to entries of remittances in the territory. In no case do they have official statistical data, however, there is a perception that in these places the reception of remittances is very low, in tune with the little migration that exists abroad.

Regarding the population aging south of Las Tunas, it behaves as follows:

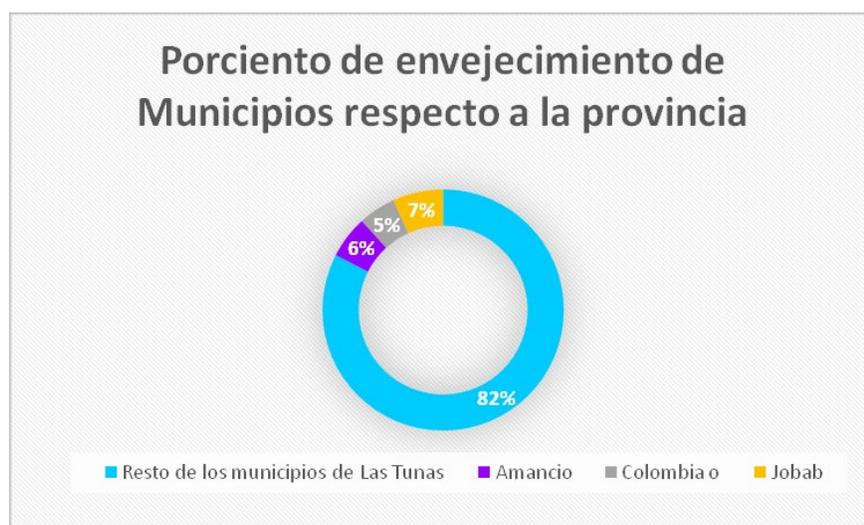
Table 14. Population 60 years and older in the Eastern Zone

Municipality	Municipal Population	Total inhab. 60 years and older	Female	Male	% Correlation Municipality Population
Amancio	38 714	6872	3454	3418	17,70
Colombia	32 537	6035	2950	3085	18,54
Jobabo	44 211	8165	3853	4312	18,40
Total	115 462	21 072	10 257	10 815	

Source: 2015 ONEI Statistical Yearbook, 2016 edition

As in the Central Zone, the existing social services in the municipalities are insufficient, which means that the family and specifically women are responsible for the care of older adults, an issue that limits them to access jobs and economic empowerment and socially. Similarly, according to the people interviewed, fewer births have been reported and this has a direct impact on aging.

Graph 2. Percentage of aging compared to the Province



Energy Dependence: ¿How is cooking being done?

In the three municipalities that make up this Zone since the Energy Revolution, a process established in Cuba with a view to energy saving, the largest percentage of households cook with electricity, as shown in the table below. Although in the interviews with the local actors, they stated that a very low percentage, cooked with firewood the data show¹¹ that more than 10% of the households of these municipalities cook with firewood as an alternative and with several purposes; On the one hand, to reduce the cost of electricity because many families have low incomes and on the other hand, it is the alternative to cook the food of the animals that they raise in family yards. It is noteworthy that the province does not capture the data of cooking coal, because they allude that after the high commercialization of the same at the international level, it is not used for domestic purposes.

Table 15. Household energy dependence for cooking. Eastern Zone

Country / Province / Municipality	Total Households	% Electricity of Total Households	% Gas	% Kerosene	% Firewood	%Total
Cuba	3 788 695	71	11	4	7	93
Las Tunas	184 976	73	1	1	13	88
Amancio Rodríguez	13 664	71	1	7	18	97
Colombia	11 133	82	1	4	10	97
Jobabo	16 025	57	2	8	26	93

Source: ONEI Provincial, Las Tunas. Data of the Population and Housing Census 2012.

* The remaining percentage cooks with other fuels

¹¹ The data available for this variable are those of the 2012 Census, since it was the last one carried out in Cuba and it is the only way used to collect this information.

Supply of drinking water by pipe during drought

In this Zone, a total of 26,529 people are supplied by pipes in time of drought and, like in the Central Zone, women are the most affected by the lack of water, they say they feel stressed by the lack of it because they are the ones who carry all the burden of domestic chores.

Table 16. Potential beneficiaries from the identified vulnerabilities. Eastern Zone

MUNICIPALITY	Amancio	Colombia	Jobabo	Total
Variable				%
				Average
Total Population supplied with water by network	15 651	5 206	10 378	31 235
<i>% of total population</i>	40.4	16	23.5	26.6
Total population supplied permanently with water with pipes	1 686	2 161		3 847
<i>% of total population</i>	4.4	6.6		5.5
Total population supplied with water pipes during drought	7 872	2 333	16 324	26 529
<i>% of total population</i>	20.3	7.2	36.9	21.5
Total people supplied by wells in the territory	2 608	27 331		29 939
Total Population supplied by individual wells			16 909	16 909
Population vulnerable to drought	27 817	37 031	43 611	108 459
Households vulnerable to drought	9 272	12 344	14 537	36 153

Source: Prepared by the authors based on the data provided by the municipalities

Summary of number and condition of rural housing

This Zone has 41 223 homes. The houses in poor condition are located mainly in the rural part of the municipalities of this Zone, which in turn are located mainly south of each municipality. Typologies of the housing fund in rural areas TYPE III, IV (in lower percentage) and V¹² predominate, being more vulnerable to natural disasters, especially hurricanes, strong winds and heavy rains. This typology responds to constructive materials.¹³

¹² Housing Type V: Wooden walls sawn on board or plank. Ceilings of beams and joists of wood or metal and tarred paper and plates of fibro asphalt, guano, canvas, etc.

¹³ Housing Type III: Concrete walls, masonry, bricks and blocks. Ceilings of beams and joists of wood or metal and corrugated plates of cement or metal abesto, gutters of cement abesto. Type IV Housing: Wooden walls sawn on board or plank. Ceilings of roofs of wooden beams and joists and tiles of clay; beams and joists of wood or metal metal.

Specific Characterization of each of the Municipalities

2.1 Brief characterization of the Corralillo Municipality

The Municipality of Corralillo is located west of the province of Villa Clara. It limits the north with the insular system of the Sabana-Camagüey Archipelago in the Bay of Santa Clara, to the south with the Santo Domingo municipality, to the east with the Quemado de Güines municipality and to the west with the Martí municipality belonging to the Matanzas province. It has a territorial extension of 847.4 km², which represents 10.6% of the total area of the province and occupies, by its territorial extension, the third place among the 13 municipalities of Villa Clara. It is structured in eight CPs of which five are rural, two semi-urban and one urban. It has a Managed Floristic Reserve Monte Ramonal "Ecological Island" of 924 ha.

The population of Corralillo, based on data from 2015 of the ONEI, edition of 2016 is 26 393 inhabitants, of which 49.3% are women. In the urban area is located 73.8% of the population of the municipality, the rest is in the rural area or 6 908 people who represent 26%. In this municipality 3.3% of the total population of the province is concentrated and has a population density of 31.5 inhabitants per km².

The municipality has a total working-age population of 16,597 of them 8,816 men and 7,781 women, which represents 62.8 of the total population. Housewives are 759 women of them 481 located in the rural area, that is 63.4% of the housewives of the municipality.

Regarding the availability of employment in general and for women, according to interviews with key informants in the territory, there is employment for women in agriculture, in the livestock business, in health and education. But in the rural area employment is only livestock and agricultural and for that reason there are many housewives in this territory.

With the opening of private work or Self-Employed Workers (TCP), in Corralillo there are more than 1 000 considered little for the population and with the tendency to fluctuate due to the fact that many close shortly after starting.

Within this TCP activity, the highest percentage is represented by coachmen (transport with horses), since the transportation deficit in the territory has made this activity an alternative for the population.

Although the TCP modality serves as a source of employment for women, most of them are engaged in traditional reproductive roles; In the entire municipality there are only two women business owners. Within this activity there is also a percentage of women who care for children (the data is not available), since the children's circle does not cover the demand, being prioritized for some sectors; all of which puts women working in the state sector in vulnerability because they are unable to pay the prices of this service that are high for the purchasing power of these women.

In the municipality three zones are identified where the correlation between the population and employment is unfavorable and an area where there is good correlation.

South Zone: This zone includes all the southern portion of the territory, it is a rural area where the

agricultural areas of the Corralillo Agricultural Company are located and it is also the most depopulated of the municipality, so there is more agricultural employment than population. In it are located the rural settlements of Gavilanes, LA Piedra, Guillermo Labre, San Pablo, Las Cruces, Motembo, Manga Larga, Siguanea, La Sierra, Motembo Viejo and Vesuvius. In addition to a small population, workers in these rural areas have to travel between two and ten kilometers to reach the work areas with the consequent expense of transportation.

North Zone: This zone is located in the northern portion of the municipality, excluding the coastal zone, where the fishing production areas of the fishing company UEB PAMAR are located, we also find the Agricultural Company "La Sierra" in which are concentrated the soils with better conditions for agricultural production.

Although this area is not the most depopulated of the municipality, there is an unfavorable correlation between employment and population, because the majority of its inhabitants do not choose to occupy the jobs in agriculture because of low wages. Therefore, it is necessary to transfer work force from the municipal seat, also with the limitation of distance and transportation.

There is evidence of the need to stimulate and improve the living conditions of agricultural workers in this area, including the usufructuaries of lands of Decrees 259/08 and Law 300/12.

Eastern Zone: This zone includes the entire eastern portion of the territory where settlements are located and areas served by the peasant sector, including the usufructuaries of land by decrees 259/08 Law 300/12, there being a favorable correlation between population and employment. The UEB Sugar Producers Quintín Banderas is located in this area, an important line in the activity of the municipality.

Within the urban settlements in this area we have Rancho Veloz, Quintín Banderas, and rural El Pilar, El Cedro and scattered farmhouses, with a mostly deficient employment force for the existing population.

Central Zone: This zone includes the entire area on both sides of the Northern Circuit from the urban settlement of Quintín Banderas to the municipal head settlement, including the urban population settlements of Rancho Veloz, and Sierra Morena. In it are located part of the rural settlements of the municipality, being the most populated area with 84.2% of the total population of the municipality we find diversity of jobs, but they are not enough for the amount of population residing in it, there is more population than job; for this reason in this area it is necessary to increase the sources of agricultural employment and services fundamentally.

Number of cooperatives and guilds in the municipality of Corralillo

In Corralillo the organizations that integrate the productive sector are the following:

Table 17. Data of cooperatives of Corralillo municipality

Type of Cooperative	Number	Sector	Total Members	Total	Female	Male
CCS	6	MINAG	1669	1268	175	1093
CPA	4	MINAG		401	40	361
	2	AZCUBA				
UBPC	4	MINAG	888	888	66	822
	8	AZCUBA				
Total	24		2547	2547	281	2266

Source: Data provided by ANAP and municipal and provincial delegations of Agriculture.

The state agricultural units present in the municipality are the following:

Table 18. Base Units of Agriculture in Corralillo (UEB)

State entities of Agriculture	TYPE	NUMBER	Total workers disaggregated by sex		
			Male	Female	Total
	UEB Forestry	1	167	15	182
	UEB Flora y Fauna	2	42	14	56
	UEB San Pedro	1	74	19	93
	UEB Adelaida	1	54	4	58
	Total	5	337	52	389

Source: Data provided by the Municipal Delegations of Agriculture

The territory also has in its productive sector the following:

- A Business Unit of Base (UEB) called PAMAR belonging to the Industrial Fishing Company of Caibarién (EPICAL)
- 43 agroecological farms (belonging to diverse productive forms) that become important referents in the manufacture of compost, the development of vermiculture and the use of integrated pest management.
- Seven organoponic orchards and seven plots¹⁴.

The productive and yield series available are shown below:

¹⁴ Part of a larger piece of land used for food production or small-scale animal husbandry.

Table 19. Food production series in Corralillo

CROPS	Production in tons in both sectors (state and non-state)					
	2010	2011	2012	2013	2014	2015
Sweet Potato	884.5	489.4	838.1	845.9	634.4	1 264.1
Taro	356.7	252.4	424.3	244.8	322.4	516.7
Cassava	889.6	827.1	749.8	973.2	969.1	1 713.7
Plantain	1 021.8	743.1	1 182.6	866.4	1 079.9	951.4
Banana	13	16.7	76.4	95	114.2	79
Rice	1 51.7	246.7	278.1	186.8	531.2	416.1
Corn	547.8	436.1	441.3	529	741.9	315.5
Black beans	130.5	218	251.6	251.5	277.2	366.9

Source: Municipal statistical yearbooks 2015, 2016 edition

Table 20. Average yield series of the main crops produced in the Corralillo municipality

CROPS	YIELD (t/ha)					
	2009	2010	2011	2012	2013	2014
Sweet Potato	4.4	3.9	5	5.3	5.7	8.3
Taro	3.6	5.4	6.1	13.1	7.1	10
Cassava	1.5	2.7	3.8	4.3	4.7	6.2
Plantain	4.7	7.4	26.2	25.2	15.4	33.5
Banana	21.2	8.7	1.7	6.8	8.9	17.6
Rice	1.19	0.97	1.76	1.31	1.21	2.65
Corn	0.91	1.17	1.62	1.42	1.4	2.9
Black beans	0.19	0.33	0.57	0.56	0.7	0.94

Source: Prepared by the authors based on data available in provincial and municipal statistical yearbooks (productions / harvests) ONEI 2015.

As analyzed in the summary section of the Central Zone, the behavior of the series of productions and yields has been variable and tends to rise. The municipality Corralillo has a similar behavior, specifically the production of plantain and plantain fruit were affected in 2013 and in 2011 respectively. Marking the productive base of the territory the Taro and the banana in its two typologies.

In terms of access to total basic services (water, sewage, health, education), 97.6% of the concentrated population of Corralillo has these services.

However, as it has been mentioned, educational and social assistance services such as day care centers, nursing homes and day care homes for the elderly are insufficient.

Table 21. Basic Services of Education and Health - Corralillo

Service	Type	Number
EDUCATION	Elementary School	18
	Middle School	6
	High School	3

	Pre university	2
	Technical Professional	1
	Special School	1
	Adults	1
	Total	32
HEALTH	Maternal Home	1
	Hospital	1
	Policlinic	2
	Nursing home for the elderly	1
	Care home for the elderly	1
	Family Doctors	31
	Urban Zone	17
	Rural Zone	14
	Total	37

As for the electric service, it covers the entire municipality with only one low-voltage zone located in Barrio Santa Elvira Rancho Veloz.

Concerning drinking water, it is recognized that the service is deficient and despite the poor condition of some water supply networks, of a total of 27 settlements, 19 are served by aqueducts, of which 14 are totally and five are partially functioning, 11 settlements have individual solutions (water is treated).

The main problems associated with these services are:

- Lack of electric turbines in the settlements of San Pedro, Manga Larga and Siguatepeque.
- Bad condition of the conductor of the aqueduct of Sierra Morena and Loma de Corralillo.
- Poor condition of the stabilization ponds of the sewage systems of Rancho Veloz, Gavilanes and Guillermo Llabre.
- Poor condition and functioning of Gavilanes sewers, Rancho Veloz Settlements, Fca. La Rosita and military hill in Corralillo

The scarcity of water resources is noteworthy for the municipality with a dam and two aquifers with problems of overexploitation and salinization. They receive water by pipes during the periods of drought, for a total of 388 people.

Regarding the sewage service, the municipality has a public system that benefits only 10% of its population. Of 28 human settlements, only six have systems that favor a partial solution for the disposal of their liquid residuals, five of them pour directly into the environment. The rest of the population (90%) does not have a sewerage system, evacuating their residuals to pits or latrines located in the yards of houses, many of them near water sources

Households Conditions

Graph 3. Conditions of Housing



Source: municipal government documents

The houses in poor condition are located mainly in the rural part of the southern area of the municipality, in the towns of Racho Veloz and Quintín Banderas. The vulnerability of these homes is due to their low resistance to extreme weather events due to the structure of their walls or roofs,

which also accumulate a high constructive deterioration.

Viability Rural Automotive: The municipality has 631.1 km of roads of them 13.6% (6.1 km) correspond to national roads, 20.6% (130 km) are municipal roads. The rest of the roads 414.4 Km (65%) are access to sugarcane areas, of Various Crops and of the Livestock Enterprise "La Sierra". The road network of municipal category is deteriorated there is 485.6 km (77%) in regular and poor condition and unpaved.

2.2. Brief Characterization of the Quemado de Güines municipality

The Municipality of Quemado de Güines is located in the north of the province of Villa Clara about 70 km from its provincial capital. Its center is located at 575 degrees north latitude and 337 degrees east longitude. Its physical limits are: To the North: Atlantic Ocean, to the South: Limit of the municipality Santo Domingo, to the East: Limit of the municipality Sagua la Grande and to the West: Limit of the municipality Corralillo.

Account with a territorial extension of 332.82 Km², the municipality is formed by 18 concentrated human settlements, of them: three urban and 15 rural, besides the dispersed population that represents approximately 13.04%, structured in five Popular Councils, of them two urban and three rural.

The population, based on data from 2015 of the ONEI, edition of 2016, is 21 689 inhabitants, of which 49% are women. In the urban area is located 65% of the population of the municipality, the rest is in the rural area or 7,626 people for 35%. In this municipality 2.7% of the total population of the province is concentrated and has a population density of 65.2 inhabitants per km².

Quemado de Güines also has the Protected Marine Area (AMP) Las Picúas Cayo Cristo which is part of the National System of Protected Areas (SNAP) and belongs to the National Company for the Protection of Flora and Fauna (ENPPFF). created in the year 1991 being legally approved by the category of Wildlife Refuge (RF).

It has a total working-age population of 13,619 of them 7,325 men and 6,294 women, representing 62.7% of the total population. Housewives in the municipality are 4 611 women. Regarding the availability of employment in general and for women, some interviewed people acknowledge that the municipality counts as fundamental sources the sugar industry and agriculture especially in the various crops and this offer is for both men and women; However, there are few people to take care of agriculture, because it is a generally manual work and with few conditions regarding technologies that humanize work, supplies, tools and work tools, among others. In the sugar industry women have offers in the offices and the central laboratory. The closure of one of the plants of the two that existed markedly reduced the job offer in the municipality, the rural areas of the municipality are characterized by having more sources of employment than resident population.

The increase in workers in the non-state sector (TCP) has tripled, modifying the structural composition of the productive base of the local economy. There are in the municipality more than

1 000 TCP representing a significant number compared to the population of Quemado almost in a ratio of 20 people per TCP. Among the fundamental activities in which women have been employed in the private sector are cafeterias (in positions that reproduce traditional roles), hairdressers and manicures.

Number of cooperatives, unions

The organizations that integrate the productive sector in Quemado de Güines are the following:

Table 22. Cooperatives data of Quemado de Güines municipality

Type of Cooperative	Number	Sector	Total Members	Female	Male
CCS	9	MINAG	2176	380	1796
CPA	5	MINAG	455	83	372
UBPC	2	MINAG	191	37	154
	6	AZCUBA	679	101	578
Total	22		3501	601	2900

Source: Data provided by ANAP and municipal and provincial delegations of Agriculture

The state companies of the agricultural sector in the municipality are the following:

Table 23. Basic Business Units of Agriculture in Quemado de Güines (UEB)

State entities of Agriculture	Type	Number	Total workers disaggregated by sex		
			Male	Female	Total
State entities of Agriculture	Farm Güines	1	97	20	117
	Farm Margarita	1	62	13	75
	Farm Catey	1	26	4	30
	Internal Service Unit	1	86	20	106
	Marketer	1	4	4	8
	Urban Farm	1	31	6	37
	Direction UEB	1	17	7	24
	Total	7	323	74	397

Source: Data provided by the Municipal Delegations of Agriculture

The data obtained from series of productions and yields are the following:

Table 24. Food production series in Quemado de Güines

QUEMADO DE GÜINES						
CROPS	Production in tons in both sectors (state and non-state)					
	2010	2011	2012	2013	2014	2015

Sweet Potato	999.1	373.3	353.7	421.7	467.1	764
Taro	219.9	220	229.2	242.5	271.4	249.8
Cassava	2 350.4	1 702.7	2 240.4	2 730.8	2 863.7	3 096.7
Plantain	2 356.2	2 123.1	1 962.1	1 806.3	1 443.7	1 173.3
Banana	926.7	703.3	653.1	512.7	440.6	312.8
Rice	239.2	138.4	198.6	106	106.5	32.7
Corn	580.3	514.5	451.2	1 163.8	1 038.1	661.2
Black beans	231.3	341.6	304.6	362	521.4	514.8

Source: Municipal statistical yearbooks 2015, 2016 edition

Table 25. Average yield series of the main crops produced in Quemado de Güines municipality

	YIELD (t/ha)					
	2009	2010	2011	2012	2013	2014
Sweet Potato	4.77	4.44	5.20	4.07	5.11	6.16
Taro	12.00	10.00	8.30	7.67	10.19	13.99
Cassava	13.68	6.02	7.61	8.02	10.18	12.41
Plantain	72.70	468.99	49.94	49.25	39.31	34.51
Viand	8.11	413.37	68.49	46.72	37.48	34.21
Fruit	24.13	12.85	27.47	58.84	47.47	35.53
Rice	1.94	31.06	15.91	5.12	3.23	2.89
Corn	3.00	2.50	2.25	1.75	4.14	2.85
Black beans	0.80	0.65	0.87	0.83	0.99	1.17

Source: Prepared by the authors based on data available in provincial and municipal statistical yearbooks (productions / harvests) ONEI 2015.

In the case of Quemado de Güines, it can be observed that the yields of plantain, fruit, rice and corn have had a decreasing tendency, while the rest of the crops, although with variations have been increasing. As stated by the people contacted in the territory, this is a municipality with a food tradition of beans and taro.

Access to Basic Services

The most critical settlements in satisfaction of the basic services are Prieto, La Cubana, La Cubana I, and El Piñón.

The basic primary services are located mostly in the urban area of Quemado de Güines, serving a total of 10 436 inhabitants, which represents 47.2% of the population of the municipality. Staff in need of polyclinic services, basic secondary, children's circle and repair workshops, have to move to the municipal seat to have access to them, which are affected by the deficiencies of public transport and the conditions of the roads in most rural areas.

The greatest concentration of gastronomic services is located in the downtown area of the

municipal seat.

Table 26. Basic services of Education and Health - Quemado de Güines

Service	Type	Number
EDUCATION	Elementary School	12
	Middle School	6
	High School	4
	Pre university	1
	Technical Professional	1
	Special School	1
	Adults	1
	Total	27
HEALTH	Maternal Home	0
	Hospital	0
	Polyclinic	1
	Nursing home for the elderly	0
	Care home for the elderly	1
	Family Doctors	22
	Urban Zone	9
	Rural Zone	13
	Total	24

Source: Municipal Statistical Yearbook, ONEI 2015 edition 2016 and data offered by the municipality

Regarding the electric service, the municipality presents a 98.4% of electrification of the houses, the main problems are the low voltage in the Triangle Zone located in the municipal seat, El Piñón, San Ramón, Carahatas, Prieto and La Cubana. A total of 134 houses (314 inhabitants) remain to be electrified in the municipality, concentrated mainly in dispersed areas with greater incidence in the areas of Loma Lico and Surí Segunda. The access roads to rural areas are in very poor condition.

Regarding the drinking water service, the municipality has 7 supply sources belonging to the National Institute of Hydraulic Resources. In the municipality 5 407 inhabitants are supplied through this service. Of the total population, 2.0% receives water by aqueduct, 75.7% of the population receives the water supply service through individual wells and by pipes. It is noteworthy the existence of brackish wells and depletion of the sources in times of drought. During the drought a total of 2 692 people are supplied by pipe.

The main problems that affect the settlements that are supplied by aqueduct are manifested in the poor technical condition of the networks due to the lack of maintenance and the contamination of the wells, which are less than 10 meters deep and since there is no Sewerage network affects the quality of the water. The municipality has as potential the construction of the aqueduct that is in the execution stage (currently paralyzed).

Regarding the sewage service, 81.7% of the municipal population does not have a system for the treatment of liquid waste, only the settlements of Caguaguas, Riquelme, Lutgardita, Carahatas

and Quemado de Güines have partial solutions; which present problems in their operation due to the lack of maintenance actions. 92% of the population pours their residuals into pits, which constitutes the main health risk, since the water supply to the population is through groundwater.

HOUSING CONDITIONS

Graph 4. Conditions of Housing



Source: Documents of the municipal governments

Only in the Popular Councils: La Puya and El Perejil concentrates 58.17% of the houses, with a total of 4 834. Typologies (III and IV) of the housing fund predominate in rural areas, rendering them more vulnerable to natural disasters. That is not the case for urban areas.

Conditions of the roads: 81.0% of the road network of the municipality are in regular and poor condition, and only 19.0% (33 km).

2.3 Brief characterization of Santo Domingo municipality

The municipality of Santo Domingo is located approximately in the center of the island, in the northwest area of the province of Villa Clara, with a territorial extension of 878.07 km², being the third largest in the province, after Manicaragua and Sagua which are the largest, occupying 10.4% of the total province.

Bordered north with the municipalities of Quemado de Güines, Corralillo and Sagua la Grande, east with those of Cifuentes and Ranchuelo, south with Santa Isabel de Las Lajas and Rhodes, both belonging to the province of Cienfuegos and west with the Arabs from the province of Matanzas.

It is structured in 10 Popular Councils of which two are urban, one is rural and seven are mixed.

The population, based on 2015 data from the ONEI, 2016 edition, is 50,514 inhabitants, 49% of them are women. 73% of the population of the municipality is located in the urban area, the rest is in the rural area or 13 635 people, for 26.9%. In this municipality 6.3% of the total population of the province is concentrated and has a population density of 57.5 inhabitants per km².

Santo Domingo has a total working-age population of 31,652 of them 16,762 men and 14,890 women, representing 62.6% of the total population of the municipality.

Regarding the availability of employment in general and for women, although the municipality has several diverse industries it is considered that there are few sources of employment that meet the needs of women, besides, agriculture is the fundamental source in the rural area to which very few women have access to.

In the territory there is a total of 1,723 workers on their own account, recognizing that this modality is depressed in the rural sector, where only the leasing of the premises belonging to social circles is accessed¹⁵ and the owners are only men.

Number of Cooperatives, Unions

The organizations that make up the productive sector in the municipality are composed of:

Table 27. Data of cooperatives of Santo Domingo municipality

Type of Cooperative	Number	Sector	Total Members	Female	Male
CCS	16	MINAG	2679	-	-
CPA	6	MINAG	315	-	-
	4	AZCUBA		-	-
UBPC	2	MINAG	155	-	-
	15	AZCUBA	-	-	-
Total	43		3149		

Source: Data provided by ANAP and municipal and provincial delegations of Agriculture

Within the productive sector, there is also:

- 19 organoponic
- 4 intensive gardens
- 5 semi-protected
- 427 plots
- 463 courtyards
- 3 state farms

Table 28. Food production series in Santo Domingo

SANTO DOMINGO						
CROPS	Productions in tons in both sectors (state and non-state)					
	2010	2011	2012	2013	2014	2015
Sweet Potato	2 797.9	759.2	909	1 385.6	2 027.9	3 492.0
Taro	801.2	268.1	239	229.9	639.8	413.6

¹⁵ It refers to recreational spaces often open in rural villages with a minimum of infrastructure to hold parties and political-cultural activities.

Cassava	1 880.2	1 120.6	1 119.0	1 209.4	2 380.4	3 349.3
Plantain	1 640.0	683.8	881.1	1 009.3	1 187.7	1 599.4
Banana	170.8	172.6	199	324	434	448.3
Rice	1 376.0	1 811.3	1 513.7	1 624.4	2 719.3	3 392.5
Corn	1 066.2	534.6	662.7	857.9	1 517.4	1 521.8
Black beans	613.2	239.4	340.9	347.6	869.3	1 092.6

Source: Municipal statistical yearbooks 2015, 2016 edition

Table 29. Average yield series of the main crops produced in the Santo Domingo municipality

CROPS	YIELD (t/ha)					
	2009	2010	2011	2012	2013	2014
Sweet Potato	4.73	4.82	4.4	4.29	4.09	7.03
Taro	9.42	9.9	6.31	11.33	6.25	12.75
Cassava	16.64	3.58	6.06	5.7	4.17	9.94
Plantain	2.18	6.3	6.49	11.62	13.96	6.91
Banana	6.2	10.61	7.22	15.43	12.18	56.02
Rice	1.6	2.07	3.44	2.22	3.13	3.98
Corn	1.46	1.83	1.96	2.08	2.1	2.97
Black beans	0.79	1.82	1.33	1.62	0.83	2.02

Source: Own elaboration based on data available in provincial and municipal statistical yearbooks (productions / harvests) ONEI 2015.

The productions and the yields in Santo Domingo as in other territories have variable behaviors throughout the presented stage; the crop that showed decrease was the banana grown in the last two years of the series. The crops of Taro, sweet potato, beans, corn and rice constitute the productive base of the municipality.

Access to Basic Services

In terms of access to total basic services (water, sewage, health, education), of the 43 concentrated settlements, 24 have all basic services, 55.85%, 11 are missing some service, 25.6% and 8 18.6% lack all services.

Table 30. Basic Services of Education and Health - Santo Domingo

Service	Type	Number
EDUCATION	Elementary School	32
	Middle School	8
	High School	5
	Pre university	1
	Technical Professional	2
	Special School	1
	Adults	3
	Total	51
HEALTH	Maternal Home	1
	Hospital	1
	Polyclinic	1
	Nursing home for the elderly	0
	Care home for the elderly	1
	Family Doctors	48
	Urban zone	20
	Rural zone	28
	Total	52

ONEI 2015 edición 2016 y datos ofrecidos por el municipio

99.89% of the houses of the municipality have electricity service. The 21 non-electrified houses are located in La Jutía, and Finca San Andrés.

Regarding the roads, there is a more critical situation in municipal interest roads, which are mostly not asphalted and about 97% of the existing 143.8 km is assessed as fair and poor.

On the other hand, 100% of the specific interest roads are classified as regular (101.5 km) and bad (50.9 km). The same happens with the 277 sugarcane roads served by the sugar mills George Washington and Carlos Baliños, where 84.76% of them present a regular or bad technical condition.

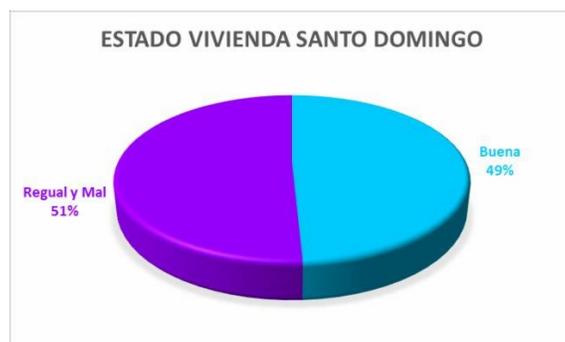
The supply system of drinking water is not sufficient. Of the 43 settlements in the municipality, 17 have aqueduct systems, representing 39.59% of the total number of settlements, and serve 63.91% of the total. A total of 11,623 people are served by pipes during drought periods.

Of the 43 settlements, only 12 have a sewerage service, with 12.16 km of such a network in regular condition, the rest of the settlements (31) do not receive this service, dumping their residuals into pits and latrines.

Housing Conditions

The municipality counts on a total of 17,000 houses, located in the urban establishments 53% of the total, while the 11.7% belonged to the dispersed houses.

Graph 5. Conditions of Housing



Source: Documents of the municipal governments

The dwellings located in the urban settlements presented the most favorable situation, while the rural dwellings presented the most critical situation since 35.3% were in poor condition, typology IV prevailing.

The road infrastructure is composed of roads of national, municipal and other specific interest. Near 39% of the routes of national interest display a regular or bad technical condition; a more critical situation presents the municipal interest pathways, which most of them are not paved and about 97% of the existing 143.8 km are between regular and poor condition.

2.4 Brief characterization of Los Arabos Municipality

The municipality of Los Arabos is located in the easternmost area of the province of Matanzas. Limiting to the north with the municipalities of Colón and Martí, to the east with the municipality of Santo Domingo and Corralillo, to the south with the municipality of Calimete and the province of Cienfuegos (municipality of Rhodes and Aguada de Pasajeros) and to the west with the municipality of Colón. It has a total surface: 758.34 km² (75 834.62 ha), by its extension it occupies the sixth place and 6.4% of the total Territory of the Province.

The population, based on 2015 data from the ONEI, 2016 edition, is 24,416 inhabitants, 49% of them are women. In the urban area is located 61% of the population of the municipality, the rest is in the rural area or 9 558 people for 39%.

It is characterized by a system of population settlements located mainly in its North-Northwest portion, leaving a large area to the South-Southeast practically depopulated, it is intended for forestry, sugarcane production and livestock.

There are 33 population settlements, of which 4 are classified as urban and the remaining 29 as rural. These are distributed in five Popular Councils (Los Arabos, San Pedro de Mayabón, Macagua, Israel Ruiz and Zorrilla-Cuatro Esquina) and two Circumscriptions served by the AMPP that are Arango and Jacán.

In this municipality 3.4% of the total population of the province is concentrated and has a

population density of 32.2 inhabitants per km².

Los Arabos has a total working-age population of 15,638 of them 8,341 men and 7,297 women, representing 46.6% of the total population of the municipality. The housewives of the municipality total a total of 3 695 women.

Regarding the availability of employment in general and for women, the fundamental employment is in the agricultural sector, since there is an Industrial Agro Complex; in the Tobacco Factory, located in the El Zorrillo settlement and very few in the work of the pineapple where men are mostly employed.

In the territory there are a total of 360 women working in the self-employed or non-state sector, of which 96% are in service areas.

The fundamental activity is agricultural and its lands are dedicated to pastures and forages, canes, forestry and various crops. The main companies and establishments stand out: the Sugar Company "Mario Muñoz", the General Company "Gusev", the Integral Forestry Company, the combination of "La Famosa" Preserves and a footwear factory.

The municipality has three important river basins that are: the Hanábana basin, Palma-Meteoro and Palmillas.

Number of Cooperatives, Unions

Most of the economic activity of the Municipality is carried out by entities that are organizations created in accordance with current legislation and that have different legal forms, predominantly the sugarcane activity both for its commercial activity and for the amount of labor force that it occupies in industrial and agricultural activity:

Table 31. Number of agricultural cooperatives in Los Arabos

Type of Cooperative	Number	Sector	Total Members	Female	Male
CCS	5	MINAG	640	134	506
	2	AZCUBA	519	75	444
CPA	1	MINAG	29	9	20
	7	AZCUBA	740	124	616
UBPC	2	MINAG	214	69	145
	4	AZCUBA	348	66	282
Total	21		2490	477	2013

Source: Data provided by ANAP and municipal and provincial delegations of Agriculture

Los Arabos also has agricultural state companies distributed as follows:

Table 32. Base Units of Agriculture in Los Arabos (UEB)

Type	Number	Total workers disaggregated by sex		
		Male	Female	Total

State entities of Agriculture	UEB Agroforestry Los Arabos	1	147	40	187
	UEB I Agricultural Los Arabos	1	137	41	178
	Urban Farm	1	21	5	26
	UEB Can 28 de Septiembre	1	18	29	47
	UEB Tobbacco industry	1	115	135	250
	Total	5	438	250	688

Source: Data provided by the Municipal Delegations of Agriculture

Los datos productivos obtenidos se presentan a continuación:

Table 33. Food production series in Los Arabos

LOS ARABOS						
CROPS	Production in tons in both sectors (state and non-state)					
	2010	2011	2012	2013	2014	2015
Sweet potato	12.3	7.6	7.8	40.3	49.6	
Taro	-	-	-	-	-	-
Cassava	4.6	12.1	4.0	57.8	57.8	50.2
Plantain	17.6	12.1	7.5	23.6	33.2	40.3
Banana	-	-	-	-	-	-
Rice	15.7	46.8	0.8	15.6	29.8	114
Corn	8.6	19.3	8.7	-	20.2	22.2
Black beans	5.1	15.5	3.8	4.8	3.2	0.9

Source: Municipal statistical yearbooks 2015, 2016 edition

Table 34. Average yield series of the main crops produced in the Los Arabos municipality

CROPS	YIELD (t/ha)					
	2010	2011	2012	2013	2014	2015
Sweet potato	1.23	1.31	2.17	3.84	3.42	3.55
Taro	0.00	0.00	0.00	0.00	0.00	0.00
Cassava	2.42	3.10	3.08	3.42	4.26	3.59
Plantain	1.98	0.93	2.80	2.65	3.69	4.33
Banana	0.00	0.00	0.00	0.00	0.00	0.00
Rice	0.57	1.11	0.12	0.80	1.61	2.42
Corn	0.52	0.74	0.48	0.00	1.22	1.91
Black beans	1.55	2.21	0.76	0.33	0.33	0.17

Source: Own elaboration based on data available in provincial and municipal statistical yearbooks (productions / harvests) ONEI 2015.

In Los Arabos, productions and yields present a clear and stable growth trend. The black beans, meanwhile, from the year 2012 had a sustained decrease falling from 2.21 to 0.17 tons per hectare in only 3 years. In the case of cassava and plantain, they have an important weight in the production of the municipality.

Access to Basic Services

Table 35. Los Arabos basic education and health services

Service	Type	Number
EDUCATION	Children's Circles	1
	Elementary School	10
	High School	3
	Pre university	1
	Professional Technical	2
	Special School	1
	Total	18
HEALTH	Maternal Home	-
	Hospital	-
	Polyclinic	3
	Nursing home for the elderly	1
	Care home for the elderly	2
	Médicos de Familia	23
	Total	41

Fuente: Anuario Estadístico Municipal, ONEI 2015 edición 2016 y datos ofrecidos por el municipio

On the other hand, 99% of the houses have electric service coverage; Meanwhile he 79.6 km have road coverage, although 50.7 km of them are in poor condition. 23% of homes have sewerage services.

The potable water supply system is described in the following table. It is good to note that 1 488 households receive water through pipes, that is, approximately 5 208 people.

Quantity and distribution of housing

The municipality has a total of 9 267 housing units, a total of 6,040 homes being located in the urban settlements and a total of 3,227 homes in the rural settlements.

2.5. Brief characterization of Amancio Rodríguez municipality

The Municipality of Amancio is the eighth Municipality of the Las Tunas Province, located geographically to the south of the territory. Bordered on the north by the municipalities of Guáimaro and Najasa of the Agramontina Province, on the west by Santa Cruz del Sur of the same province, on the east by the Municipality of Colombia and on the south by the Gulf of Guacanayabo. It has a territorial extension of 856.4 km².

In the territory is the Wildlife Refuge, "San Miguel del Junco and Cayo Rabihorcado".

The population, based on data from 2015 of the ONEI, edition of 2016 is 38,714 inhabitants, distributed in seven popular councils one urban, three semi-urban, three rural and 80 districts, of which 49% are women. In the urban area is located 72% of the population of the municipality, the rest is in the rural area or 10 471 people for 27%.

In this municipality 7.2% of the total population of the province is concentrated and has a population density of 45.4 inhabitants per km².

Amancio has a total working-age population of 25,602 of them 13,629 men and 11,973 women. There are 10 839 women housewives in the municipality.

In the municipality, the availability of general employment and for women is concentrated in the cooperative sector that offers agricultural employment; as well as in the UBPC cane.

In the specific case of women the existence of the clothing company Melissa is a source of female employment in the municipality along with the TCP that within the fundamental activities that exist are paladares, carretilleros, disk recorders, caretakers of children and coffee shops. In the case of women employed in the private sector, they assume traditional roles. There are women whose economic source is the making of crafts and the popular pastry.

Although it is considered agricultural work as very hard for women, some women applied for land in usufruct from the decrees Law 259 and 300.

The municipality has a sugar mill and a derivative factory. Not only sugar is produced, but it also produces important derivatives such as: alcohol, rum, soda, furfural, sacharonise, bagasse and boards. It has an Agriculture Company with several food poles, areas of urban agriculture and livestock

production. There is a port of embarkation of sugar in bulk, a fishing company, with a shrimp industry.

Number of cooperatives, unions

The organizations that make up the productive sector in the municipality are composed of:

Table 36. Data of agricultural cooperatives of the municipality Amancio Rodríguez

Cooperative Type	Number	Sector	Total Members	Female	Male
CCS	16	MINAG	1 289	230	1 059
	1	AZCUBA			
CPA	5	MINAG	203	33	170
	2	AZCUBA			
UBPC	1	MINAG	468	72	396
	8	AZCUBA			
Total	33		1 960	335	1 625

Source: Data provided by ANAP and municipal and provincial delegations of Agriculture

The areas of coastal protective forests are in the coastal part, with predominant species such as mangroves: a mangrove area very vulnerable to climate change. The four characteristic species that constitute it are: Red mangrove (Rm), Dark Mangrove (An), Pataban" (Lr) a variety of mangrove, hard wood used for piles) and "Yana" (Cer), (hard wood used to make coal) by semi-deciduous forests and a protected area with a Wildlife Refuge category, "San Miguel del Junco and Cayo Rabihorcado".

Regarding the production series, some data is presented below:

Table 37. Food production series in Amancio Rodríguez

AMANCIO RODRÍGUEZ						
CROPS	Production in tons in both sectors (state and non-state)					
	2010	2011	2012	2013	2014	2015
Sweet potato	-	-	-	-	-	157
Taro	-	-	-	-	-	-
Cassava	279	296.1	229	180.4	255	366.1
Plantain	-	-	-	-	-	227
Banana	15.1	24.3	8.3	11.3	11.3	10.5
Rice	99.5	117.4	112.5	180	220	299.4
Corn	621.1	753.1	832.7	877.4	712.1	522
Black beans	-	-	-	-	-	30.6

Source: Municipal statistical yearbooks 2015, 2016 edition

Table 38. Average yield series of the main crops produced in the municipality of Amancio Rodríguez

CROPS	YIELD (t/ha)					
	2010	2011	2012	2013	2014	2015
Sweet Potato						5.3
Cassava	3.4	6.7	9.1	9.8	9.8	9.4
Plantain	1.6	2.3	4.8	8.5	8.8	10.9
Banana						10.2
Rice	2.3	3.2	2.6	4.2	5.5	4.5
Corn	1.4	1.6	1.8	2	2.9	3.7
Beans	0.4	0.7	0.7	0.8	0.9	1.1

Source: Prepared by the authors based on data available in provincial and municipal statistical yearbooks (productions / harvests) ONEI 2015.

Although there are information gaps in this municipality, the crops presented show stable growth in production and yields. It is one of the municipalities of Las Tunas most affected by the cyclones of 2008 and 2012, which could be influencing the productive results of the territory. It is also evident that the municipality relies on the positive and growing results of cassava, plantain, fruit and rice crops.

Access to Basic Services

Table 39. Basic services of education and health - Amancio Rodríguez

Servicio	Tipo	Cantidad
EDUCATION	Elementary School	54
	Middle School	1
	Children Circles	1
	High School	5
	Pre university	1
	Mixed Center	1
	Special School	2
	Comprehensive course for young people	1
	University Campus	4
	Total	70
HEALTH	Maternal Home	1
	Hospital	1
	Rehabilitation Center	1
	Polyclinic	1
	Home for the Elderly	1
	Dental Clinic	1
	Pharmacy	3
	Care home for the elderly	1
	Family doctors	44
	Urban Zone	18
	Rural Zone	26
	Total	48

Source: Municipal Statistical Yearbook, ONEI 2015 edition 2016 and data provided by the municipality

Distribution and Condition of Households

The municipality of Amancio has 14 734 homes of them in the urban area 10 589 and rural 4 145. The construction status of these homes is as follows:

Table 40. Distribution by CP and by constructive status in Amancio Rodríguez municipality

Popular Council	Condition of Households			Total
	G	R	B	
C/P 01	4000	776	776	5552
C/P 02	920	630	652	2202
C/P 03	931	917	1000	2848.
C/P 04	125	175	400	700
C/P 05	457	220	350	1027
C/P 06	412	639	398	1449
C/P 07	100	122	273	495
C/P 08	131	230	100	461
TOTAL	7076	3709	3949	14 734

Source: documents provided by the municipal government.

2.6. Brief characterization of the Colombia municipality

The municipality Colombia is located south of the Province of Las Tunas, bordered on the north by the municipality of Guáimaro of the province of Camagüey, on the south by the Gulf of Guacanayabo, on the east by the municipality Jobabo and on the west by the municipality of Amancio, its territorial extension is 559.42 km² with a population of 32 537 inhabitants, basically grouped in 32 population settlements. Of them, one urban that groups a population of 23 125 inhabitants and the rest is rural, equivalent to 32 537 inhabitants with a population density of 58.1 inhabitants per km². It is conformed by five Popular Councils, of them two rural and three mixed.

Colombia has a total working age population of 21 312, of which 11 242 are men and 10 070 are women.

Number of cooperatives, unions

Table 41. Data of agricultural cooperatives of the municipality Colombia

Cooperative Type	Number	Sector	Total Member	Female	Male
CCS	10	MINAG	945	191	754
	2	AZCUBA			
CPA	3	MINAG	160	47	113
	1	AZCUBA			
UBPC	4	MINAG	630	128	502
	6	AZCUBA			
Total	26		1 735	366	1 369

Source: Data provided by ANAP and municipal and provincial delegations of Agriculture

There are six state UEBs of the agricultural sector in the municipality.

Coastal protected forest areas are found in the coastal zone, with predominant species such as mangroves: a mangrove area very vulnerable to climate change, the four characteristic species that make it Mangrove red (Rm), Dark Mangrove (An), Patabán (Lr) and Yana (Cer).

The following tables are presented in the production and yield series:

Table 42. Series of food production in Colombia

COLOMBIA						
CROPS	Production in tons in both sectors (state and non-state)					
	2010	2011	2012	2013	2014	2015
Sweet potato	576.8	630.7	821	931.7	1 327.8	964
Taro	28.6	2.3		2	1.8	
Cassava	1 112.1	1 826.4	1 918.4	2 848.8	4 704.2	4 193.1
Plantain	561.3	1 224.5	1 760.6	1 709.4	1 606.9	1 505.8
Banana	15.8	62.7	99.6	65.1	93.5	53.6
Rice	32.2	56.2	97.9	114.1	117.8	129
Corn	659	782.8	1 068	1 160.7	1 555.4	932.2
Black beans	16.4	37.1	47	65	77.2	38.4

Source: Municipal statistical yearbooks 2015, 2016 edition

As expressed by the various actors contacted when referring to the food tradition, they pointed to products such as plantain, corn, cassava and sweet potato, which coincide with the crops with the best levels of production. The behavior of the rest of the crops shows variable growth trends, although with increases and decreases throughout the period. The data of the productive yields can not be shown because there are no official records of the crops per hectare.

Access to basic services

Table 43. Basic services of education and health - Colombia

Service	Type	Number
EDUCATION	Elementary School	31
	Middle School	7
	High School	4
	Pre university	1
	Professional Technical	2
	Special School	1
	Adult	1
	Total	47
HEALTH	Family doctors	34
	Urban zone	20
	Rural zone	14
	Total	

Source: Municipal Statistical Yearbook, ONEI 2015 edition 2016 and data offered by the municipality

The general housing fund of the municipality behaves as follows:

Table 44. State of conservation of the housing fund of Colombia

Housing Fund	State of conservation		
TOTAL	B	R	M
11 595	8 014	2 069	1 512

Source: Data provided by the municipal government.

Population served by sewage system

There is no sewage system that covers the sanitary requirements of the entire population, as a result, waste of all kinds is poured in the river, across different parts of the urban center.

2.7 Brief characterization of Jobabo municipality

The Jobabo Municipality is located in the south center of the province, 36 km south of Las Tunas, the provincial capital and has a total area of 885.4 km², which represents 13.4% of the province's total. It limits to the south with the Gulf of Guacanayabo, to the east with the Municipalities Tunas and Río Cauto, to the west with Colombia and Guaimaro and to the north with the political divisions of Guaimaro and the municipality of Tunas. The municipal head owns 66945.84 agricultural ha that represents 59% of the total.

It has 13 Popular Councils, four urban and nine rural. In the town of Sábalo is the Monte Cabaniguán Wildlife Refuge, declared a Ramsar site with an area of 9 500 ha.

The population, based on 2015 data from the ONEI, 2016 edition, is 44211 inhabitants, of which 48% are women. 47.2% of the population of the municipality is located in the urban area, the rest is in the rural area, that is, 23 342 people for 52.7%.

In this municipality 8.2% of the total population of the province is concentrated and has a population density of 49.9 inhabitants per km².

The working-age population of Jobabo is a total of 28,626, including 15,526 men and 13,100 women and a total of 8,512 housewives. Regarding the availability of general employment, as well as for women, the people interviewed consider that the municipality has a scarce availability of employment for women, since the rural offer is mainly agricultural in the cooperative sector. They also refer that the TCP has little incidence in employment, the fundamental activity is masculine because it is developed mainly in transport (drivers and pedicabs). Minor possibility for women because there is very little activity of food sales, which are also mostly men. However, they highlight the existence of a coal workers brigade, formed by only women in a rural community working under very strong conditions. There are some women employed in the tobacco factory currently in the territory.

The agricultural cooperative sector of Jobabo behaves as follows:

Table 45. Number of cooperatives, unions in the municipality Jobabo

Type of Cooperative	Number	Sector	Total Members	Female	Male
CCS	15	MINAG	2302	436	1866
CPA	5	MINAG	267	45	222
UBPC	8	MINAG	663	169	494
Total	28		3232	650	2582

Source: Data provided by ANAP and municipal and provincial delegations of Agriculture

The state entities of the agricultural sector in Jobabo are the following:

Table 46. Base Units of Agriculture in Jobabo (UEB)

State entities of Agriculture	Type	Number	Total workers disaggregated by sex		
			Male	Female	Total
	Municipal Delegation of Agriculture	1	25	12	37
	UEB agricultural	2	617	207	824
	Tobacco Factory	1	92	134	226
	Silvicultural unit	1	176	25	201
	Flora and Fauna Unit	1	67	17	84
	Flora and Fauna Unit	1	38	18	56
	Plant Health	1	3	2	5
	UEB Coal Production	1	533	51	584
	LABIOFAM	1	9	6	15
	GELMA (commercial and supplies, inputs)	1	14	6	20
	UEB Porcine	1	8	3	11
	UEB Minor Cattle	1	3	0	3
	Grain	1	13	5	18
	Poultry	1	1	0	1
	Beekeeping	1	14	1	15
	Total	16	1613	487	2100

Source: Data provided by the Municipal Delegations of Agriculture

The production in recent years have behaved in the following manner:

Table 47. Food production series in Jobabo.

JOBABO						
CROPS	Production in tons in both sectors (state and non-state)					
	2010	2011	2012	2013	2014	2015
Sweet Potato	370.9	163.2	156.5	219.9	292.6	197.2
Taro	6	0	0	1.8	0.4	7
Cassava	818.3	664.1	461.7	835.7	12 998	734.6
Plantain	1 451.8	396.6	250.2	489.8	426.3	542.3
Banana	29.5	10.4	12.5	15.1	27	30
Rice	103.4	124.4	78	88.1	14	4
Corn	1 140.5	792.3	975.4	1 101.3	1 884.7	971.2
Black beans	116	146.3	258.5	20	0	0

Source: Municipal statistical yearbooks 2015, 2016 edition

Table 48. Average yield series of the main crops produced in the municipality Jobabo

JOBABO						
YIELD (t/ha)						
	2010	2011	2012	2013	2014	2015
Sweet Potato						
Taro	3.1	19.6	16.6	4.8	5.9	7.3
Cassava						
Plantain	1.7	13.8	33.4	5.2	6.2	8.4
Banana	1.4	21.4	25.4	7.8	12.9	7.3
Rice	0.6	14.1	19.7	5.3	12.8	7.3
Corn	1.1	8/	2.6	2.6	4.3	4
Black beans	0.6	6.6	8.3	1.7	1.5	2.4
Sweet Potato	0.5	0.7	0.5	1	0.8	0.9

Source: Municipal statistical yearbooks 2015, 2016 edition

The production and yields of the municipality of Jobabo in the 2010-2015 series clearly show a variability of results. The production of plantains showed the lowest growth while cassava and sweet potato showed the best results.

Access to basic services

Table 49. Jobabo basic education and health services

Service	Type	Number
EDUCATION	Children's Circle	2
	Elementary School	61
	Middle School	8
	High School	5
	Pre university	2
	Professional Technical	1
	Special School	1
	Adult	1
	Total	80
HEALTH	Hospital	1
	Polyclinic	1
	Dental Clinic	1
	Maternal Home	1
	Family Doctors	51
	Urban Zone	20
	Rural Zone	31
	Total	55

Source: Municipal Statistical Yearbook, ONEI 2015 edition 2016 and data provided by the municipality

Regarding social assistance, Jobabo has a home for the elderly and a nursing home.

With regard to the sewage service, the contactees report that there is no sewer system, mostly pits and that the technical housing condition is very poor.

The housing fund of the municipality of Jobabo is characterized by a universe of, 14 894 homes, of the same Typology I, 2070, Typology II, 188, Typology III, 4302, Typology IV, 451 and Typology V, 7883. Around 56% of the houses in the municipality are typology Constructive IV and V, meaning that they are very vulnerable to exposure to strong winds, which could cause severe damage during the passage of a hurricane.

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