




## Annex 2 – Social Assessment

Version	Date	Author	Initials	Review	Initials	Approval	Initials
2.0	May 2019	Luisa Torres Duenas Bouke Ottow		A. Giardino		D.J. Walstra	

**Status**  
Final



## Contents

<b>1 Introduction</b>	<b>1</b>
<b>2 Interview methods</b>	<b>3</b>
2.1 Questionnaire	5
2.1.1 Social aspects questionnaire	5
2.1.2 Natural coastal hazards questionnaire	6
<b>3 National context: São Tomé and Príncipe</b>	<b>9</b>
3.1 Culture	9
3.1.1 Language and stories	9
3.1.2 Tchiloli	9
3.1.3 Dança Congo	9
3.1.4 Other dances	10
3.1.5 Religion	10
3.2 Economy	11
3.2.1 Fisheries	11
3.2.2 Tourism	11
3.2.3 Cocoa	11
3.2.4 Oil	11
3.2.5 Land ownership	11
3.2.6 Education	12
3.2.7 Other economic aspects	13
3.3 Governmental structure	14
3.4 Governmental and non-governmental initiatives	16
3.4.1 CONPREC	16
3.4.2 GIME	17
3.4.3 MARAPA (Mar Ambiente e Pesca Artesanal)	18
3.4.4 Additional NGO's	19
<b>4 Social assessment results</b>	<b>21</b>
4.1 Introduction to project sites and description	21
4.2 Structure of the social assessment per community	22
4.3 Iô Grande	23
4.3.1 Site description and aerial view	23
4.3.2 History	24
4.3.3 Economic activities	25
4.3.4 Active organizations	25
4.3.5 Exposed assets	25
4.3.6 Main issues	27
4.3.7 Stakeholder participation suggestions	27
4.4 Praia Melão	29
4.4.1 Site description and aerial view	29
4.4.2 History	31
4.4.3 Economic activities	31
4.4.4 Active organizations	31
4.4.5 Exposed assets	32
4.4.6 Main issues	34

4.4.7	Stakeholder participation suggestions	34
4.5	Pantufo	36
4.5.1	Site description and aerial view	36
4.5.2	History	38
4.5.3	Economic activities	38
4.5.4	Active organizations	39
4.5.5	Exposed assets	39
4.5.6	Main issues	39
4.5.7	Stakeholder participation suggestions	40
4.6	Praia Lochinga, Gamboa, and Cruz	42
4.6.1	Site description and aerial view	42
4.6.2	History	44
4.6.3	Economic activities	44
4.6.4	Active organizations	45
4.6.5	Exposed assets	46
4.6.6	Main issues	46
4.6.7	Stakeholder participation suggestions	47
4.7	Micoló	49
4.7.1	Site description and aerial view	49
4.7.2	History	51
4.7.3	Economic activities	52
4.7.4	Active organizations	52
4.7.5	Exposed assets	53
4.7.6	Main issues	54
4.7.7	Stakeholder participation suggestions	55
4.8	Praia Abade	57
4.8.1	Site description and aerial view	57
4.8.2	History	58
4.8.3	Economic activities	59
4.8.4	Active organizations	59
4.8.5	Exposed assets	60
4.8.6	Main issues	61
4.8.7	Stakeholder participation suggestions	63
<b>5</b>	<b>General recommendations</b>	<b>65</b>
5.1	Participatory risk mapping meetings	65
5.2	Adaptation solutions meetings	65
5.2.1	Bottom-up participation	66
5.2.2	Build on existing initiatives	66
5.2.3	Relocation	66
5.2.4	Measures and development of the area	66
<b>6</b>	<b>References</b>	<b>67</b>

## 1 Introduction

The key-objective of this task is to carry out a detailed social assessment at the selected pilot communities. The assessment is used to:

- Gain a better understanding of the social structure and organization of the communities, possible presence of different sub-groups within the community, presence of organizations already effectively operating within the community (e.g. church, NGOs, football clubs, (traditional) cultural groups, etc.), economic activities, etc.
- Gain a better understanding of the communities' perception of hazards and risks to be used as basis for the Risk Mapping (Task 4)
- Derive information on vulnerability of assets to flooding events by direct observations and/or interviews (e.g. type of houses, construction materials, repair costs, etc.).
- Get insight into local preferences of possible adaptation options, including, but not limited to, physical resettlements

In order to achieve the objectives above, the project team visited São Tomé and Príncipe from December 8<sup>th</sup> - 18<sup>th</sup>, 2018. Eight communities were visited in the following order: Iô-Grande, Cruz-Gambôa-Lochinga, Micoló, Praia Melão, Pantufo and Abade.

In total, approximately 80 to 100 people were involved in interviews and other conversations. The interviews were carried out using a list of questions aimed at determining the social structure and main issues faced by the communities, and collecting information to help validate numerical models developed for this project.

Before each site visit, CONPREC (Conselho Nacional de Preparação e Resposta as Catástrofes – National Council for the Prevention and Response to Disasters) contacted their local representatives to inform them of the upcoming visit. The local CONPREC representatives gathered key members of the communities (leaders, presidents of existing associations, etc.) prior to the project team's arrival. The project team also spoke with other community members, both spontaneously and located during the course of the site visit. This approach was the most effective in order to get a full picture of the community given the short visits (1 day per community).

This annex is based on the direct observations during site visits and informative discussions with members of the STP government, MARAPA and CONPREC. It briefly describes social characteristics common to São Tomé and Príncipe as a whole, as well as the specific findings of the social assessment for each community. Finally, this annex provides recommendations for preparation of upcoming site visits, which will include participatory risk mapping (see Annex 4).



## 2 Interview methods

At each of the eight project sites, the project team conducted a series of interviews with various community members (approximately 80 -100 people across all communities). In total, only 48 people names were registered (see Table 2.1 ). The people registered were the ones with whom the team held longer and/or more in depth conversations. Many others observed and contributed to the conversations and voiced their opinion, both in agreement and disagreement.

The interviews were semi-structured. During the interviews, we referred to a list of questions (see section 2.1), with a special emphasis on flood and erosion-related issues. We did not follow the list of questions exactly, only asking the questions that were relevant to the interviewee(s) and that we felt the person could answer.

Upon arriving, in collaboration with CONPREC, we attempted to identify the following community members:

- Chefe da praia (beach master)
- Village leader(s)
- (Leader of the) fishermen
- (Leader of the) *palaiê*, fish merchants
- Vereador (local representative at the district council)
- Representative of the câmara (representative of the district in national government)
- Local CONPREC member(s)
- MARAPA representative(s)

Unfortunately, not all of these community members were available to meet during the site visits. The team always met with a number of fishermen and *palaiê*, and in almost all communities the village leader. A number of miscellaneous community members were also interviewed.



Photo 2.1 (left) Interviewing Chefe de Praia in Pantufo, (right) Interview *Palaiê* group Praia Cruz site visits. Photos by B. Ottow.



Photo 2.2 (left) Interviewing a resident in Pantufo, (right) Team kick-off for Praia Melão site visits. Photos by A. Giardino (left) and N. Vandebroek (right).

Table 2.1 List of interviewees per site-location

Region	Name	Occupation	Age
Iô Grande	Americo Lazaro	Leader/Fishermen	>50
	Dulce Pereira Forte (Nanda)	Palaiê /female leader	35-35
	Maike Lazaro	Youth leader	24
	Jose Luis	Local Health care center agent/ Quiosque keeper	>50
	Jorginho	Youth group	22
	Maria Menezes Constantino	Palaiê	32
	Various (4 members of local CONPREC team)	All Fishermen	
Praia Loxinga-Gambôa-Cruz	Melo Cristobal	Fishermen/ CONPREC member	40-55
	Julieta	Kindergarten Gambôa staff and CONPREC member	27
	Jaime Veracruz	Local Contractor	35-45
	Adelina	Palaiê Loxinga	45-55
	Eliseu de Almeida	Local CONPREC member and fishermen	30-35
	Jose Luiz Rodriguez	President fishermen association Gambôa	
	Conceição	Housewife / eventually Palaiê	<35
	Edgar Rodriguez	Vereador for infrastructure in Água Grande	
	Gervacio Vaz	Vereador for education, youth and sports	
	Pakish Bom Jesus	Vereador for environment	
	Clementino Boa M.	President of the Independent syndicate of teachers	
	Delniçia Almado	Teacher & secretary primary school in Cruz	<35
	Francisco de Souza	Chairman fishermen association Loxinga	<55
	Luiz Ponce	Government official of airport living in the region	<45
Melão	Ajen	Inhabitant of airport region	60- 70
	Cupertino Martins	Leader community/ President fishermen association/ CONPREC member	<55
	Manuel Lindi	Fishermen	<30
	Jose da Cruz	Fishermen	<40
	Alberto Luiz	Fishermen	<50
	Ana dos Santo Lima V.	President Palaiê association	<45
	Ana Maria	Palaiê	
	Germina Afonso	Palaiê	



	Virigilia da Cruz Manuel	Palaiê	
	Eduri Leal	Leader youth association	<25
Pantufó	Tomé Ramos	Fishermen/ CONPREC member	<40
	Hamilton Ferreira do Rosario	Local Policemen/CONPREC member	<45
	Jiclei	Chefe de praia	< 35
	Vicente Francisco Lima	President fishermen association / multiple boat owner	<50
	Idalecia	Palaiê	<30
Micoló	Joaquim Virigilio da Costa	Leader community/ President fishermen association/ CONPREC member	50-60
	Devidson Lopez	Motorbike driver	24
	Sergio	Youth leader	<25
	Anita	Palaiê	<30
	Aparecida	Palaiê/ Cooker	45-55
	Simon Manuel	Inhabitant Micoló Campo	<40
	Adilson Alvez Pereira	Chefe de praia/ President fishermen association	<35
Abade	Joana Vaz Moreno Pereira	School Staff and CONPREC member	<40
	Paulino da Silva	President of agriculture association	
	Natesia	President of Palaiê association	
	Carlos Aurelio Vigo Tito	Canoe builder/Fishermen	50-60
	Maria Antonia	Palaiê	<40

## 2.1 Questionnaire

The following list of questions was prepared in order to gather relevant information concerning the social structure of the communities and their experience with natural coastal hazards.

After introductory discussions on the problems experienced by the communities, simple methodologies were used for prioritizing the different issues. As an example, in one community, we used pebbles of different sizes to symbolize the problems (including coastal hazards, but also problems as lack of sanitation infrastructure, electricity, unemployment, etc.). Different members of the community were asked to classify and prioritize the problems. The methodology varied from community to community according to context and what the team thought it was appropriate.

Questions related to natural coastal hazards were formulated in order to gather exposure and vulnerability information useful for the risk mapping of all communities (see Annex 4).

### 2.1.1 Social aspects questionnaire

1. Personal information about the interviewee
  - a. Name
  - b. Age
  - c. Occupation
  - d. Other roles
2. General Information on the community
  - a. History of the community
  - b. Number of inhabitants
  - c. Main groups
3. Houses/households
  - a. Number of people per household

- b. Number of floors and average height of a house
  - c. Material used
- 4. Occupation
  - a. What are the main economical drivers/income generating activities of the area? (e.g. farming, trading-selling, transportation, fishing, livestock, construction, services, tourism, government/school/hospital/police)
  - b. Who participates in this?
  - c. Quantification: how many people, how much?
  - d. Do people remain in the community or commute for work purposes to the capital?
  - e. What are other important activities? (e.g. schooling, football, religious, cultural)
- 5. What are the main job-related, social (including sports), or cultural (including religious) groups?
  - a. Fishermen and palaiê association
  - b. Farmers association
  - c. CONPREC (Conselho Nacional de Preparação e Resposta as Catástrofes – National Council for the Prevention and Response to Disasters)
  - d. Gime (**G**ruppo de **I**nteresse de **M**anutenção de **E**stradas = Community Road Maintenance Groups)
  - e. Local NGOs
  - f. Women's group
  - g. Youth group
  - h. Sports club
  - i. School
  - j. Religious: Church? (which?) Jambi
  - k. Dancing (Bulaue, Danco congo, Tchiloli, Puita, Ussua, Socope)
- 6. How (well) are the activities organized?
  - a. How many people
  - b. Functionaries
  - c. What kind of activities
  - d. How often
  - e. Contribution fee? How collected? How spent?
  - f. Impact?
- 7. Problems
  - a. What are the main problems in the community?
  - b. Which you consider as the worst problem of the community?
  - c. In which priority order?
  - d. How important is the flooding problem?

## 2.1.2 Natural coastal hazards questionnaire

- 1. Flooding/erosion
  - a. How bad are flood-related problems?
    - i. Height/depth, area covered, water level reached during previous events (high water marks)
    - ii. Frequency: How many times the region floods in a year
    - iii. In which month(s) do floods typically occur, and how long does it take for the water to retreat?
    - iv. Which type of flooding is more common: river/rainfall/sea?
    - v. Frequency of riverine/rainfall flooding and duration
    - vi. When was the first flood you can remember?

- vii. When was the biggest flooding event you can remember?
    - viii. What is the most recent flood you can remember?
  - b. What is the highest acceptable water depth for you to be able to still continue your daily activities?
  - c. Has the beach retreated in recent years?
  - d. Does active sand extraction from the beach take place? What is the estimated sand extracted volume?
  - e. Have waves produced damage to houses and assets (boats, markets, etc.?)
  - f. What were the impacts of past flood events? (e.g. schools closed, lack of work, inability to visit the hospital?) Are roads, sewerage, schools, aqueduct, health care centers affected during a flood?
  - g. Which daily activities are interrupted by flooding? For how long?
  - h. Which regions are affected by river/rainfall flooding?
  - i. Does the drainage system works properly? Street flooding due to pipes?
  - j. How many houses have been completely lost? - Memory of which event was? What was the water depth?
  - k. Has anyone in your community died due to a flood? When? How many?
  - l. Which assets are threatened in a flood?
  - m. Cost associated with flooding/value of assets:
    - i. Cost of agricultural fields, price per weight of certain crop
    - ii. Cost of livestock
    - iii. Livestock dies is flooding events? How many?
    - iv. Cost of canoes and average daily catch, average daily value of catch
    - v. Loss of boats? How many are they in the community and where are they located
  - n. How much money you need to invest to repair your house after a flood event?
    - i. Cost of repair materials
    - ii. Cost of cleaning after a flood event. Things that normally need to be repaired in the house after an event: roofs, floors, doors, windows, walls, foundation, plumbing?
    - iii. Assets affected in a house - beds, mattresses, electronics, wardrobes, kitchen, etc.
    - iv. Total cost of a house
  - o. Has electricity gone down due to flooding event?
  - p. Has water supply being affected by flooding?
- 2. Causes and Solutions
  - a. What are possible causes of the flood-related problems?
  - b. Any type of prevention/alert/action when flooding is occurring or about to occur?
  - c. What are possible solutions you see for tackling the flooding problem?
- 3. Communication/participation
  - a. Common ways of communication
  - b. Ideas on participation



### 3 National context: São Tomé and Príncipe

#### 3.1 Culture

##### 3.1.1 Language and stories

The origin of the inhabitants of São Tomé is diverse. They are a mix of people from different parts of Africa and Europe (mainly Portugal), so different stories and forms are told and used, reflecting the different origins of the people.

A *contagi* is a popular folk tale that features figures familiar from both African and European folktales, such as royalty, giants, and witches, frequently dealing with encounters between men and animals. The turtle often plays a prominent role as a sympathetic, intelligent, and bright animal, comparable to the fox in European stories. The tales reflect important aspects of social life in the archipelago, such as the natural environment, the plantation, hunting, traditional medicine, and beliefs.

##### 3.1.2 Tchiloli

The best-known manifestations of local folklore are popular theatre performances that include colourful costumes. On Príncipe, a medieval drama, the *Auto da Floripes* is played.

Forros, an ethnic group on the island of São Tomé, perform the most famous play: “The Tragic Story of the Marquis of Mantua and Emperor Charlemagne”, or *tchiloli*. It combines drama, dancing and music and can go on for hours (the audience can ask for replays of the scenes). The story line is from Europe (about Charlemagne and his vassals); the way it is performed certainly has African elements. The masks that are used, commonly painted in a white-face style, can be understood as manifestations of the spiritual world, for in Africa white is the colour of the dead.

In between the scenes, the actors dance to the music of the orchestra, which consists of flutes and percussion instruments. Volunteer actors (men only) keep their role, transmitted from generation to generation, all their life long. The spectators participate actively in the performance by making comments during the various scenes of the play. The play has always given the local people the opportunity to have debates on justice, the confrontation between the strong and the weak, a fair trial, and the stamina of those who are right and finally win. As this popular play developed in a plantation colony marked by slavery and forced labour, the search for justice and truth has been an important aspect of its production (Seibert 2004).

##### 3.1.3 Dança Congo

Distinct cultural societies on São Tomé, comprising twenty to thirty members each, perform the *Dança Congo*, acted out in a wordless show with dances, acrobatics, whistles, and drumming. It is enacted in the open air by permanent associations in the communities. All roles (also the women ones) are played by men. The story is about four incompetent sons, the *Bobos* (Buffoons), who have to give the *Roça* (farm) they inherited from their father to the *Capitão of Congo*. Other characters are: the *Feiticeiro* (sorcerer), the *Zugozugo* (assistant of the sorcerer), the *D'jabo* (devil), and the *Anso Mole* (the angel killed by the sorcerer).

Similar performances are played in Brazil, Colombia, and Panama. The theme probably stems from the coronation of the Mani-Congo in Angola. The dance may have come to São Tomé directly from Africa or indirectly from Brazil (Seibert 2004).



Photo 3.1 Colourful costumes in the chiloli



Photo 3.2 Some Dança Congo actors

## 3.1.4 Other dances

The *ússua* and the *sócópé* are performed by community-based groups. Their members pay fees, and the groups also function as associations of mutual assistance in the case of funerals, illness, and other misfortunes.

The *puíta* (or *semba*) is a dance introduced by Angolan contract workers. It was once performed all night long by the African contract workers and the Tongas on the plantations during a party in honor of a deceased person. The guests eat and drink to the deceased's health before they dance to the sound of the percussion music. *Puíta* is also the name of the large drum used for the dance.

The *bulaué* is a dance which developed after independence among Tongas living in urban neighbourhoods. It has been adopted by the larger Forro community and can now be found in all corners of the island. Unlike the older Forro dance societies, the *bulaué* society does not offer mutual assistance to its members.

## 3.1.5 Religion

The vast majority of the people are Christians, with around 80% Roman Catholic, 15% Protestant and the remainder other or no religion. Protestant groups are growing and include New Apostolic, Baptist, Evangelical, Seventh Day Adventist, the Portuguese Maná and Pentecostal denominations. There is also a growing number of Jehovah's Witnesses, a growing community of about 200 Muslims and a similar number of the Baha'i faith (Becker 2008).

The moral teachings of the traditional church seem not to really interfere with the Santomean way of life. Few couples marry, causing the rate of births outside marriage to be the highest in the world.

Animist traditions that believe in the unity of body and soul, and the existence of souls in plants and animals, remain strong and exist alongside Christian rituals. Traditional healers and ritual specialists, often members of a major religion, oversee the local spirit-possession cult, *djambí*.

## 3.2 Economy

### 3.2.1 Fisheries

Fisheries play a small role in the STP economy. Foreign (mainly European) fishing fleets extract valuable catches from STP waters. The most abundant fish species are seabream, flying gurnard, squid, cornet fish, snapper, grouper and grunt.

Opportunities in this sector can be found in improving fishing know-how and fishing equipment, supplying cold storage units, and creating processing plants that can undertake export on a significant scale.

In coastal communities small scale fisheries is the main economical driver.

### 3.2.2 Tourism

Tourism is a growing business in STP, although the growth is slow. Since STP is so little known, most tourists have come from Portugal, because of the colonial links. However, there is an untapped European market beyond Portugal.

There is also a large untouched tourist market in continental West Africa. The main challenges for tourism in STP are limited infrastructure (including water, sanitation, roads and emergency health services) and lack of trained personnel.

### 3.2.3 Cocoa

The cocoa export has dropped from 11,000 ton/year to 3,000 ton/year (oral communication Dr. Henrique Pinto da Costa).

### 3.2.4 Oil

In 2005 the country signed, jointly with Nigeria, its first offshore oil exploration and production sharing agreement with international oil firms. So far this has generated income from the selling of licenses, not yet from the actual winning and selling of oil.

In 2007, the World Bank and IMF waived \$360 million in debt owed by São Tomé and Príncipe. This represented about 90% of the country's foreign debt (BBC News).

### 3.2.5 Land ownership

In the colonial days the land was divided into 30 plantations owned by 10 large companies. Each plantation ran from high elevation to low elevation. The plantation covered different climate zones with different ecosystems/crops. At the highest elevation there was forest, in the zone below it, coffee was grown. Below that, cocoa, and in the lower zone, sugar cane and coconut (see Figure 3.1 ).

This system was abandoned just before and after independence. In 1974, after the revolution in Portugal, the companies and therefore plantations were nationalized. As a result, the plantations stopped functioning prior to independence. They were already old-fashioned, depended on economy of scale, and were already experiencing competition from other countries (in the 19<sup>th</sup> century São Tomé was the biggest exporter of cocoa, but after the peak

in 1913 it has gone down continuously). The large companies were nationalized and the land divided and given to the people. The system collapsed as it flourished because of the economy of scale. People left the plantations and moved to the coast, where they started to inhabit previously marginal land: swamps and mangrove areas.

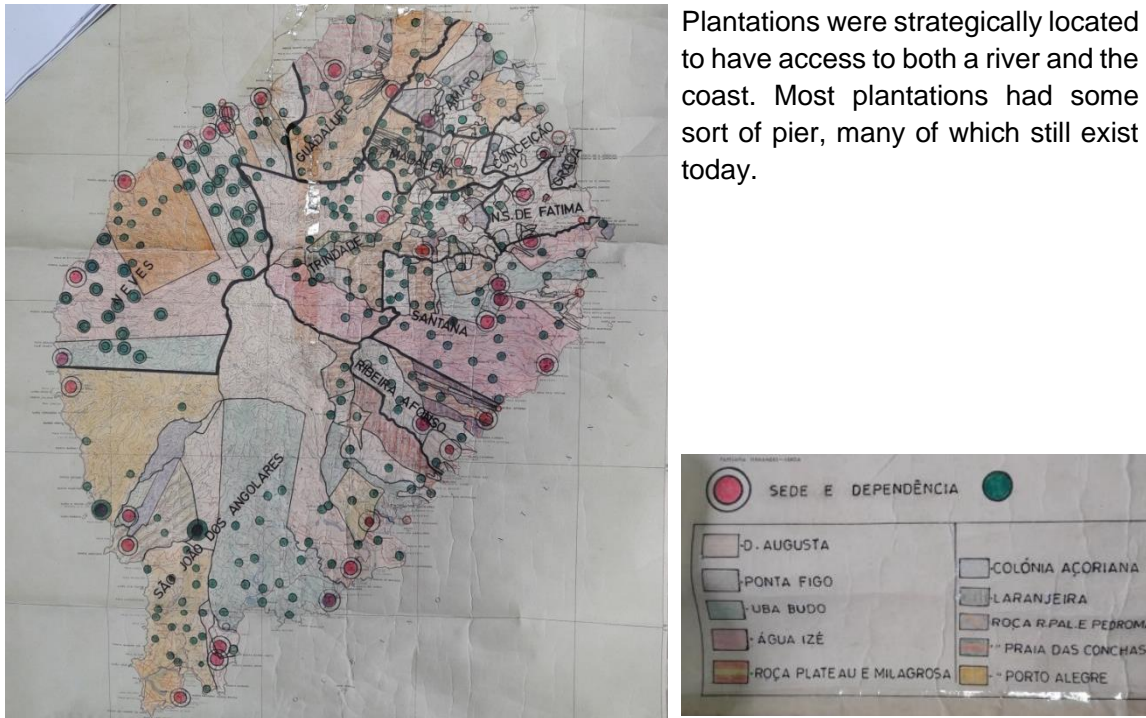


Figure 3.1 Map of the plantations on the island of São Tomé in 1958. The different colours represent the different companies that own the plantations.

It is not clear to what degree people own land. The land on which private houses are built is still a “concession” given to private persons, but the ownership of this land remains with the government (oral communication André Alvares).

There is great mobility of people because of the improved infrastructure, and people like to live near the city, where there are services like hospitals. In pre-colonial days, services were much closer to the people. For instance, there used to be 15 hospitals in the different plantations.

All the information described previously was mainly based on oral communication with Dr. Henrique Pinto da Costa.

### 3.2.6 Education

Primary school consists of two cycles: first cycle of grade 1 till grade 6, age 10 and the second cycle of grade 7 till 8, age 12. About 85% of children go to school (Becker 2008).

Until 1952, there were no grammar schools on the islands. Today, the Liceu Nacional in the capital has 4,000 students, studying up to grade 11, age 17 (Becker 2008).



Since 1996, São Tomé and Príncipe has had a higher-education polytechnic school, offering baccalaureate degrees. In 2007, the private Lusíadas University opened, offering degrees in business administration and law.

### 3.2.7 Other economic aspects

The number of people below the poverty line has grown consistently between 1984 and 2001: from 36% of the total population in 1984 to almost 54% in 2001 (Monteiro Fortes, 2011) and 66% in 2009 (CIA World Fact Book). The poverty is unequally distributed, meaning that in some parts of the country the number of people below the poverty line is much more than 66%. Knowing and understanding the local poverty situation is essential when looking into local problems and solutions related to extreme meteorological events and climate change. Table 2.1 presents some general socio-economic indicators, taken from the CIA World Fact Book.

Unemployment is difficult to measure and probably runs at about 50% (Becker 2008).

Table 3.1 Some general information (Source: the CIA World Fact Book and INE:

<https://www.cia.gov/library/publications/the-world-factbook/geos/tp.html>; <https://www.ine.st/index.php>):

Total area:	964 sq. km
Coast line:	209 km
Land use:	- agricultural land: 50.7% (2011 estimate) <ul style="list-style-type: none"> <li>• arable land 9.1 %</li> <li>• permanent crops 40.6%</li> <li>• permanent pasture 1%</li> </ul> - forest: 28.1% - other (built-up areas, roads, barren): 21.2%
Life expectancy at birth:	65.7 years (2018 est.) (INE: 67)
Median age:	18.7 years
Population:	204,454 (July 2018 estimate, (INE: 197700) (60% under 25)
Total dependency ratio <sup>1</sup> :	86.7
Population growth rate:	1.66% (2018 est.)
Urbanization:	72.8% of total population (2018)
Urbanization rate:	3.33% annual rate of change (2015-2020 est.)
Literacy:	74.9% (2015 est.) (INE: 90.1%)
Sanitation facility access:	- improved: <ul style="list-style-type: none"> <li>• Urban: 40.8% of population (2015 est.)</li> <li>• Rural: 23.3% of population (2015 est.)</li> <li>• Total: 34.7% of population (2015 est.)</li> </ul> - unimproved: <ul style="list-style-type: none"> <li>• Urban: 59.2% of population (2015 est.)</li> <li>• Rural: 76.7% of population (2015 est.)</li> <li>• Total: 65.3% of population (2015 est.)</li> </ul>
Electrification:	- total population: 59% (2013) - urban areas: 70% (2013) - rural areas: 40% (2013)
Telephones:	- fixed lines: per 100 inhabitants: 3 (2017 est.)

<sup>1</sup> Dependency ratios are a measure of the age structure of a population. They relate the number of individuals that are likely to be economically "dependent" on the support of others. Dependency ratios contrast the ratio of youths (ages 0-14) and the elderly (ages 65+) to the number of those in the working-age group (ages 15-64).

Internet:	- mobile cellular: per 100 inhabitants: 86 (2017 est.) percent of population : 25.8% (July 2016 est.)
GDP (per capita):	\$ 3,200 (2017 est.): cocoa (68%), copra, coffee, palm oil (2010 est.)
Imports:	\$ 127.7 million (2017 est.)
Exports:	\$ 15.6 million (2017 est.)
Inflation rate:	16% (31 December 2017 est.) (INE: 7.7%)
Unemployment:	20.8% (2012 est.) (INE: 13.6%)
Population below poverty line:	66.2% (2009 est.)

### 3.3 Governmental structure

ACE (Asesores de Comercio Exterior S.L.) made an assessment of the public finance management system of São Tomé and Príncipe in September 2009. The following description was taken from their final report (Lawson et al 2010).

São Tomé & Príncipe has functioned under a democratic multi-party system since 1990. The **President** of the Republic is elected to a 5-year term by direct universal suffrage and must gain an outright majority to be elected. The President may hold up to two consecutive terms.

The **Prime Minister** is named by the President, with the consent of the National Assembly and after consulting with the elected representatives of the political parties and taking due account of the electoral results. The fourteen members of the Cabinet of **Ministers** are chosen by the Prime Minister. The **National Assembly** is the supreme organ of the State and the highest legislative body. It is made up of 55 members, who are elected for a four-year terms and meet semi-annually.

The Government of São Tomé & Príncipe is structured into five categories of institutions:

- **Sovereign entities (7):**
  - The Presidency of the Republic
  - The National Assembly
  - The Prime Minister's Office (*Gabinete do Primer Ministro*)
  - The Supreme Court (*Supremo Tribunal de Justiça*) and its subordinate courts at regional and district levels
  - The Office of the Attorney General of the Republic (*Procurador-Geral da República*)
  - The Court of Accounts (*Tribunal de Contas*)
  - The Constitutional Court (*Tribunal Constitucional*)
- **Ministries (13)**
- **Regional Assembly** for the Special Autonomous Region (*Autarquia Especial*) of Príncipe
- **District Councils (*câmaras distritais*):** Six on São Tomé (Agua Grande, Cantagalo, Caué, Lemba, Lobata and Mezochi) and one on Príncipe (Pagué) (see the map in Figure 3.2).
- **Parastatal enterprises (8)**, which operate as self-funding commercial entities – the telecommunications company (CST), the post office (*Empresa dos Correios*) the airports authority (ENASA), the ports authority (ENAPORT), the water and electricity company (EMAE), the vegetable oil company (EMOLVE – *Empresa de Óleos Vegetais*), the

Monte-Café coffee company and the public bus company (*Agência de Transportes Colectivos*)

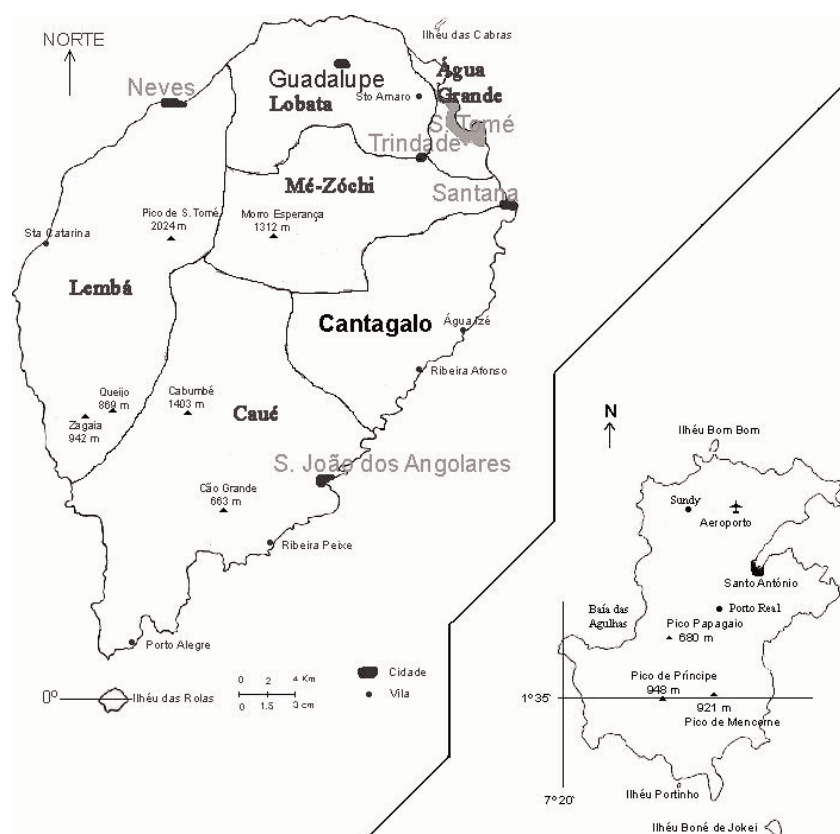


Figure 3.2 Administrative division of São Tomé and Príncipe.

The Sovereign entities and the ministries comprise the Central Government, while the Special Autonomous Region of Príncipe and the six **District Councils** comprise the Regional and Local Governments.

The **District Councils** consist of an elected chair (presidente) and council members (vereadores/councilors). The vereadores represent their village(s) and also each has their specialism. The vereadores together form the government for the whole district, not only for the communities they are elected by, and they focus on a specific field (infrastructure, education, youth, housing, etc.) for the whole district.

Under the government of São Tomé & Príncipe, the special autonomous region (*Autarquia Especial*) of Príncipe has its own – regional - government, headed by the regional president. The regional government has four ministers, each with their offices: Infrastructure, Agriculture (including fisheries), Education, and Finance.

Príncipe has an elected assembly consisting of 7 delegates (“deputados”) and their 7 alternates. This assembly meets at least four times a year and approves the annual budget of the regional government and the regional laws. On Príncipe, there are no districts and no “vereadores”. The deputados each represent a different “zona”.

According to Dr. Henrique Pinto da Costa (personal communication) a difficulty for local development is the lack of local government with mandate. There are districts, but that level is too far from the local communities and the vereadores are not really leading local areas, but each has a special sector for the whole district they are looking after. There is a local Chefe da praia, but they are part of the capitania/coastal protection, which is part of the army. Although they also deal with land use, determining where things can be built and where not, they have no authority.

The present day district boundaries do not reflect watersheds. In 2017, the World Bank financed an investment plan study for Sao Tome in which new administrative regions/boundaries are suggested according to catchment areas.

### 3.4 Governmental and non-governmental initiatives

In São Tomé there are many projects and initiatives. While they typically have good objectives, they are sometimes not well coordinated with the government or with each other. In this way, precious funding and resources may be dissipated without a lasting result. Some exceptions are CONPREC, GIME, and projects by Marapa.

#### 3.4.1 CONPREC

The work of CONPREC (Conselho Nacional de Preparação e Resposta as Catástrofes – National Council for the Prevention and Response to Disasters) started in 2009, with assistance from UNDP. In April 2010, the Government of STP established a preparatory committee for CONPREC that in December 2010 produced a Disaster Contingency Plan and a National Disaster Strategy Plan. On 24 May 2012, CONPREC was officially established.

CONPREC consists of representatives from:

- Civil protection/ Fire Department
- Directorate General Environment
- Directorate of Natural resources and Energy
- Directorate of Agriculture
- Directorate of livestock
- Local Government
- Coast guard
- Army
- National police
- National Institute of meteorology
- Red cross
- Ministry of Foreign Affairs
- Ministry of Health

The Ministry of Decentralization, which is responsible for the Region and the Districts, is also closely involved.

Prevention activities include:

- Establishment of local committees
- Providing information
- Inventory/mapping of risks
- Training the local committees

After the training, CONPREC people continued to visit the local committees every 3 months.

According to the information given by the national coordinator of CONPREC (Carlos Diaz), the national council has 14 technical members, 10 fixed positions for communication purposes with communities and 250 volunteers spread around 31 active communities in the country. 25 communities are on the main island, and the remaining 6 communities are located in Príncipe. Between 2012 and 2018 there appears to have been a growth and strengthening of the organization, as there were only 14 active communities in 2012.

In each active community, CONPREC has 8-10 local members who most of the time are representative people from the village as presidents of associations, leaders, Chefe de praia, etc. The local teams have access to communication equipment which they can use to contact relevant authorities in case of a disaster emergency. This equipment is also used to get meteorological information that is important for early warning and alerts. This information is not detailed, and the alerts are mainly used for fishermen safety purpose rather than for evacuation of people within the communities.

In the case of Príncipe, aside from the 6 local communities, the regional committee consists of 5 representatives from:

- Agriculture,
- Meteorology
- Health
- Education
- Communication

and will soon include representatives from:

- Defense
- Parliament

### 3.4.2 GIME

GIMes (**G**rupo de **I**nteresse de **M**anutenção de **E**stradas = Community Road Maintenance Groups) are rural civil society groups supervised by the São Tomé and Príncipe government body in charge of roads (INAE) and funded directly by the state. They are composed of people living in the vicinity of the road and are responsible for maintaining a section of road. 32 GIMes provide work for 1700 people – 3% of the total population. The initiative has been successful in terms of road maintenance and rehabilitation, and generating employment opportunities for the very poor. It has also been found to be an inexpensive way to maintain the roads.

The GIMes are established in 2005 with help from the EU. The 2010 DEVCO E3/ESIP report calls GIME a successful example of employment-intensive<sup>2</sup> methods that could be replicated elsewhere and also extended to other sectors, such as drainage, irrigation, reforestation and rubbish collection. The report also recommends building the capacity of some GIME groups to take on more technically challenging works. A key concern the report mentions is the

---

<sup>2</sup> "Employment-intensive" is the term used by the International Labour Organisation (ILO) to describe the optimal use of labour to achieve the maximum effect on poverty reduction, while paying due regard to cost and quality issues. Generally, an appropriate mix of labour, material and equipment is required to provide products of adequate quality in a cost effective manner.

sustainability of the project, as government funding will be difficult to find once the project has closed. Other concerns are the lack of clarity about whom the GIME report to, and the fact that while it provides employment, it does not create ownership nor tangible products (Dr. Henrique Pinto do Costa, personal communication).

### 3.4.3 MARAPA (Mar Ambiente e Pesca Artesanal)

MARAPA is an NGO that works closely with the palaiê and fishermen's association. The organization has introduced new boats to increase security and decrease deforestation in the region. Their objectives can be summarized as follows:

- 1 Support of local initiatives by the fishing communities
- 2 Fight against poverty of the coastal communities
- 3 Promotion of professional organizations towards a sustainable development of artisanal fisheries.

This NGO has good relationships with the government and has implemented several foreign-funded projects (e.g. from Japan, FIDA, France, Canada) on fisheries development in the past. In addition, they have experience with awareness campaigns and stakeholder participation, reason why they are valuable in work related to introduce adaptation solutions to fishing communities.

Whereas CONPREC focuses on the terrestrial activities, including activities meant to protect the land against flooding, MARAPA is mainly concerned with the security of the fishermen and securing their and the palaiê's livelihoods.

The activities in this MARAPA project comprise:

- Compass, metal reflector and GPS for the boats
- Fish detection equipment
- Life vests, safety flares and watertight mobile phone holders
- Up-to-date meteorological information for fishermen
- Polyester boats
- Information flyers
- 2-3 day training for fishermen
- Training palaiê in drying and salting fish

This MARAPA project works in 23 fishing communities, including Praia Melão, Pantufo, Micoló and Abade. In those communities work focused on training *palaiê* women in drying and salting fish (seen already in Abade), introducing new fishing vessels to increase security of fishermen, in addition to participating as well in the turtle protection programme of the NGO ATM (Association of Marine Turtles). Moreover, the NGO is currently (2018) working on a loan system with a bank in São Tomé for the community of Praia Melão and Micoló. The loan is especially designed for palaiê women and fishermen to help them develop their businesses and improve their working tools.

MARAPA was founded in March 1999, and as of December 2018 has 18 permanent workers, including 6 technicians who provide support to the entire country. Their experience has taught them to focus on individual fishermen rather than established fishermen associations. Eventually groups will develop and organize themselves. They are strong believers of the importance of involving local communities in order to reinforce some necessary actions to improve life in the communities (e.g. preventing illegal sand extraction or carrying out re-vegetation projects).

MARAPA would be very willing to be involved in our meetings with the communities and do not require payment, as they already have allotted time in their personal projects.

#### 3.4.4 Additional NGO's

From the meeting held at Praia Abade on the island of Príncipe, the community mentioned another NGO which is active on the island. This NGO is the **Fundação Príncipe Trust (FPT)**, which was officially created in 2015 and had a budget of 400,000€ in 2018 for projects related to biodiversity conservation and for creating economic and social development opportunities.

The main focus of this organization is to expand the knowledge about Príncipe's biodiversity in order to influence decision-making processes, reduce illegal and harmful practices to biodiversity and improve local consumption practices. A number of projects have already been carried out in Praia Abade, such as establishing a manufacturing center for handmade soap and training and distributing materials for processing fishery products for the palaiê's association.





## 4 Social assessment results

#### 4.1 Introduction to project sites and description

Figure 4.1 shows the location of the eight communities in São Tomé and Príncipe, including Iô-Grande, Praia Melão, Pantufo, Cruz-Lochinga-Gambôa, and Micoló in São Tomé and Praia Abade in Príncipe. Figure 4.2 shows the administrative boundaries. Table 4.1 provides some basic population statistics at each site.



Figure 4.1 Map of the study area villages on São Tomé (left) and Príncipe (right)

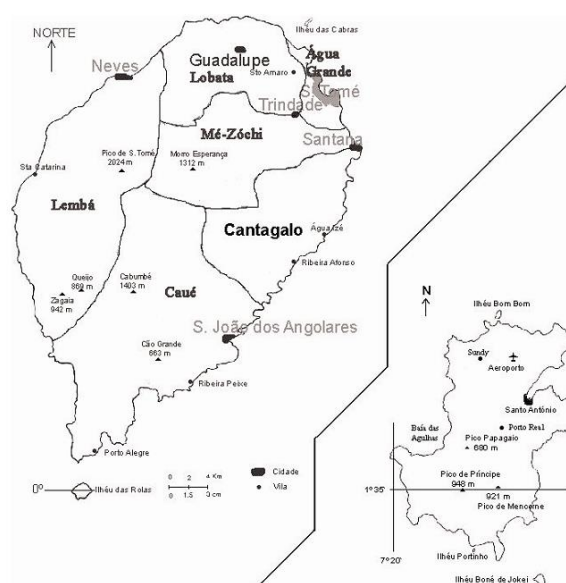


Figure 4.2 Administrative division of the districts in São Tomé (left) and Príncipe (right).

*Table 4.1 Population at each of the pilot communities for year 2012, population according to the project terms of reference (year 2012), and projected population for year 2018 based on the 2012 and 2016 data. In the last column, the estimated extension of each community is shown.*

Community	Population INE Census (2012)	Population TOR (2016)	Population Projected (2018)	Approx Area (ha)
Iô Grande	234	270	291	2
Praia Melão	2,669	3,096	3,336	7
Pantufo	1,836	2,108	2,264	5
Praia Lochinga	1,231	1,803	2,181	8
Praia Gambôa	1,118	1,230	1,288	14
Praia Cruz	1,652	1,720	1,753	10
Micoló	1,404	1,557	1,643	12
Praia Abade	232	255	267	3

## 4.2 Structure of the social assessment per community

Each of the community descriptions in this annex consists of a number of sub-sections, as indicated below. Much of this information was also presented in the Field Visit Report, but is repeated here for completeness:

1. **Site Description:** A general description of the community, including representative photos, site maps and a summary of characteristics that make the community unique.
2. **History:** A brief summary of the history of the community. How did it come to exist? How has it changed? This section also includes a historic map. This information came from interviews with residents and regional experts. This information was not available for all communities
3. **Economic Activities:** An overview of the economic activities and occupations active in the community, mainly based on interviews during the 1-day site visits.
4. **Active Organizations:** A list and brief description of the organizations active in the community. The local organizations will play an important role in engaging residents and implementing selected adaptation options
5. **Exposed Assets:** A description of the exposed assets in the communities: Livestock, buildings, etc. and their estimated value according to the inhabitants. The estimates use the São Toméan STD as currency (1 EUR = ~24.5 STD in December 2018). This information is based on interviews during the 1-day site visits. This information will be an important component of the risk assessment
6. **Main Issues:** This section includes a description of the general perceived hazards by the community. This section does not include a detailed description of the natural hazards since this is included in Annex 3 and in the Field Report. It is important to highlight that local perception of hazards and their priority may differ from the quantitative analysis carried out in Annex 3 by means of numerical modelling.
7. **Stakeholder Participation Suggestions:** Some initial conclusions and recommendations for how to engage the local communities in the current project and subsequent implementation of selected adaptation options. This differs by community, depending on active organizations, types of problems, economic activities, and more

### 4.3 lô Grande

The project team visited lô Grande on December 9<sup>th</sup>, 2018.

#### 4.3.1 Site description and aerial view

lô Grande is a small village in the southeast corner of São Tomé Island, in the Caué District. Photo 4.1 depicts the waterfront area at this small site. Figure 4.3 zooms in and marks important facilities and infrastructure, areas particularly susceptible to natural hazards, and areas of ecological and cultural importance.

The village is only accessible from the N2 main road, running north-south, followed by an unpaved road that takes 5 minutes by car.

The village is divided into two main zones, defined by the residents. The first zone ("Zone I") lies between the coast and the crossing of the main pluvial drainage channel (see Figure 4.3). The second zone ("Zone II") lies between the drainage channel and the group of stone houses (including the health care center) just before the bridge where a small branch of the river Grande crosses the upper part of the village (see Figure 4.3).

Characteristic features in the village are the primary school near the beach, which currently has four different classes and two teachers who make the weekday commute from São Joao dos Angolares. There are three permanent small quiosques where the community can buy daily household essentials, one healthcare center (Photo 4.3) providing basic attention and first aid, and a small catholic church.



*Photo 4.1 Aerial view of lô Grande, facing southwest. The community also continues inland, to the right of the photo. Drone image by J. Pronker, CDR International.*





Figure 4.3 Site Map: Iô Grande

The population of the village was 270 in 2016 (according to ToR). In 2012, the population was 234 (INE, 2012). This information suggests an average annual growth rate of 3.65%, which, if we assume linear growth, corresponds to 291 people in 2018. This agrees with the estimate provided by the leader of the community (280).

### 4.3.2 History

Iô Grande was originally a temporary resting place for fishermen from the north who followed fish that migrate south once a year during the rainy season (and back north again later). The temporary shelters were tolerated by the local plantation that existed at the time. Since independence of STP, the settlement has become more permanent. The first houses in the community were built in Zone I, and they have gradually moved to Zone II when flooding from the sea causes permanent damage.

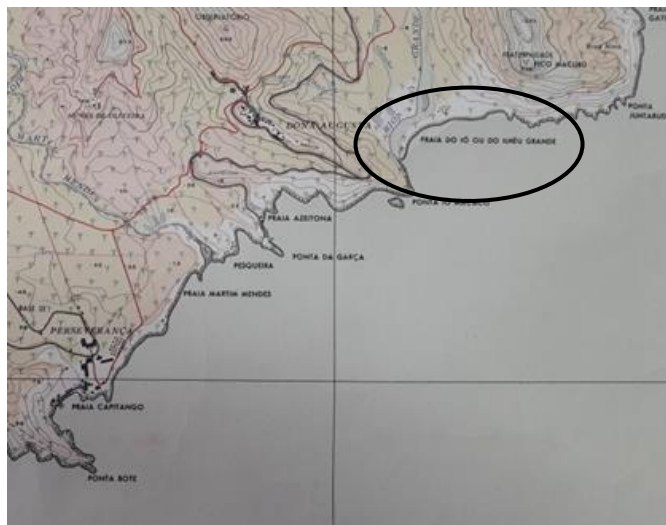


Figure 4.4 The southwestern part of the island of São Tomé on a map from 1958. *lô Grande* (in the oval) was a very small settlement at the time.

### 4.3.3 Economic activities

Table 4.2 lists the most common occupations, and number of active workers. An (unknown) number of people seem to work for Agripalma, an oil palm company close by. Unemployment is estimated at 50%, most of them women. The explanation given for this is the absence of kindergarten for younger children.

Table 4.2 Occupations in Iô Grande (based on interviews during site visit).

Occupation	#
Fishermen	16
Palaiê	35 (total, 5 active)
Quiosque owners	4
Agripalma workers	?

A normal (daily) catch for a fisherman is 15-20 kg. The fishermen sell the fish to the palaiê for 40 STD/kilo. The palaiê sell the fish for 80 STD/kilo. Travel to the market costs 50 STD. People also raise pigs and occasionally chickens.

### 4.3.4 Active organizations

In contrast with other villages analyzed in the past (see example of Ribeira Afonso, (Deltares 2011) and in the current study, this community does not have a Chefe de Praia, nor a vereador or secretary of the Câmara. This community also does not have an official village leader. The leadership of the community is mainly defined by common agreement: Mr. Americo Lazaro was previously a vice-president for the fisherman association and assumed the role for the entire community as well 20 years ago.

#### 4.3.4.1 CONPREC

There is a CONPREC team of four people that includes the village leader and the health care officer.

#### 4.3.4.2 Fishermen's Association

There is an active fishermen's association with 16 members and a group of five palaiê.

#### 4.3.4.3 Other organizations

All men are part of the cards (baralho) group, which is considered a strong group. A youth group of 25 people organizes sports activities and beach clean-ups. Both men and women participate in the jogo do cacete (dance) group, and twice a month there is Bulaue music. There is a small catholic congregation and an evangelical congregation.

### 4.3.5 Exposed assets

According to the community leader, Iô Grande currently has 52 (registered) houses, which corresponds to roughly 5 people per household. All the houses built in this region are made of wood (Photo 4.2) with the exception of four stone structures: the health care center (Photo 4.3),

two additional houses that were built by a government initiative<sup>3</sup> 12 years ago (2006), and the primary school near the shoreline (Photo 4.3).

Houses in Zone I are generally not elevated, as it can be seen in Photo 4.2. According to the community, elevated houses in poles near the coast often experience wind damage. This is the reason why the homeowners have opted not to raise their homes with the exception of some house that are constructed over an elevated base of 30 to 40 cm above ground level. In Zone II the elevation of the tallest houses can be in the order of 1.70 -1.90m, but it general all house have minimum 40 - 50 cm of elevation.



Photo 4.2 (left) Typical ground-level houses near the coast and (right) raised wooden houses further inland, in Iô Grande. Photos by B. Ottow.



Photo 4.3 (left) primary school and (right) health care center in Iô Grande. Photos by B. Ottow.

Table 4.3 Estimates of houses, construction material, and common asset values in Iô Grande (source: interviews during site visit)

Asset	#	Value per item	
Wooden Poor house	52	STD	17,500
Stone house	2	STD	175,000
Health Care Center	1	STD	125,000
School	1	STD	1,250,000
Small pig	-	STD	800
Large pig	-	STD	4,000

<sup>3</sup> The initial project contemplated the construction of 60 stone houses to relocate the entire population. From that project only the 2 houses seen in the village were constructed.

#### 4.3.6 Main issues

##### 4.3.6.1 *Local perceptions of problems*

The groups we interviewed, which included the village head, several palaiê, fishermen and youth, identified the main problems that the community face in order of relevance as follows:

1. Recurrent loss of power/electricity
2. Flooding (sea)
3. Flooding (rainfall runoff)
4. Unemployment
5. Lack of kindergarten

In addition, lack of sanitation was mentioned as well but the community felt the 5 problems mentioned above were more relevant.

Residents report that flooding occurs for an average of 10 days per month during the rainy season and/or during large wave events. This leads to loss of livestock (piglets) and makes fishing a challenge since they have to stop their activities for several days (4 days more after the storm stops) since according to local fishermen the water turbidity is too high to fish.

##### 4.3.7 Stakeholder participation suggestions

1. Residents are aware of the flooding problems and consider it an important problem (although lack of electricity was identified as a more important issue)
2. There is a village leader, elected by the community, who is also involved in CONPREC. This is a good person through whom to contact the community
3. The palaiê and youth groups are active, and should be represented in any participatory activities
4. Fishermen should be involved, but that will not be difficult, as the village head is also a fisherman
5. It might prove difficult to involve the community in the construction and maintenance of measures
6. If possible, a local authority should be involved in the discussion. Either the vereador of the region or a similar figure
7. Women that are not palaiê should also be included, including if possible women that work of volunteer at the school
8. People from both identified zones of the village (zone I and II) should be in the upcoming participatory meetings

Participatory risk mapping and proposed adaptation options will be verified with a good representation of the communities and described as part of Annex 4 and Annex 5. The following are the community members that should be involved as part of this process:

- The village leader
- Other CONPREC people
- Palaie and women in different activities

- Other fishermen
- Representative(s) of the youth groups
- Residents from different regions

The meeting with these representatives will be organized through the client/CONPREC and probably through the village leader.



#### 4.4 Praia Melão

The project team visited Praia Melão on December 12<sup>th</sup>, 2018.

##### 4.4.1 Site description and aerial view

Praia Melão is located south of the communities of Ghanda and Pantufo and is part of the district of Mé-Zóchi. The village is located in the northeast corner of São Tomé Island, 4.5 km south of the capital. Characteristic features of the village are the football field, the association of fishermen, and the church in the southern part of the village. Photo 4.4 and Photo 4.5 show aerial views of the community and Figure 4.5 is a site map, which marks important facilities and infrastructure, areas particularly susceptible to natural hazards, and areas of ecological or cultural importance.



*Photo 4.4 Aerial view of Praia Melão, facing northwest. Mangrove wetland area is in the left center part of the photo. Drone image by J. Pronker, CDR International.*

Praia Melão is located along the secondary road EE103 (INAE). The village is divided into two regions: Praia Melão Cima (higher elevation) and Praia Melão Baixa (lower elevation) (Figure 4.3). In Praia Melão Baixa, a few houses are located between the road and the beach, while in Praia Melão Cima many houses are located on the east side of the road. Between the limits of the two regions of village, there is a mangrove wetland area on the west side of the road (Photo 4.4). The beach is mainly used by fishermen.

Praia Melão is the most populous of the eight project sites, with approximately 3096 residents in 2016 (according to the ToR). In 2012, the population was 2669 according to the census carried out by the National Institute of Statistics (INE, 2012). This information suggests an average annual growth rate of 8%, which corresponds to a 2018 population of 3336.

According to women living in the area, women have 4 to 8 children, so families have approximately 6-10 members who normally live together in the same house.



Photo 4.5 Aerial view of Praia MelãoCima, facing southeast. Drone image by J. Pronker, CDR International.



Figure 4.5 Site Map: Praia Melão



#### 4.4.2 History

Praia Melão was already a village (dependencia) in the time of the plantations (Figure 4.6). The historic map shows a number of houses on both sides of the road, and on the headland, though the community is much denser today than in 1958.



Figure 4.6 Map of the north-eastern part of the island of São Tomé from 1958, containing Praia Melão and Pantufo

#### 4.4.3 Economic activities

Praia Melão is primarily a fishing community. Information gathered from the interviews suggests that there are approximately 500 people involved in fishing activities. The president of the palaiê association estimates there are 100-120 palaiê woman in Praia Melão. There are two fishing shifts: one in the morning and one in the afternoon. Fishermen usually work in teams of two. The average catch is 30 to 40 fish, which sell for 15 to 50 STD, depending on the size. Palaiê women sell fish in the region and in the capital, and report a profit of 15 to 20 STD per fish. The palaiê do not have a preference from which fisherman they buy from, except for family members.

The chairman of the fishermen association mentioned that other sources of income come from raising animals and growing tomatoes, carrots, potatoes, cassava, sugar cane and other vegetables. This occurs mainly on the west side of the access road, on the north side of the village. Some women provide cleaning services in the capital.

According to interviewees, the unemployment rate in Praia Melão is very high, for young people and especially women.

#### 4.4.4 Active organizations

##### 4.4.4.1 Fishermen's Association

The fishermen's association is divided in to two sections: one for Praia da Cima with 50 members (Photo 4.6) and one for Praia Baixa with 35 members. Members contribute 20 STD per month.



Photo 4.6 Fishermen's association in Praia Melão Cima. Photo by L. Torres Duenas.

#### 4.4.4.2 Palaiê Association

The palaiê association consists of 26 women (out of 100 – 120 palaiê). The hope is that with assistance from MARAPA (see next paragraph) and the new micro loan scheme, more women can join.

#### 4.4.4.3 MARAPA

MARAPA is an NGO that works closely with the palaiê and fishermen's association. The organization has introduced new boats to increase security and decrease deforestation in the region. MARAPA has also introduced new fishing equipment and provides training on sustainable fishing, security, and business development. MARAPA is establishing a micro loan scheme to assist palaiê and fishermen with developing their businesses. They plan to train women in diversifying fish products into raw, salted, and smoked versions. This would decrease the dependency on freezer storage (which suffers from unreliable electricity) and could increase the profit of the business.

#### 4.4.4.4 CONPREC

CONPREC is active in this community, with 8-10 active members.

#### 4.4.4.5 Other organizations

A youth association has 22 members and participates in cleaning activities together with CONPREC. The president of the association is Eduri Leal. A group of 45 people also frequently plays cards, with tournaments on Sundays with neighboring communities (Ghanda and Pantufo).

#### 4.4.5 Exposed assets

Most of the houses in Praia Melão Baixa are made of wood and raised 30 to 50 cm above the ground (see Photo 4.7). This region also has a few stone houses.

Praia Melão Cima has more raised houses than Baixa. Many of these houses are raised 80 to 150 cm above the ground, as it can be seen in Photo 4.7 (right). Table 4.4 provides estimates of the cost of various houses and other common assets. There are no statistics available about the number of houses in Praia Melão. This will be estimated in Annex 4 from the drone images collected during the field visit.



Photo 4.7 (left) Typical house in Praia Melão Baixa. (right) Typical raised house in Praia Melão Cima with resident showing flood level. Photos by L. Torres Duenas.

Table 4.4 Estimates of houses, construction material, and common asset values in Praia Melão (source: interviews during site visit).

Asset	Value/cost	
Average Wooden house	STD	90,000
Stone house	STD	250,000
Large wooden canoe	STD	15,000
Canoe with outrigger	STD	28,000

Canoes in Praia Melão are often exposed to damage from waves. The president of the fishermen's association estimated that there are around 200 boats. There are two predominant types: the traditional wooden canoe (see Photo 4.8, left), and a newly introduced fiberglass canoe with an outrigger to increase stability (Photo 4.8, right). The latter was introduced to the region by MARAPA, and the fishermen stated that more of them are trying to switch to this more stable type of canoe.

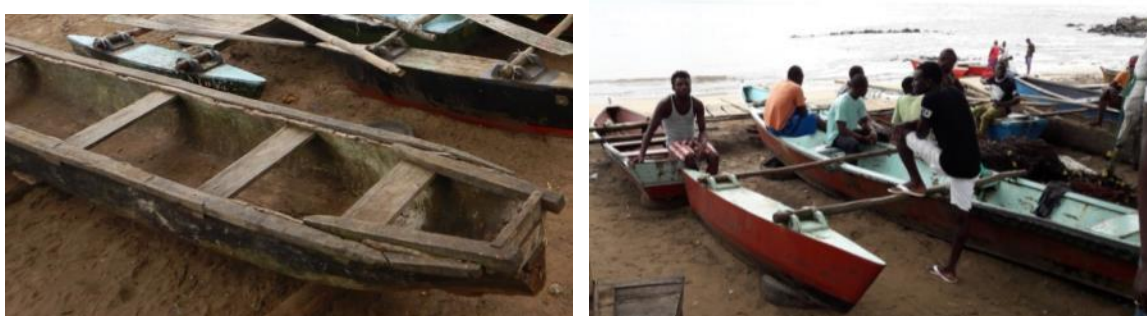


Photo 4.8 ((left) Traditional canoe in Praia Melão. (right) Outrigger canoe in Praia Melão. Photos by L. Torres Duenas.

While there are various types of livestock in Praia Melão, none are in the regions where coastal flooding is reported. Residents said that they have never lost an animal due to flooding, either

from rain or coast. Therefore, the values of these assets are not relevant for this particular community.

## 4.4.6 Main issues

### 4.4.6.1 Local perception of problems

Locals report that the coastal flooding situation worsens between February and April, and approximately three times a month fishermen have to move their canoes completely off the beach and move them to the highway blocking the road for several hours. According to interviewees, 30 houses have been destroyed in the past 20 years due to erosion, flooding, and wave impact. The community also identified in order of relevance the main issues they face as follows:

1. Unemployment
2. Coastal flooding
3. Lack of electricity (vital for fish conservation)
4. Access to drinkable water & public bathrooms
5. Stagnant water on the west side of the community

Different people in the community agree with the identified issues, but the order may vary between actors. For example, for palaiê women the most pressing issue is the lack of electricity and the stagnant water which causes outburst of malaria/dengue cases. For the fishermen, coastal flooding is the most important since it has a direct impact on their assets (boats) and economic activities. Young people or women not involved in fishing activities think access to sanitation conditions should be addressed first.

## 4.4.7 Stakeholder participation suggestions

1. People are quite aware of both coastal and rainfall flooding issues and consider them important problems
2. Both fishermen's associations and the palaiê association are strong groups. Both should have at least three representatives in the participatory activities, including the presidents of these organizations
3. The CONPREC committee is present. The members seem knowledgeable and active and have a good relationship with the community. Organizing meetings/activities with/through them would be a good approach for the participatory activities. However, they should become more involved with women's associations
4. The fishermen's associations could lead the community through the agreed adaptation reduction strategies and help monitor sand extraction activities, since they are the main group affected by flooding issues
5. Women (palaiê and others) should be included and well-represented during consultations. Women could, for example, help identify teachers who can help communicate plans to students
6. MARAPA and local CONPREC members should be involved in the conservation of the beach, with more cleaning and training activities to improve the livelihood of the people in the region

7. Local and district authorities should be involved (relevant vereador and representante da Câmara) in order to gain broader support and increase the likelihood that land use regulations and building codes are implemented and followed
8. For the upcoming meetings is important that people from the different regions of the community are represented. Inhabitants of Praia Melão Cima nearby the access road need to be included. In addition, the few house owners of the lowest part of Praia Melão should be in the meeting as well also including people living nearby the stagnant water area
9. The youth organization needs to be represented, also selecting students that can help in enforcing laws or maintenance of adaptation solutions
10. Relevant local authorities should be always in the meeting (ex: veredeador, chefe de praia, etc.)

Participatory risk mapping and proposed adaptation options will be verified with a good representation of the communities and described as part of Annex 4 and Annex 5. The following are the community members that should be involved as part of this process:

- Chefe de praia
- CONPREC people
- Palaie (3 or more)
- (3 or more) representatives from the fishermen association
- Other fishermen
- Representative(s) of MARAPA
- Representative of the local government (district)

The meeting with these representatives will be organized through the client and through CONPREC/fishermen association.



## 4.5 Pantufo

The project team visited Pantufo on December 13<sup>th</sup>, 2018.

### 4.5.1 Site description and aerial view

Pantufo is located just south of the city of São Tomé, in Água Grande District, on the northeast coast of São Tomé Island. Photo 4.9 and Photo 4.10 show an aerial view of Pantufo, facing north and south, respectively, while Figure 4.7 is a site map, which marks important facilities and infrastructure, areas particularly susceptible to hazards, and areas of ecological and cultural importance.

The population of the village was 2018 in 2016 (According to ToR). In 2012, the population was 1836 (INE, 2012). This information gives an average annual growth rate of 3.5%, which corresponds to an estimate of 2264 residents in 2018.

Pantufo is located along the secondary road EE103 (INAE). This road runs parallel to the beach and reconnects with NE2 further to the south. The town is defined by a large square in front of the Catholic church (Photo 4.9). The town school is located further south, on the landward side of the road, at the border with Praia Melão (outside the borders of the site map).



Photo 4.9 Aerial view of Pantufo, facing north. Drone image by J. Pronker, CDR International.





Photo 4.10 Aerial view of Pantufo, facing south. Drone image by J. Pronker, CDR International.



Figure 4.7 Site Map: Pantufo

There is a narrow rocky beach along most of the Pantufo shoreline, with the exception of the church square, which protrudes into the sea. The newly-constructed road lies adjacent to the shoreline, and is fronted by a low lattice concrete wall (Photo 4.11). The beach is very narrow, with little space for boats. Perpendicular to the streets are some storm water drains with outfalls at the coast.



Photo 4.11 Pantufo, facing south from the church square. Photo by B. Ottow.

## 4.5.2 History

The first houses were built in a single row along the coast (Figure 4.6 – contains Praia Melão and Pantufo) in the '40s for the Public Works government officials. Later the village expanded inland and further south.

## 4.5.3 Economic activities

Table 4.5 provides an estimate of the number of residents working in common occupations in Pantufo. Fishing is an important component of the local economy. There are 100 – 130 boats, which are normally owned by a small number of community boat owners. A normal catch is around 40-50 big fish per boat per day. The earnings are split into 4 to 5 equal parts: one part each to the owner of the boat, two fishermen, the guard of the boats, and the owner of the motor. The price of fish ranges between 2 and 20 STD for small fish and 12 to 20 STD for large fish.

Sand extraction, while illegal, occurs extensively in Pantufo. Sand is extracted at a rate of approximately 45-100 bags (30-40 kg each) per day (estimate from interviews). Each bag can be sold for 50 STD.

It is unclear how prominent unemployment is. However, the capital city is nearby, with many options for transport, so many people find work there.

Table 4.5 Estimates of additional asset values (source: interviews during site visit)

Occupation	#
Fishermen	300
Palaiê	150
Quiosque owners	Every 3-4 houses 1 quiosque
Motorbike taxis	42

<b>Taxi drivers</b>	35
<b>Contractors</b>	30
<b>Cleaning women</b>	80
<b>Sand extraction</b>	?

#### 4.5.4 Active organizations

##### 4.5.4.1 CONPREC

The village seems to have an active CONPREC team. The CONPREC team leader is also the local police officer.

##### 4.5.4.2 Fishermen's Association and Palaiê

The fisherman association has only 30 members (of the 300 fishermen). The fishermen's association shares a space with the gas station. The palaiê women are poorly structured. Only 50 of the estimated 150 palaiê belong to the fishermen's association, some of whom only buy 3-4 fish per day, so they are not very active. Ten women in the association own canoes and buy larger quantities of fish. A laundry area was recently built (on the beach) and serves as a recreational centre for the palaiê. This building will likely have drainage issues. The recreation centre is used by other groups as well (to play cards by fishermen, youth, etc.).

##### 4.5.4.3 Other organizations

There are various religious groups: catholic, evangelical, apostolic, universal, mana. The strongest is the catholic group. There is a *Dança puita* dance group, but the ones for *Dança congo* and *Dança bulaue* have the strongest participation, and they represent the community when there are carnivals and cultural interactions.

#### 4.5.5 Exposed assets

Many houses are made of stone, but also many of wood. Table 4.6 presents some cost estimates for typical houses and assets in the community.

Table 4.6 Estimates of houses, construction material, and common asset values in Pantufo (source: interviews during site visit)

<b>Asset</b>	<b>Value per item</b>
<b>Poor wood house</b>	STD 30,000
<b>Good wood house</b>	STD 100,000
<b>Poor Stone House</b>	STD 200,000
<b>Good Stone House</b>	STD 825,000
<b>Annex to a stone house</b>	STD 70,000
<b>Small pig</b>	STD 1,000
<b>Large pig</b>	STD 5,000

#### 4.5.6 Main issues

##### 4.5.6.1 Local perception of problems

Coastal flooding was identified as the second most important problem by the interviewees, with either unemployment or sanitation issues as the most important issue. Other problems included lack of electricity and access to potable water. In Table 4.7 the ranking of issues ordered from high to low priority according to different groups in the community is shown.



From the interviews we learned that most flooding occurs between February and April. For approximately two weeks each month, canoes are stored partially on the road to protect them from wave damage. Each year there are approximately 12 canoes lost/damaged to wave impact and flooding.

Table 4.7 Problems face by the community of Pantufo in order of relevance for different groups.

Ranking	Fishermen & CONPREC	Palaie
1	Sanitation issues	unemployment
2	Coastal flooding	Coastal flooding
3	Wetland flooding	energy
4	Energy supply	
5	unemployment	
6	Access to drinkable water	

#### 4.5.7 Stakeholder participation suggestions

1. The youth and fishermen's association should be involved in execution and ownership of any solutions. They are the group that can communicate and influence the community
2. CONPREC should be involved in participatory risk mapping, together with at least two representatives from the following groups: students, palaiê, fishermen (including president of the association), the church, and dance/football groups. These people seem to represent the majority of the community. This will help in the coordination of actions needed for the community to accept and take ownership of solutions
3. People are aware of the flooding problem and consider it an important problem
4. There is a village leader, elected by the community; he should be part of the participatory meetings. Also the Chefe de praia and other relevant authority figure should be included
5. CONPREC and youth organizations seem quite active. They could be involved in selection of adaptation measures
6. The involvement of palaiê could be a challenge, given the low level of participation, but should still be attempted
7. It is highly important to include the residents of the region where coastal flooding is an issue (see location in Figure 4.7)

Participatory risk mapping and proposed adaptation options will be verified with a good representation of the communities and described as part of Annex 4 and Annex 5. The following are the community members that should be involved as part of this process:

- The village leader
- CONPREC people
- Palaie (at least 3)
- (at least 3) representatives from the fishermen association
- Representative(s) of the youth organizations

The meeting with these representatives will be organized through the client and through CONPREC/fishermen association.

## 4.6 Praia Lochinga, Gamboa, and Cruz

The project team visited Praia Cruz, Gambôa, and Lochinga on December 10<sup>th</sup>, 2018.

### 4.6.1 Site description and aerial view

Praia Cruz, Gambôa and Lochinga are three adjacent coastal communities between the São Tomé International Airport and the north coast, in Água Grande District. Photo 4.12 shows two views of the beach. Figure 4.8 is a site map, which marks important facilities and infrastructure, areas particularly susceptible to natural hazards, and areas of ecological and cultural importance.



Photo 4.12 The beaches of Lochinga (left) and Gambôa (right).



Figure 4.8 Site Map of Praia Cruz, Gambôa, and Lochinga, with drone image courtesy of CONPREC, OLA, and SNPCB (2018).

The population for Lochinga, Gambôa and Cruz in 2016 (according to ToR) and in 2012 (INE 2012) are presented in Table 4.8. Based on the information, an annual growth rate was computed and an estimate for the population for 2018 is given. The estimated population in 2018 for all three communities is 5222. The population is skewed young, with women having on average 5 to 8 children, starting at age 15.

Table 4.8 Population estimates Praia Lochinga, Gambôa, and Cruz.

Source	Year	Population		
		Lochinga	Gambôa	Cruz
<b>Census 2012</b>	2012	1231	1118	1652
<b>ToR</b>	2016	1803	1230	1720
<b>Estimation</b>	2018	2181	1288	1753
<b>Average annual growth rate</b>		10%	2.40%	1%

#### 4.6.1.1 Praia Lochinga

Praia Lochinga (sometimes spelled Loxinga) is the easternmost community, densely developed in the narrow strip of land (~100 m) between the São Tomé International Airport and the sea. There is only one access road (same to access the airport), which ends in Lochinga. Most of the housing is between the road and the sea, while some houses were constructed between the airport wall and the road. The following are some of the characteristic features of Praia Lochinga:

- Central beach where fishermen land their catch
- New apostolic church in the east with a congregation of 30 people, mainly from Gambôa
- Discoteque
- Public laundry (which does not have water)
- Small Mana church

There is no healthcare center or (primary) school. These are located in Praia Cruz. There is also a secondary school on the south side of the airport.

#### 4.6.1.2 Praia Gambôa

Praia Gambôa is the community between Praia Cruz and Praia Lochinga. The strip of houses between the main road and the airport is much broader at Praia Gambôa than in Lochinga. At the border between Lochinga and Gambôa, there is a stagnant pond, with an adjacent functioning laundry facility. On the other side of the road are the Pentecostal and Adventist churches. The latter is mainly frequented by people from Lochinga. In the center of Gambôa is a catholic church. Most of the fish from all three communities arrives at Praia Gambôa. The fish market “SãoPaulo” is located next to the beach where the fishermen return with their catch. The fishermen association is located along the main road.

#### 4.6.1.3 Praia Cruz

Praia Cruz is the westernmost of the three communities. The most conspicuous element is the large football field at the west side of the village (Figure 4.8). Further south is the primary school for all 651 children in the three communities (and Diogo Nunes). All the children (100%) attend school, in two shifts each day. Next to the school is the health centre, which serves all four communities. Praia Cruz has its own beach, which is much steeper than the one at Gambôa. At the west end of the community there is a large pond that a Chinese project attempted to use for fish breeding.

## 4.6.2 History

It is likely that there have been small fishing communities in this area for a long time. A previously-existing law prohibited permanent structures within 800 m of the shoreline. However, temporary shelters were tolerated by the landowners (plantations). Later, around the time of independence, these settlements became permanent.

A large influx from workers arrived from Santo Amaro, Changra, Maianço and Desejada around 1945, to work on construction of the adjacent international airport. While the three communities mix and strongly interrelate, for instance in the joint organization of their successful football club (5 time national champions) there are subtle differences between the communities. The airport workers settled mainly in Praia Gambôa, which is now more business-oriented, while Praia Cruz and Lochinga are more focused on fishing. There is a fourth community, Diogo Nunes, just west of Praia Cruz, which can also be considered part of these communities. This community suffers from erosion caused by sand mining.

The airport runway was first oriented in NW – SE direction. This was later replaced by a runway in E-W direction. The present football field in Praia Cruz is at the northwestern end of the former airstrip.

Originally there was a coastal road east of the airport, connecting Gambôa with the communities south of the airport at Praia Francesa. Lochinga developed along this road. The road was blocked, however, when the airport runway was extended. Today the children from Praia Lochinga that want to attend secondary school walk around the airport to reach the school near Praia Francesa.

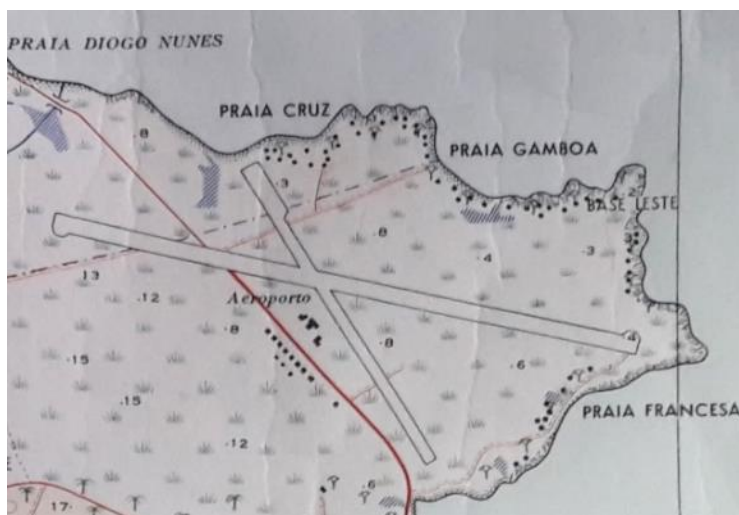


Figure 4.9 Historic map from 1958 showing the communities of Praia Cruz, Gambôa, and Lochinga

## 4.6.3 Economic activities

The main occupation in Praia Lochinga and Cruz is fishing. The men are fishermen, and the women are palaiê. The vereador estimates that 70% of all fish in the capital (São Tomé) comes from the beach in Praia Gambôa. MARAPA estimates this at 60%. Exact numbers of fishermen in each of the communities were hard to obtain. From our interviews, we estimate 43 in



Lochinga, 100 in Gambôa, and 800 in Cruz. The vereador estimated the number as much lower, see Table 4.9. There are approximately 250 palaiê from the three communities and 150 from outside. Palaiê do not seem to have an alliance to certain fishermen, apart from their husband. Typical prices of fish at the main fish market in Gambôa are presented in Table 4.10. At Praia Lochinga, a small fish is normally sold for 3-4 STD.

Table 4.9 Number of fishermen in Praia Lochinga, Gambôa, and Cruz

Community	Estimate from spokesperson in community	Estimate vereador
<b>Lochinga</b>	> 52	200-300
<b>Gambôa</b>	100	100-150
<b>Praia Cruz</b>	800	300-400

Table 4.10 Prices at the Gambôa fish market

Fish species	Price per fish (in STD)
<b>Atum</b>	20
<b>Fulu fulu</b>	2-5
<b>Sabonete vermelho</b>	20
<b>Olho grosso</b>	100

It is hard to tell what the employment rate is, as there is a gradual gradation between full-time fisherman/palaiê and completely unemployed. The estimate by our spokesperson for unemployment in Lochinga is 30%, but this is not a formal statistic. Many fishermen, a third of the young men, have moved to Angola. Villagers can also find employment in the capital, as that is close by and ample transportation is available. A one-way ride in one of the many yellow taxis to the capital costs 15 STD.

#### 4.6.4 Active organizations

##### 4.6.4.1 CONPREC

CONPREC reports having active teams of 8 people in each of the three communities. During our visits, we were accompanied by several CONPREC team members. The CONPREC team members were knowledgeable about the residents and activities in the communities. They communicate using hand-held radios and reported that, while they don't meet daily, they are on duty every day. Their activities include cleaning the beach, alerts, precaution, finding lost fishermen<sup>4</sup>. According to some people we interviewed, including the vereador, the residents rarely notice CONPREC's activities.

##### 4.6.4.2 Fishermen's Association

There are two fishermen's associations in the communities: one for Lochinga and one for Gambôa and Praia Cruz. The fishermen's association of Praia Gambôa/Cruz seems active. They have an office and a number of palaiê members. The association in Lochinga counts 52 members (only men, no women), but is considered inactive. The chairman explained that some years ago the association received assistance from the government. When the person

<sup>4</sup> On the day we visited, there were two boats missing, and the Portuguese coast guard was helping the Santomean coast guard in finding them.

representing that part of the government left that position and the arrangement/assistance changed, the association became less active.

#### 4.6.4.3 Other organizations

In Lochinga and Gambôa, and probably also in Cruz, there is an active card playing club. The one in Lochinga has 40 members (only men) and the one in Gambôa has 25 members. They play a tournament every Sunday. There are also a student club (~60 members) and a dance group (~20 members) in Gambôa. They dance kuduro, congo and funk. The Praia Cruz football club (32-40 members) is very active and is well known in São Tomé. They have won the national championship five times. The vereador used to be the chairman. Although the club is named after Praia Cruz, many of the active members live in one of the other communities, especially Gambôa. The vereador mentioned a number of organized religious groups with a total of ~400 members (Escutivos, Catholics, Adventists, and more).

#### 4.6.5 Exposed assets

Houses towards the eastern end of the Lochinga are poorer than the ones in the middle. Most of the houses on the south (airport) side of the road are made of stone. In the flood prone area in Lochinga, some houses are built on (wooden) stilts, while others are lower and have a stone layer to prevent the water from entering. The houses in Gambôa appear in better condition and of higher quality than the ones in Lochinga. In Lochinga there are approximately 20 small quiosques. There is a height restriction of 5 meters for houses due to the adjacent airport.

Table 4.11 Estimates of houses, construction material, and common asset values in Praia Lochinga, Gambôa, and Cruz (source: interviews during site visit)

Asset	Value/cost
Poor wood house	STD 50,000
Good wood house	STD 150,000
Stone house	STD 220,000
Small canoe	STD 4,000
Large synthetic boat	STD 70,000
Piglet	STD 1,500
Adult Pig	STD 4,000
Roof (metal/zinc) plank	STD 265
Wooden plank	STD 70

#### 4.6.6 Main issues

##### 4.6.6.1 Local perception of the problems

Locals report that flooding occurs for approximately 15 days each month in February and March, and believe the extent of flooding has increased in recent years. The worst event the interviewees in Praia Lochinga and Gambôa could recall was in March 2015. During flood events, boats and animals are lost. Ground vegetation and trees are damaged/lost. Fishing is not possible during or shortly after a storm event, due to high turbidity (8 days after storm event).

Interviews also uncovered a number of problems unrelated to coastal and fluvial flooding and erosion, including lack of drinking water, waste(water) treatment (no toilets – beach used for this purpose), mosquitos, lack of electricity, lack of space, unemployment, noise from planes,

garbage, and more. However, flooding was identified in the top three problems by most of the locals interviewed.

In Table 4.12 the ranking of issues ordered from high to low priority according to different groups in the community is shown.

Table 4.12 Problems face by the community of Cruz-Gambôa- Lochinga in order of relevance for different groups.

Rank	Contractor Loxinga	Palaie Loxinga	Laundry ladies Gambôa	Conprec team at Gambôa	Laundry girls Gambôa 2	Palaie Gambôa	Vereador	Chairman fishermen association Loxinga
1	Sea flooding	mosquitos – malaria	water (drink and wash)	sea	water	Energy	Space: not enough	Sea flooding
2	Drinkable water	sea	Mosquitos	Mosquito	Energy	water	Sanitation-toilets	Lack of fishing equipment
3	Energy	Drinkable water	Sea flooding	Energy	sea	Sea	Garbage	
4	Lack of employment	Energy				plane related issues (trembling)	Floods	
5	Mosquitos	Lack of employment					Education	
6							Lack of employment	
7							Electricity	
8							Drinking water	

#### 4.6.7 Stakeholder participation suggestions

1. People are quite aware of flooding and consider it an important problem
2. There are people like the vereador who have a vision and take initiative, but overall, local residents are not well organized.
3. The CONPREC committee is present, and the members seem knowledgeable and active and have a good relationship with the community. Organizing meetings/activities with/through them seems the best way to engage the community
4. The fishermen associations should also be involved, as they are very present and any measures taken to address flooding should serve their interests
5. Care must be taken that the women are well represented when consultation takes place. This is a bit difficult as the women do not seem to have their own organization. The vereador has promised to reach out to women that are influential in the community
6. According to the vereador, meetings to consult/involve the communities about adaptation measures should be combined with activities that the people are interested in, like a sports event. He thinks this would also draw women from the community

Participatory risk mapping and proposed adaptation options will be verified with a good representation of the communities and described as part of Annex 4 and Annex 5. The following are the community members that should be involved as part of this process:

- The vereador
- CONPREC people
- Palaiê (at least 3)
- (at least 3) representatives from the fishermen associations
- Representative(s) of the youth organizations

The meeting with these representatives will be organized through the client and through CONPREC/fishermen association.

## 4.7 Micoló

The project team visited Micoló on December 11<sup>th</sup>, 2018.

### 4.7.1 Site description and aerial view

Micoló is a town on the north coast of São Tomé Island, in the Lobata District. Photo 4.13 and Photo 4.14 show two aerial views of the community. Figure 4.10 is a site map which marks important facilities and infrastructure, areas particularly susceptible to natural hazards, and areas of ecological and cultural importance.



Photo 4.13 Aerial view of Micoló, facing west. Drone image by J. Pronker, CDR International.



Photo 4.14 Aerial view of Micoló, facing east. Drone image by J. Pronker, CDR International.



Characteristic features of the village are the school, the discotheque, the health center, the public laundry and the first hotel of the village, which is under construction and close to completion. There are a few shipwrecks on the beach, which are gradually being dismantled.

According to the leader of the community, the village is divided into three regions: Micoló Campo, Reta and Praia (see Figure 4.10). The village is accessible from the Capital via a secondary road that defines the region. This road finishes at the center for youth and motorbike taxi drivers, where it connects with a shore parallel road, which extends approximately 500 m to the east, ending near the lagoon outlet to the sea. The shore parallel road also extends west towards the village of Fernão Dias.

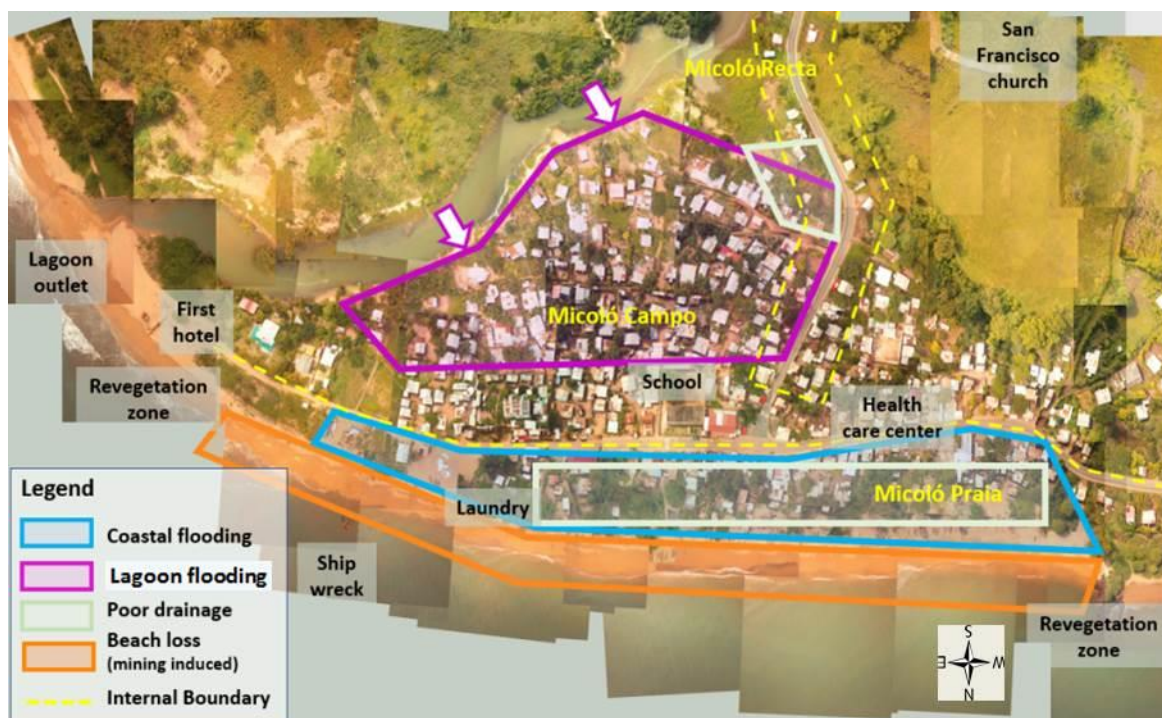


Figure 4.10 Site Map: Micoló

Micoló Praia is everything between the shoreline and the shore parallel road. Micoló Campo extends to both sides of the intersection point of the road. The eastern side is enclosed by the boundaries of the lagoon, and the west side is characterized by a higher elevation. Micoló Reta includes the homes along the secondary road that enters the village center.

In 2012, the population of Micoló was 1404 people plus 431 people living in the area of Micoló Recta (INE, 2012). On 2016, Micoló had 1557 inhabitants (according to the ToR). This number probably does not include Micoló Recta. These estimates suggest an average annual growth rate of 2.65%, which would correspond to a 2018 of 1643. If the people in the “Recta” area are considered, then according to the statistics the total number of inhabitants of this village will surpass 2000, which is in agreement with the estimate made by the Chefe de praia (2000).

Households have between 4 and 10 members. Women normally start having children around the age of 16. The general perception of the population establishes that there are more women than men (60% women and 40% men).



Photo 4.15 Youth &amp; motorbike taxi center in Micoló



Photo 4.16 Discotheque in Micoló



Photo 4.17 First hotel in Micoló



Photo 4.18 Public laundry in Micoló

#### 4.7.2 History

The community developed due to this location's proximity to the San Francisco church. The church sits atop a small hill adjacent to the town (Figure 4.11). Each year, a pilgrimage is made to the church. When the owner of the plantation to which Micoló belonged died, there was no heir. The San Francisco church then divided the land among the people. The soil here is rich, but shallow and requires good care that the people were not always able to give. The development of Micoló received a boost in the 1950's when the road from Cruz Grande was straightened.



Figure 4.11 Historic Map of Micoló from 1958.

## 4.7.3 Economic activities

Micoló is mainly a fishing community. Other labors include commercializing fish (palaiê activity), raising of livestock (mainly in the Campo region), selling and growing agricultural products (banana, tomatoes, matabala, sugarcane, etc.), driving motorbike taxis (~30 drivers) and selling daily use items at small shops (quiosques). Farmers do not grow most of their product in Micoló; this occurs further to the north closer to the Fernão Dias area.



Photo 4.19 Traditional fishing boats in Micoló. Photo by L. Torres Duenas.

According to the community, there are around 130 people who are fishermen. Only 69 of them belong to the fishermen's association. This association also includes only 8 palaiê women out of 250. Half of the palaiê women sell cooked fish to the community and tourists, and the other half sell it raw in nearby markets they buy small fish for 3 STD and sell it for 7 or 10 STD. The price of fish can oscillate between STD 20 to 100, depending of the size of the fish. A normal catch for a single boat consist of 50 kg of fish, for which the fishermen earn 800 - 1000 STD. The fishermen have around 45 boats or canoes.

Around 10 people of the community now belong to CONPREC, and there are 2 night guards employed by MARAPA to help in the turtle conservation project.

According to the leader and some palaiê women, around 60-70% of the population is unemployed.

## 4.7.4 Active organizations

### 4.7.4.1 Fishermen's Association

While only half of the people involved in fishing are members, the community leader is a member, making it a reference among the community. The contribution to belong to the association is 20 STD per month.

### 4.7.4.2 CONPREC

CONPREC is active in this community. There are 10 community CONPREC members.



#### 4.7.4.3 MARAPA

MARAPA employs two guards for the regional sea turtle conservation project.

#### 4.7.4.4 Youth Association

The youth association has 12 members who carry out activities such as cleaning of the beach (3 times per year), supporting CONPREC, and organizing the football team. The cleaning activities normally involve gather from 40-50 youth. One of the village leaders is also the leader of this association.

#### 4.7.4.5 Other organizations

There is dance group that practices Ussua, Puita, Congo ad Buluaie. They participate in the carnival celebration and represent the community in cultural activities. There is also an informal card playing group (~80 members) that gathers every Sunday. There are active catholic and *assembleia de Deus* congregations.

There are plans to develop an “Inhabitants Association” in order to identify which households are most at risk of issues related to water.

#### 4.7.5 Exposed assets

There are no statistics related to the exact number of houses in Micoló. Nonetheless, we estimate that, given the average number of people in a family, there must be approximately 400 houses, taking into account buildings with a public or entertainment function (school, health center, discotheque). The exact number of houses is estimated from the drone images taken from the field visit (Annex 4).



Photo 4.20 Typical house (left) nearby the lagoon region - Micoló Campo and (right) from the beach region - Micoló Praia. Photo by L. Torres Duenas.

With the exception of a few buildings, all the houses are made of wood. Most of the houses in the Campo region are elevated more than 1.70 m (see Photo 4.20 , left), while most of the houses in the Praia region are only raised 20 to 30 cm from the ground (see Photo 4.20 , left), and some at ground elevation. The difference in height was attributed to wind damages in the shoreline region. According to the leader, there are already 26 houses in the Praia region that constantly flood, while there are 30 houses in the Campo area located nearby the lagoon that always flood when it rains (but most of them are raised, so only the livestock and belongings left on the ground floods).

Table 4.13 provides approximate prices of buildings and repair costs provided by residents in Micoló. Prices in the northern region of São Tomé Island are higher due to lack of wood in the area. Damages due to flooding are mainly associated with walls and floors. Many people on the beach area also report that they frequently have to replace their roof due to wind damage. The cost of the health care center and school was not estimated since they are apparently not affected by flooding. Churches are wooden and have roughly the same price range as the houses away from the beach.

People in the Campo region have lost livestock due to flooding from the lagoon, especially when rain occurs during the night. Table 4.13 also provides estimates of the value of each type of livestock.

Table 4.13 Estimates of houses, construction material, and common asset values in Micoló (source: interviews during site visit)

Asset	Value/cost
Poor wood house	STD 50,000
Average wood house	STD 75,000
Good wood house	STD 150,000
Stone house	STD 350,000
Piglet	STD 1,500
Adult Goat	STD 2,000
Chicken	STD 100
Duck	STD 500
Canoe	STD 4,000
Replace wall or floor panels	STD 15,000
Metallic roof slabs	STD 250

#### 4.7.6 Main issues

##### 4.7.6.1 Local perception of problems

Flooding is one of many problems Micoló faces. Residents reported many issues related to high water levels in the lagoon (see Photo 4.21 ). They also identified a number of areas with poor drainage due to dead end drainage ditches. Residents report coastal flooding in the area between the beach and the road, causing inundation of 20 cm in some locations. According to the leader of the community and fishermen, the strongest wind comes from the south. The worst flood events that the community remembered were in February 2015 and April 2017. The most recent coastal flood was in November 2018.

When asked about issues other than flooding, the community prioritized their issues as follows:

1. Unemployment (especially for women)
2. Sanitation problems
3. Lagoon flooding
4. Coastal flooding,
5. Frequent power outages (affects storage of fish).

Additionally, there has been an increase in rock extraction from the hill on the west side of the access road to Micoló. No rock or landslides have occurred yet, but the community is expecting this to happen soon, potentially affecting the Micoló Recta region.



*Photo 4.21 Resident showing flooding level in her property (approx. 50 cm) caused by high lagoon water levels. Photo by L. Torres Duenas.*

#### 4.7.7 Stakeholder participation suggestions

1. Participatory risk mapping should involve representatives from all the active organizations
2. Particular attention should be given to including women, who represent ~60% of the community. This includes both palaiês within the fisherman association and outside of it, and other women with different type of economic activity
3. It is important to also include farmers and people that raise livestock since this is one of the main economic activities in Micoló
4. People in the village mentioned Vereador Adiquiel (who is also part of CONPREC) and Arlindo Gue, the representative of the Câmara. These are two authority figures that were not in the village during the field visit. Since they are in charge of more than only Micoló, residents look up to more to the leaders of the community. However, these regional leaders should also be involved in the participatory risk mapping, if possible
5. Residents from all the different regions of the village should be included in the participatory meetings

Participatory risk mapping and proposed adaptation options will be verified with a good representation of the communities and described as part of Annex 4 and Annex 5. The following are the community members that should be involved as part of this process:

- Vereador/Representative of the Câmara
- CONPREC people
- Palaiê (at least 3)

- (at least 3) representatives from the fishermen association
- Representative(s) of the youth organizations
- MARAPA

The meeting with these representatives will be organized through the client and through CONPREC/fishermen association.

## 4.8 Praia Abade

The project team visited Praia Abade on December 14<sup>th</sup>, 2018.

### 4.8.1 Site description and aerial view

Praia Abade is the only project site located in the Autonomous Region of Príncipe, a small island 150 km northeast of São Tomé Island. Praia Abade is located on the east side of Príncipe, 7 km from the capital, in a small pocket beach in a very sheltered cove. Photo 4.22 captures the coastline of the community. Figure 4.12 is a site map, which marks important facilities and infrastructure, areas particularly susceptible to natural hazards, and areas of ecological and cultural importance.

The community has only one dirt access road, which is currently undergoing upgrades, and which crosses the village from west to east, turning south at the small creek. There are few houses between the beach and the road. The majority of the population lives on the landward side of the road (including the health care center, kindergarten, and school).

Praia Abade is also one of the smallest communities in the present study, with only 255 residents in 2016. In 2012, the population was 232 according to the census carried out by the National Institute of Statistics (INE, 2012). This corresponds to an annual growth rate of 2.4%. Assuming linear growth, this means there are ~268 residents in 2018. In this region, households have 6 to 10 members. The general perception of the population establishes that there are more men than women (60% men and 40% women).



*Photo 4.22 Aerial view of Praia Abade, facing east. Drone image by J. Pronker, CDR International.*





Figure 4.12 Site Map: Praia Abade

## 4.8.2 History

Before the community of Praia Abade existed, the Portuguese Dependência Abade company was present in the region. Fishermen saw this as an opportunity and went to the beach to catch and sell their product to the people in the Dependência.

In order to increase their catch, a group of fishermen decided to build small shacks and locate traps for andalas (a type of fish). They caught fish and took it to the Dependência and also their respective communities. The amount of shacks and settlements started slowly increasing near the beach area, with people arriving from nearby locations in Príncipe and even some from São Tomé.



Figure 4.13 Historical Map of Praia Abade from 1958.

### 4.8.3 Economic activities

Praia Abade is mainly a fishing community. Other occupations include commercializing fish (palaiê activity), raising livestock (pigs, goats and chicken), selling and growing crops (banana, matabala, cassava, pineapple, tomato, etc.) and selling daily use items at small shops (8 quiosques in total in the community).

According to the community, there are approximately 70 fishermen. The normal catch for a canoe (with two fishermen) is around 40-50 kg. Locals estimate that around 60 women are palaiê. The palaiê sell three fish products: raw/fresh, salted and smoked. Most of the palaiê go to the city of Santo Antonio to sell their product. They normally buy around 10-20 kg per day, and sell for a profit of 15 to 20 STD/kg. There are also a number of (~4) canoe builders.

The president of the agricultural association estimated that around 50 people perform agricultural activities. 10 to 15 are exclusively involved in growing crops. Others raise livestock and grow crops. The agricultural sector has an association with 37 people.

### 4.8.4 Active organizations

#### 4.8.4.1 CONPREC

CONPREC has 8 active members in the community. They are well integrated, as a number of members also have roles in the community (e.g. the Chefe de praia, president of association, professors, fishermen, palaiê, etc). The community has a higher sense of risk perception since the local members of CONPREC in Abade have started volunteering activities like a night watch in storm season (quaresma) and spring tide to be able to react in case an event starts at night. They also have a register of major coastal flood events since 2016, with the date, and sometimes time and duration.

#### 4.8.4.2 Fishermen's and Palaiê Association

The fishermen's association has 36 active members. Members pay a monthly fee of 20 STD. The president of the association is also the Chefe de praia. The palaiê association has 35 active members. The members pay a monthly fee of 20 STD.

#### 4.8.4.3 MARAPA & Principe Trust

MARAPA is working closely with the fishermen's association to help fishermen update their fishing equipment and perform more sustainable and safer fishing. MARAPA and the Príncipe Trust Foundation (another NGO active in the community) are also working with the palaiê association to introduce new methods to commercialize fish (salted, smoked, raw). In addition the Príncipe Trust Foundation has a project within the community related with the manufacture of artisanal soap for the community and to sell it to nearby villages.

#### 4.8.4.4 Agricultural Association

The agricultural association has 37 active members. The members pay a monthly fee of 20 STD.

## 4.8.4.5 Other organizations

According to the community there are other relevant groups, but they do not have a president or a formal organization. Examples include the youth group (20-30 people, men and women). They normally gather to play football. Another group of 10 gathers to play cards on Sundays. There are two main religious congregations: the Adventists (15-20 members) and the Catholics (35 members). Approximately 50-60 women also prepare cultural presentations to represent Abade during national holidays. They also participate in celebrating international women's day (March 8<sup>th</sup>).

## 4.8.5 Exposed assets

There are no statistics related to the exact number of houses in Praia Abade. We estimate that, given the average number of people in a family, there must be approximately 50 houses, taking into account buildings with a public or entertainment function (school, health care center, kindergarten). The exact number of houses will be estimated from the drone images collected during the field visit (Annex 4).

With the exception of a few buildings (school, kindergarten, artisanal soap production facility, health care center), all the houses are made of wood. In general, the houses on the landward side of the coastal road are elevated 40 cm, with some as high as 1.2 m closer to the upper wetland area (Photo 4.23). In the strip between the road and the beach, the houses are elevated 40 cm. All Annexes to the houses (e.g. kitchen) are located at ground level.

The fishermen estimated that there are ~70 canoes in the community (Photo 4.24). A canoe builder provided prices for large and small canoes and gave an estimate for the two community resin boats (Table 4.14). We also asked residents raising animals to estimate the value of the livestock in the community (Table 4.14).



Photo 4.23 Left: typical house between the beach and the road. Right: house on the landward side of road. Photos by L. Torres Duenas.





Photo 4.24 Typical fishing boats in Praia Abade. Photo by L. Torres Duenas.

Both fishermen and farmers have not had major losses (only few chickens and occasionally a piglet) due to flooding, but this can be attributed to their awareness and quick response time in moving livestock and canoes to safer locations. Similarly, houses do not experience any content loss since they place valuable assets in elevated places within the house. Damages due to flooding occur mainly to the wooden planks on the floor or on the walls. Wind occasionally damages the houses on the beach.

Table 4.14. Estimates of houses, construction material, and common asset values in Praia Abade (source: interviews during site visit)

Asset	Value/cost
Poor wooden house	STD 30,000
Good wooden house	STD 210,000
Stone house	STD 400,000
Large canoe (wooden)	STD 15,000
Small canoe (wooden)	STD 8,000
Resin boat	STD 300,000
Baby goat	STD 1,000
Adult goat	STD 3,000
Piglet	STD 700
Adult pig	STD 70/kilo
Chicken	STD 200

#### 4.8.6 Main issues

##### 4.8.6.1 Local perception of problems

Inhabitants of the region reported that the last time there was coastal flooding October 2018. Water reached the road and the first line of houses behind the road. This community has been recording the flood events since 2016. This action came after some critical storms that occurred in 2015 (no records available). The leader of this initiative is Joana Vaz Moreno Pereira (part of the school staff and local member of CONREC) who can be seen in Photo 4.25 showing her records. All her notes have been transcribed and are presented in Table 4.15.



Photo 4.25 Joana local member of CONPREC explaining about her flooding records in the village of Abade. Photo by A. Giardino.

Table 4.15. Coastal flooding records in Praia Abade (source: Joana Vaz Moreno- CONPREC local member)

Year	Month	Days
2016	January	26 to 29
	February	9 to 13
	September	3 to 5 (Saturday at 4pm)
2017	February	24 to 27
	March	18 to 21
	April	27 to 30
	May	8 to 12
	June	10 to 14
	July	27 to 30
2018	January	28 to 30 (at 2pm)
	March	12 to 13 (at 10am)
	April	24 to 26 (at 1pm)
	May	16 to 18 (at 3pm)
	June	20 to 22 (at 2pm)
	August	27 to 29 (at 1am)
	October	16 to 18 (at 1am)

According to the community the prioritization of problems is as follows:

1. Access to potable water
2. Coastal flooding
3. Sanitation (lack of bathrooms)
4. Poor drainage
5. Small creek/river flooding
6. Lack of access to the capital (Santo Antonio) since the dirt road is frequently inaccessible during intense rainfall events.

They also mentioned malaria (8 cases last year), but this is normally addressed with mosquito control measures. Finally, fishermen buy gas for their motors at a store adjacent to the health care center. Some of the residents believe this is a bad combination (gas station adjacent to health center) due to the amount of medicine and chemicals stored in the health facility.

#### 4.8.7 Stakeholder participation suggestions

1. Participatory risk mapping should involve members of all the active organizations (palaiê, fishermen, agriculture, young, etc.)
2. People in the Abade seem like a close-knit and collaborative community that is voluntarily willing to help. The fact that there are several organizations and defined groups make it easier to assign responsibilities. Fishermen and palaiê could be primarily responsible for leading adaptation solutions, since they are the first people to be impacted. In the case of revegetation measures, the group of agriculture and farmers should lead this initiative
3. Presence of CONPREC is essential in the participatory meeting, as they are well integrated in the community
4. Youth should be more involved in the community. They could help with cleaning, maintenance, and/or replantation
5. The flood records are highly valuable and should be continued and even implemented by CONPREC in other communities outside of Abade
6. Women should be encouraged to participate more actively, especially young women since they are future mothers that can pass along risk perception and flood reduction strategies to their families
7. The community agreed that for the participatory risk mapping, at least the following people should be involved: four fishermen including the president of the association, four palaiê including the president, three different women that could represent this group, four members of the agriculture association, two representatives of the church groups, for young people (age < 30) and the members of CONPREC. The representatives should come from all parts of the village (beach, behind road, east side) in order to cover the risk delineation properly

Proposed adaptation options will be verified with a good representation of the communities as part of Annex 5. Among others:

- The village leader
- CONPREC people
- Palaiê (at least 4)
- (at least 4) representatives from the fishermen association
- (4) representatives of the agriculture association
- 2 representatives of the church groups
- Representative(s) of the youth organizations

The meeting with these representatives will be organized through the client and through CONPREC/fishermen/palaiê association.



## 5 General recommendations

### 5.1 Participatory risk mapping meetings

Each community differs in terms of local economies, active organizations, and level of engagement/cooperation. A tailored approach is necessary in order to involve the communities in participatory risk mapping and the selection and implementation of adaptation measures. Local authorities (e.g. vereador, Chefe de praia, district authority), fishermen and palaiê associations, and owners of exposed assets should be involved. In some communities, involving women is more challenging, but their involvement is essential since they often represent more than half of the population and drive the economy of the villages. Members of CONPREC could help engage participants before the project team arrives for the second set of site visits.

The project can benefit from the experience and involvement of an NGO like MARAPA, especially in communities like Micoló. MARAPA knows the fishing sector and the coastal communities quite well, has experience in raising awareness and in stimulating local organizations to develop. In Abade, cooperating with NGO Fundação Príncipe Trust (FPT) could be helpful.

Is important that the meetings are organized with an inclusive speech which triggers the participation of the key members of the community. Interactive material such as drone videos from the communities should be presented beforehand (if possible) to familiarize the participants with aerial views of their village and facilitate map identification. Visual material should be provided and group work should be encouraged during the sessions.

All the previously mentioned recommendations derived from the social assessment are implemented for the participatory risk mapping sessions (Annex 4).

### 5.2 Adaptation solutions meetings

A preliminary list of adaptation options was proposed for each community, to address the key issues (Field Visit Report). Resettlement is a top choice identified by many of the communities, most of whom had already identified a potential location for resettlement. Other common adaptation options include developing standards for building resilient houses, revegetation and beach zonation, improving and/or maintaining drainage, constructing or designating sheltered areas for fishing equipment, reinforcing existing coastal structures, and enforcing laws prohibiting sand mining. Conceptual designs of suitable adaptation options are presented as part of Annex 5 and will be discussed with the communities during a second field visit.

On the one hand, flooding can be prevented by technical measures; on the other hand, the effects of the flooding are also caused by people's ideas and behaviour: building houses in flood prone areas, sand mining, and other activities. People must be aware of the relationships between their community's activities and effects of floods, and jointly determine feasible and effective rules and regulations. These rules and regulations should be adhered to and enforced. In order for this to work, effective institutions are necessary. This calls for raising awareness, institutional development, and capacity building, alongside technical measures.

While residents indicate that flooding is a problem, framing the problem as only related to flooding could prevent finding sustainable solutions. Therefore, the problem of flooding should be seen in the total context of socio-economic development.

## 5.2.1 Bottom-up participation

For the future measures to be effective and sustainable, the community must be involved in the process of determining which measures should be taken. They should also preferably participate in the actual implementation and maintenance of the measures, whether with money (unlikely), material (more likely), or labour (most likely). When the community participates in the implementation of the measures, they are more likely to also participate in the decision-making and planning.

## 5.2.2 Build on existing initiatives

In general, residents show little individual initiative/motivation in addressing these issues, and expect solutions to come from the (central) government. However, there are exceptions. In Cruz/Gambôa/Lochinga the district/vereador has several plans for development and there are also local initiatives on Príncipe. Solutions against flooding are more feasible to be implemented and maintained when they are linked to these local initiatives.

The type of technical measures that are proposed should be such that the community can participate. When there is a choice between a highly sophisticated technical solution for which high-tech machinery is needed and a simpler measure in which the community can participate with labour (moving, building) and material (wood, stones), the latter should be chosen. In any case, participation will be necessary for maintaining any kind of implemented measure.

## 5.2.3 Relocation

The interviewees indicated that people are willing to move their houses to less flood prone areas, provided the government takes care of the necessary preparations (and likely funding). Relocation is a logical solution in many of these communities and should certainly be considered and discussed in the consultation process.

## 5.2.4 Measures and development of the area

Where people live and work depends on many factors. The pilot communities are not isolated, but interact with other communities, the capital and the whole country. Where will employment opportunities develop? Where will attractive housing possibilities arise? Where will necessary services be? How will transportation develop? How will land ownership develop? How will tourism develop? The answers to these questions will influence to what degree people will want to build houses in places that are prone to coastal hazards. Adaptation solutions in the current project and beyond should take into consideration, where relevant, the spatial planning for the District and the country.

## 6 References

- Africa Monitor, (2012). "São Tomé and Príncipe: Regional tensions cause alarm"  
<http://africamonitor.net>
- BBC News, (2018). "Sao Tome and Principe country profile".  
[http://news.bbc.co.uk/2/hi/Africa/country\\_profiles/1064541.stm](http://news.bbc.co.uk/2/hi/Africa/country_profiles/1064541.stm)
- Becker, Kathleen (2008). "São Tomé and Príncipe. The Bradt Travel Guide." 232 p.
- CDR International B.V., (2018). Água Grande Coastal Protection Project (D2B16ST01), Vulnerability Analysis, Topographical Survey Report, Draft. For the Ministry of Infrastructure, Natural Resources and Environment (MIRNA).
- CIA, (2019). "The World Fact Book- AFRICA: Sao Tome and Principe".  
<https://www.cia.gov/library/publications/the-world-factbook/geos/tp.html>
- Clifford Chance (2011), "Doing Business in São Tomé e Príncipe". Clifford Chance LLP Client briefing 2011.
- Costa Alegre, Mé-Chinho, (2009). "Towards a National Ocean policy in São Tomé and Príncipe". The United Nations-Nippon Foundation Fellowship Programme. Division for ocean Affairs and the Law of the Sea office of Legal Affairs, the United Nations.
- De Bruijm, K.N and F. Klijn (2009). Risky places in the Netherlands: a first approximation for floods. J Flood Risk Management 2, 58-67
- Dee, D. P. and co-authors, (2011). The ERA-Interim reanalysis: configuration and performance of the data assimilation system, Q. J. R. Meteorol. Soc., 137 (656), 553-597, doi:10.1002/gj.828.
- International Monetary Fund, (2003/2005) "Democratic Republic of São Tomé and Príncipe: Poverty Reduction Strategy Paper"
- Democratic Republic of São Tomé and Príncipe, (2006). "National Adaptation Programmes of Action on Climate Change"
- DEVCO E3/ESIP, (2010). "Study on employment-intensive methods in infrastructure and other Non-Social Sector programmes"/ Final Report, commissioned by DEVCO E3/ESIP.
- Feio, Joana Areosa, (2008). "De Étnicos a "étnicos": Uma Abordagem aos "Angolares" de São Tomé e Príncipe". Tese submetida como requisito parcial para a obtenção do grau de Mestre em Antropologia.
- Giardino, A., O. de Keizer, J. Schellekens, (2011). São Tomé and Príncipe: Adaptation to Climate Change Climate variability and hydro geomorphological study. For UNESCO-IHE. Deltares Project #: 1203676-000.
- Hagemeijer, Tjerk. "The Gulf of Guinea Creoles: genetic and typological relations" In: Bhatt, Parth and Tonjes Veenstra (eds.), Creoles and Typology: Special issue of Journal of Pidgin and Creole Languages 26:1 (2011), pp. 111–154.



Henriques, M. & Neto, K., (2014). Geoheritage at the Equator: Selected Geosites of São Tomé Island (Cameron Line, Central Africa). Sustainability. 7. 10.3390/su7010648.

INE,(2012). IV Recenseamento Geral da população e da Habitação 2012 (IV RGPH 2012). São Tomé - São Tomé e Príncipe: Instituto Nacional de Estatística (INE).

Jobbitt, Rafaela., (2017) "Mobilizing the Authentic: Angolares and the politics of identity Formation in São Tomé and Príncipe in historical perspective". (Dissertation abstract York University).

Kummerow, C., Simpson, et. al, (2000). The Status of the Tropical Rainfall Measuring Mission (TRMM) after Two Years in Orbit, Journal of Applied Meteorology, 39(12).

Lawson, Andrew, et al., (2010). "Evaluation des finances publiques selon la méthodologie PEFA (Public Expenditure and Financial Accountability) à S. Tomé et Príncipe". Final Report EC Multiple Framework Contract beneficiaries programme. Lot N 11: Macro Economy, Public Finances and Regulatory Aspects, specific contract no 2009/208867/1

Lorenzino, Gerardo A., (2007). "Linguistic, Historical and Ethnographic Evidence on the Formation of the Angolares, a Maroon-descendant Community in São Tomé (West Africa)". Portuguese Studies Review 15 (1-2) (2007) 193-226.

Macqueen, Norrie., (2008). Review of "Comrades, Clients and Cousins: Colonialism, socialism and democratization in São Tomé and Príncipe", by Gerhard Seibert, 2006. African Affairs (2008), Volume 107, Issue 426, pp. 288-290.

Merz, B., et al (2010). Assessment of economic flood damage. Nat. Hazards Earth Syst. Sci., 10, 1697-1724, 2010

Monteiro Fortes, José Alexandre., (2011). Projecto de Adaptação às Mudanças Climáticas. Marco de Gestão Ambiental e Social do Projecto.

República Democrática de S. Tomé e Príncipe, (2006). National Adaptation Programmes of Action of Climate Change. [http://www.preventionweb.net/files/8567\\_stp01.pdf](http://www.preventionweb.net/files/8567_stp01.pdf).

Saldanha, Nádia, et. al, (2009) " HLA polymorphisms in Forros and Angolares from São Tomé Island (West Africa): Evidence for the Population Origin." Journal of Genetic Genealogy, 5(2): 76-85, 2009.

Seibert, Gerhard, (2003). "The Bloodless Coup of July 16 in São Tomé e Príncipe". Lusotopie 2003: 245-260.

Seibert, Gerhard , (2003). "Coup d'état in São Tomé e Príncipe: Domestic causes, the role of oil and former "Buffalo" Battalion soldiers". African Security and analysis Programme occasional paper.

Seibert, Gerhard, (2004). "Healing and Spirit Possession in São Tomé and Príncipe". In: African Folklore. An Encyclopedia. Philip Peek and Kwesi Yankah, editors. 2004. pp. 332-334.

Seibert, Gerhard, (2004). "Performing Arts of São Tomé and Príncipe". In: African Folklore. An Encyclopedia. Philip Peek and Kwesi Yankah, editors. 2004. pp. 680-687.

Seibert, Gerhard, (2006). Review of: Burness, Donald. "Ossobo: Essays on the Literature of São Tomé and Príncipe", 2005. H-Net Reviews in the Humanities & Social Sciences.

Seibert, Gerhard, (2012). "São Tomé and Príncipe in 2011: Again Waiting for Better Times, with a New Old President". IPRIS Lusophone Countries Bulletin: 2011 Review: 39-45. Portuguese Institute of International Relations and Security (IPRIS)

Shore Monitoring & Research B.V., (2018). Field & Processing Report: São Tomé. For CDR International.

Tadros, Mark and Fiona Tummon., (2007) "São Tomé and Príncipe: Adaptation to Climate Change program. Technical support for climate modeling. Historical decadal changes in regional climate and aerosols". Climate Systems Analysis Group, University of Cape Town.

The United Nations Democracy Fund, (2007) "News from the field: Voice for the Voiceless-Introducing community radio to São Tomé e Príncipe". <http://www.un.org/democracyfund/XNewsSaoTomeePrincipe.htm>.

Transparency International: [http://transparency.org/policy\\_research/surveys\\_indices/cpi](http://transparency.org/policy_research/surveys_indices/cpi)

Trovoada, M.J., et. al., (2001) "Evidence for population sub-structuring in São Tomé e Príncipe as inferred from Y-chromosome STR analysis.", 65, 271-283.

UNESCO-IHE and Deltares, (2012). Coastal geomorphology and adaptation options study: São Tomé & Príncipe. Technical report, Delft, The Netherlands