2015

Climate Vulnerability and Capacity Assessment : A Baseline Report

FOREWORD

People of Timor-Leste, as in many other parts of the world, have experienced hotter summers, sporadic rainfall, shifted seasons, drying up of the water streams, and more frequent climate induced disasters and natural hazards such as floods, landslides, and erosion in the recent years. These are just some of the visible impacts of climate change on our daily lives. These changes in the climatic patterns have direct impact on our livelihoods, health, infrastructure, economic activities and on overall development of the country. Several studies conducted in the past such as the National Adaptation Programme of Activities (NAPA) and Initial National Communication (INC) have already proved that these changes are real and are caused by climate change.

As a result, there is a growing number of people who are being exposed to these climate risks, and the level of vulnerability is increasing as well due to the absence of effective strategy to tackle negative impacts of climate change. However, Timor-Leste is not alone in this crossroad. Governments and people around the world are also coping with the challenges and devastations in their own ways. Many of these governments working together with its people to develop policies and quicker ways of responding to disasters and creating new and improved ways of helping climate vulnerable people cope with negative impacts. We, in Timor Leste, also need to take a step back and look at our current efforts to minimize the negative impacts and see where are we as a nation in preparing ourselves against these challenges, and what specific activities are being undertaken to enhance the adaptive capacity of the ones who are most at risk and most vulnerable due to the climate change.

UNDP Timor-Leste has been supporting the people and the government of Timor-Leste in its efforts to make people and communities more climate resilient. We believe that our support would be more effective if we help to strengthen the existing government mechanisms and systems of planning and development. Therefore, our constant efforts have been to align our work to the needs and priorities of the local communities, local governments and the overall climate resilient development goals of the country. In this regard, one of our projects is working closely with local governments, the Ministry of State Administration (MSA) and the Ministry of Commerce, Industry and Environment (MCIE) to build and rehabilitate rural small scale infrastructures.

We believe that this partnership will translate into long term development gains because through this work, we are strengthening home-grown Integrated District Development Planning (PDID) process especially in its efforts to mainstream climate change adaptation and climate resilience into local development, planning and budgeting process. To further reinforce the probability of sustainability of our work, we have been working closely with the government and local stakeholders to enhance their capacities to identify, plan and internalize activities that contribute to build climate resilience.

We realize that rural small scale infrastructures such as water supply systems, small roads, irrigation canals, bridges, and drainage systems are very crucial for local communities. That is why UNDP has been identifying the most critical projects from the approved Suco Planning matrix and providing technical and financial support in not only undertaking the rehabilitation work but also for making these infrastructures climate resilient. However, our work is a pilot attempt and we are currently confined to eight administrative posts of Ermera, Liquica and Baucau.

We had commissioned a study in order to help the local planners, our implementing partners – MSA and MCIE to understand the risks of common hazards such as landslides, erosion and flood which affect local communities and the small scale infrastructure. The study is also to understand how they can replicate and scale up the work that we are doing in the selected sucos of Ermera, Liquica and Baucau to other climate risk prone areas. The main objectives of this study, which was undertaken by Care International Timor-Leste are to find out (i) the levels of risks that the disasters are posing in the study area, (ii) factors that cause these

risks, (iii) the most vulnerable areas (also called as hotspots), and (iv) how the local communities are coping with those risks.

While this report does not delve into the specific risks that threaten small scale infrastructure, all in all this report provides is a strong baseline to move ahead and make climate responsive planning on the basis of the climate risk hotspots. I believe that the Suco and Aldeia level planners will be able to strengthen the next year's and the coming years' PDID process using the climate risk information provided by this report. Together, we will build a more climate resilient rural Timor-Leste with abundant climate sustainable small scale infrastructure.

Knut Ostby 

UN Resident Coordinator & UNDP Resident Representative for Timor-Leste

ACKNOWLEDGMENT

Strengthening Resilience of Small Scale Rural Infrastructure (SSRI) and Local Government Systems to Climate Variability and Risk Project would like to acknowledge the support, collaboration and cooperation it received from its implementing partners – Global Environment Facility, Ministry of State Administration and Ministry of Commerce, Industry and Environment and its staff during the entire process of preparation of the Climate Vulnerability and Capacity Assessment (CVCA) in the selected Suco in three municipalities of Baucau, Ermera and Liquiça.

SSRI would like to acknowledge specifically Care International Timor Leste (CITL) for undertaking the CVCA, conducting GIS analysis and producing Climate Risk Maps indicating hotspot areas and producing the report with the CVCA and GIS analysis. Similarly, SSRI would like to acknowledge Municipality Administrator of Baucau, Ermera and Liquiça, Administrator of Administrative Post of Baucau Villa, Vemasse, Quelicai, Liquica, Bazartete, Maubara, Ermera Villa and Hatolia, SChefe de Suco, Chefe de Aldeias, local community members, EVAS members, local government staff and CITL community mobilizers for their valuable contributions to the assessment. SSRI would also like to acknowledge the participants from Ministry of Agriculture and Fisheries, Ministry of Social Solidarity / National Directorate for Disaster Management, Ministry of Public Works, Centre for Climate Change and Biodiversity, Roads for Development (R4D)/ ILO in the Stakeholder Consultation held on July 16, 2015 for their time and contributions in identifying the gaps in the draft report and helping to further enhance the quality and relevance of the report in the context of climate change landscape of Timor Leste.

EXECUTIVE SUMMARY

Bio-physical conditions in Timor-Leste put much of the country's infrastructure at risk from a range of natural hazards. High mountains, steep slopes, large volumes of rainfall, intense and prolonged downpours, sparse natural vegetation and friable, sandy soils – these characteristics describe many parts of Timor-Leste, and together they pose a number of threats to the nation's infrastructure. Under most of the climate change scenarios now being taken seriously, it is weather-related threats in particular that are likely to get more and more severe in the future. Among the most serious are flooding, landslides and soil erosion. In order to protect infrastructure against current risks and prepare for harsher conditions in the future, the people of Timor-Leste need to understand more about what causes events and processes such as floods, landslides and erosion, why risks are higher in some places than in others, and what can be done to reduce risk, protect communities and safeguard investments in infrastructure. UNDP commissioned CARE's Climate Vulnerability and Capacity Analysis project through its Small Scale Rural Infrastructure (UNDP-SSRI) Project to answer some of these questions and to provide more detailed information about the risks to infrastructure that can contribute to the Governemnt of Timor Leste's (GoTL) planning and decision making process.

CARE's project comprised a two-pronged approach to gain a deeper understanding about threats to infrastructure from weather-related hazards in the eight administrative posts it is working in. The first part of this project was a spatial analysis and mapping exercise which would produce a series of maps and statistics showing the distribution of different levels of risk from weather-related hazards. The mapping exercise would also examine the extent to which existing infrastructure was threatened by these hazards.

The mapping study looks at relationships between three weather-related hazards and four types of infrastructure. The hazards are flooding, landslides and soil erosion, and the types of infrastructure are houses, schools, health facilities and roads. The geographic extent of the mapping work was defined by the administrative areas in which SSRI is already working – Baucau, Quelicai and Vemasse in Baucau Municipality, Ermera and Hatulia in Ermera Municipality, and Bazartete, Liquiçá and Maubara in Liquiçá Municipality. The framework for the analysis wasn't determined by administrative boundaries alone – analysts developed risk characterisations for river catchments as well as for *sucos* and administrative posts. To map the relative risk of exposure to the three different hazards, the mapping team considered a wide range of contributory factors, including elevation above sea level, steepness of slopes, density and condition of vegetative cover, texture of the soils, average annual rainfall and proximity to rivers and streams.

Baucau, Vemasse, Hatulia and Maubara are the administrative posts (APs) most at-risk from flooding. Out of almost 10,000 hectares at-risk in the study area, 8,800 hectares are in these 4 APs. The catchments most susceptible to flooding in these parts of the country are those of the Seiçal River in Baucau AP, the Vemasse River in Vemasse AP and the Lois River in Hatulia and Maubara APs. These floodplains make excellent farmland and are attractive places to live, but this exposes a substantial number of houses and other infrastructure to damage from flooding.

Based on this study, approximately 14,000 hectares are at risk of landslides. This is 7.5% of the total study area. Of the at-risk area, 8,464 hectares (61%) are considered to be at medium or high risk of landslides. High risk areas are concentrated in Quelicai AP. Other areas prone to landslides include all three APs in Liquiçá Municipality and parts of Hatulia AP. Most at risk areas don't have much infrastructure at present. Existing roads generally avoid passing through landslide areas, with only 35km (4%) of the total length of 893km considered at risk, and of these, only 6km are in high risk areas. However, a landslide damaging even a very short section of road can cause severe disruption to transport and communications.

The APs with the largest potential problems from erosion are Ermera, Bazartete and Liquiçá, where more than 90% of the land area is considered to be at medium or high risk. Ermera AP stands out because roughly half its land area and infrastructure is at high risk of soil erosion. It is important to note that erosion generally has broader impacts than landslides and flooding, and communities and infrastructure

downstream can suffer damaging, expensive and long term consequences of erosion that occurs in upstream areas many kilometres away.

The study produced 24 maps to illustrate different levels of risk of flooding, landslides and erosion in each of the eight SSRI APs. The data, and the maps and statistics generated from it, represent a valuable information resource that enables better decision-making by a range of stakeholders, including planners, engineers, community leaders and members of the public. The maps and data are available in a variety of formats, including printed maps, digital maps, GIS layers and Google Earth files, to make them accessible to as wide a range of users as possible.

The technical data and mapping alone can only provide so much information however, and so the second part of the project's two-pronged approach turned to the communities themselves in order to better understand the realities on the ground. This required the application of CARE's Climate Vulnerability and Capacity Analysis (CVCA) tool, which involved facilitating workshops with local communities to understand their perspectives and previous experience of what the main risks are, how those risks affect small-scale infrastructure, and what measures the communities themselves would like to see to protect their roads, water supply systems, houses and bridges. Moreover, the analysis aims to increase the understanding of who the most vulnerable communities are, where they are located, to what and why they are vulnerable.

The CVCA workshops conclude with a location-wise assessment of vulnerability and risk associated with small scale infrastructures. This vital part of the process allows us to understand where the community feels, based on their own experience, priorities and perceptions, they are the most vulnerable and the most at risk.

In addition to floods, landslides and erosion, communities list heavy rain, strong winds and drought as significant problems. Whilst accepting that such weather events are real and can have serious consequences, assessing exposure to heavy rains, strong winds and drought are not within the remit of this study, which focuses on assessing exposure to hazards to which severe weather contributes, rather than on assessing exposure to the weather itself.

By combining local knowledge with scientific data, this project provides a deeper understanding of the threats to infrastructure from weather-related hazards, and the vulnerability of communities in terms of their exposure and susceptibility to climate risks. This provides the critical basis on which to develop action plans to facilitate the enhanced resilience of rural communities in the target administrative posts in Timor Leste.

Glossary of Technical Terms and Abbreviations

ALGIS	Agriculture and Land Use Geographical Information System
ALOS	Advanced Land Observing Satellite
AP	Administrative Post
ASTER	Advanced Space-borne Thermal Emission and Reflection Radiometer
CITL	CARE International in Timor-Leste
CVCA	Climate Vulnerability and Capacity Analysis
DEM	Digital Elevation Model
GIS	Geographical Information System
GPS	Global Positioning System
JICS	Japanese International Cooperation System
MAF	Ministry of Agriculture and Fisheries
NASA	National Aeronautics and Space Administration
NASA JPL	National Aeronautics and Space Administration Jet Propulsion Laboratory
NDF	National Directorate for Forestry
SSRI	Small Scale Rural Infrastructure Project
Suco	An administrative area most usually translated as 'village'. Timor-Leste has 442 *sucos*
TMAP	Timor GIS and Mapping Solutions Lda
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UTM	Universal Transverse Mercator (coordinate system and map projection)

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1.0 Background and Objectives

UNDP, through the Small Scale Rural Infrastructure (SSRI) unit, commissioned CARE International in Timor-Leste (CITL) to undertake a Climate Vulnerability and Capacity Analysis in order to better understand the vulnerability of certain communities to climate risks. The focus of this analysis is on the vulnerability of the community, with vulnerability based on how exposed or at risk people are to disasters (exposure) and how likely they are to be impacted (susceptibility). To do this the initiative involved two key types of analysis, the first being CARE's Climate Vulnerability and Capacity Analysis (CVCA) which works with communities to understand previous exposure and susceptibility and priority concerns. The second analysis used maps, images and spatial statistics generated with GIS, to assess the exposure of existing and proposed infrastructure to risks associated with weather and climate change. By bringing together these two pieces of critical analysis we have been able to develop aclearer picture of the vulnerability of certain communities and the implications for their capacity to be resilent.

The GIS mapping commenced In February 2015, when CARE contracted local company Timor GIS and Mapping Solutions (TMAP) to develop a series of risk maps and generate statistics to give a better understanding of the distribution and magnitude of various risks, and the extent to which those risks pose a threat to existing infrastructure. This report includes documents the methodology used to generate the maps and statistics, and presents detailed results from the study as a series of administrative post-level risk profiles. The CVCA workshops were conducted simultaneously to document local knowledge and experience of the different aspects of risks and vulnerability to climate change, exposure, sensitivity and resilience, from the community's perspective. This report documents the methodology and process of the CVCA workshops and compares the outcomes and findings from the CVCAs with those of the GIA mapping study in order to build a clearer picture of what risk looks like in each suco.

Infrastructure in Timor-Leste already suffers from a range of weather-related hazards; landslides, flooding and soil erosion being among those with the greatest destructive potential. Damage to infrastructure from hazards such as these is extremely costly in terms of lost production capacity; it displaces people from their homes, land and businesses; it isolates communities from schools, markets, healthcare facilities and social support services; and it uses up scarce resources when structures need to be repaired or rebuilt frequently.

The reasons why Timor-Leste is particularly vulnerable to hazards such as landslides, flooding and erosion are both bio-physical and human. On the bio-physical side, Timor-Leste's weather, topography, geology, soils and natural vegetative cover combine to create conditions susceptible to landslides, flooding and erosion. At certain times of year, large volumes of rain fall in intense downpours that can last from a few minutes to a few days. At other times of year, rainfall is scarce, the ground dries out and vegetative cover becomes very thin. Much of the country is mountainous, characterised by high elevations and steep slopes. On these slopes, soils are often thin, friable, low in clay and organic content, and poorly bound together by vegetation. Timor-Leste's natural environment is already quite hostile and risk prone and as global temperatures rise, some predictions suggest weather events in the country could become even more extreme, potentially increasing exposure to the hazards of landslides, floods and erosion.

From the human perspective, social and economic factors conspire to make it very difficult for many communities in Timor-Leste to cope with or adapt to weather-related hazards. These are mostly subsistence farming communities and they rely on the country's natural resource base for their livelihoods. They live in remote rural areas due to traditional land ownership and kinship ties, and this affords them with the land and water they need to farm. It is often in these areas where the physical

conditions are the harshest and the threats from landslides, flooding and soil erosion most severe. With Timor-Leste's rapidly growing population, more and more infrastructure is needed to house people, transport them around the country and deliver goods and services to them. In the context of increasing population, traditional farming practices have resulted in widespread deforestation, further exacerbating exposure to natural hazards. At the same time, more people are being forced to live in marginal areas where the potential for landslides, flooding or erosion is already relatively high.

Agriculture in Timor-Leste generates very little money, so resources for building houses, roads, water supply systems, irrigation systems and other small-scale infrastructure are limited. This often means structures are not built strongly enough to withstand the forces of nature. And even if communities do have the means to build to high engineering standards, they may not be well informed about the nature, magnitude or extent of specific weather-related threats to different locations. The GIS mapping is intended to help fill that gap by providing information about which types of risk threaten different parts of the country, what degree of risk different areas face, and what types of existing infrastructure are most at risk from landslides, flooding and soil erosion.

At the same time as TMAP has been conducting GIS analysis and preparing maps showing relative risks associate with landslides, flooding and erosion, CARE engaged with members of rural communities to gain insight into their perspectives on exposure to the different hazards. The goal is to present those responsible for planning and building small scale rural infrastructure with the best technical and scientific data available, together with insights gained from local knowledge and local understanding, to help them make better-informed decisions about where to build, what to build and how to build. By improving the quality of future infrastructure developments in this way, the aim is to help strengthen the resilience of communities to stand up to weather related threats, both under current conditions and in what is likely to be a harsher climate in the future.

This report has been broken into seven key sections: the overall objectives of the project; the GIS methodology and results; the CVCA process, methodology and results; triangulation of both sets of data; limitations and learning; recommendations, and conclusions.

The primary objective of the spatial analysis and mapping was to produce a set of maps showing variations in the levels of risk of different kinds of weather-related hazards. To supplement the maps, and as a bi-product of the spatial analysis that generates them, statistics will be generated quantifying the locations at different levels of risk in administrative areas, and showing how much of various kinds of existing infrastructure are considered at-risk from landslides, flooding and erosion. The maps are to be used to help identify 'hot spots' - places that are particularly prone to weather-related hazards - where future interventions can be targeted. Outputs from the mapping is intended for a range of different audiences and user-groups and to this end includes large scale printed maps, electronic versions of those same maps, a GIS database comprised of all the spatial data used for and generated by the study, and Google Earth-compatible layers of risk data and infrastructure locations. A short training course to help familiarize members of the UNDP-SSRI team with maps and other outputs was also included in the scope.

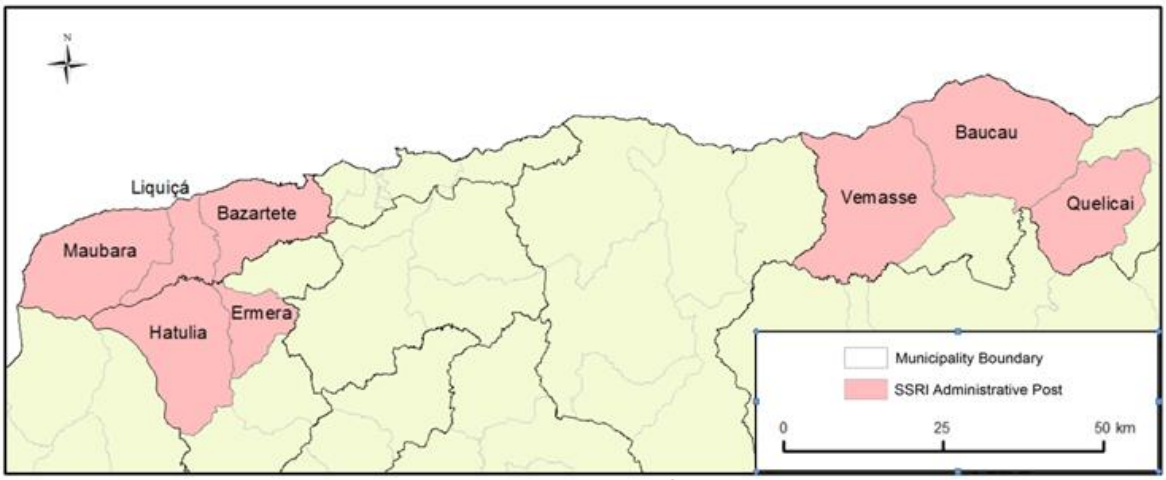
The primary objective of the CVCA was to assess the community resilience to climate change, and what risks face their small scale rural infrastructures. It was important not to influence the community in their decision making in order to gain a clear picture of what they place their priorities on. While the GIS mapping focussed solely on: landslides; flooding, and erosion, the CVCA allowed the communities to voice their concern about other natural occurrences such as flash flooding and drought. The CVCA also gave an insight into what priority the community placed on different infrastructure. We would expect homes, schools and clinics to be of the highest priority and in most need of protection; the CVCA showed us that some communities did not consider a school to be a priority. This raises the interesting question; can the community see their main risks and how it connects to their land?

Finally, the report pulls together the two important pieces of analysis into an overview that allows us to better understand the levels, impacts and realities of risk in each community and start to explore possible areas that require particular attention or further intervention. The resulting information on risk and vulnerability enables a much more informed approach to further planning and intervention at community level.

2.0 Spatial Analysis and Mapping

2.1 Scope of the study

The geographic extent of the study area was eventually set as the area defined by the 8 administrative posts in which UNDP-SSRI is currently working, namely Baucau, Quelicai, Vemasse, Ermera, Hatulia, Bazartete, Liquiçá and Maubara. Map 1 shows the extent of the study area, with 3 APs in Baucau Municipality, 2 APs in Ermera Municipality and 3 APs in Liquiçá Municipality. The 8 APs are comprised of a total of 79 *sucos,* and they occupy 186,548 hectares of land, which is 12.5% of Timor-Leste's total area of 1,492,000 hectares (General Directorate for Statistics, 2013).



MAP- 1. Geographic Extent of the Study Area

The reaso Confining the research and analysis to these 8 APs enabled the development of a detailed picture of local threats to infrastructure, and at the same time to show that detail in the context of broader, regional patterns. This enables us to analyse something more than just a general picture of weather-related risks at municipality level. These APs were therefore selected because they were suitable for this purpose, providing the opportunity for detailed, site-level studies and broad-scale, municipality- and national-level overviews.

There are a large number of hazards and threats to infrastructure associated with weather and climate and it was necessary for this study to be selective. Based on CARE's feedback from communities in recent years landslides, flooding and soil erosion are generally considered to pose the most serious threats to infrastructure so these three hazards were the basis of the study. There are many different kinds of flooding, landslides and erosion, so that even within the 3 categories of hazards it had to be selective, for full descriptions of the types of hazard please see Annex 1.

In order to assess the relative exposure of different locations to the risks identified detailed technical analysis of specific data, criteria and indices were used. This included analysis of existing data, spatial analysis, statistical analysis and field work the full methodology for which is also included in Annex 1.

2.2 Outputs

The primary outputs from this risk mapping study are a set of 24 risk maps, electronic databases of risk statistics and GIS data, and this report documenting the technical Approach used and the results achieved.

MAPs - The 24 risk maps show areas at varying degrees of risk for flooding, landslides and erosion in each of the 8 administrative posts SSRI is working in. The 24 maps were published in several formats, taking into account the range of needs of different target audiences. The maps were designed to be printed at A1 size (594mm x 841mm), and two complete sets were printed at high quality at this size. In this format, the maps are intended for use in planning and management meetings, especially when large groups of people are involved. They will also be useful in field offices and remote areas where computers and internet access are scarce. The same maps are printed at A3-size in Section 4 of this report. They are more convenient at this scale, but convenience comes at a price, and though these maps are just about legible, it is difficult to see a lot of the detail at this small scale.

Electronic versions of the maps were delivered in both PDF and JPG format. The high-resolution PDF maps are particularly useful because they are layered, and when opened with Adobe Acrobat software, they can be used a very powerful, flexible planning tools. Acrobat allows the user to turn different layers of data on and off and turn different map elements on and off (legends, north arrow, inset maps, scale bar, title block, etc). Panning and zooming functions are also available, making it possible for users to focus on a particular area of the map and select only the layers of data they are interested in for display. Since the maps were published to PDF at high resolution, all features, labels and graphic elements remain sharp, even when zoomed in at very large scales. This makes it possible to extract all the detail available in the maps.

TMAP conducted a short training course to introduce members of the SSRI team to the PDF maps. During this course, participants experimented with the navigational functions the Acrobat application and explored different uses to which the maps in this format might be put. Examples of the exercises the instructor led them through included counting the number of schools in each *suco* of a particular administrative post, identifying all the health facilities in medium and high risk areas for flooding, and selecting sections of roads that passed through areas with a high risk of landslides.

In JPG format the maps are less flexible, and users lose the ability to turn layers and map elements on and off. Zooming is still possible, and resolution is still good. The main value of the JPG maps will be for re-printing copies at A1-size, for distributing via the internet, and for presenting in documents and presentations.

GIS Database – The spatial data that generated the maps was delivered in two electronic formats – one compatible with ESRI GIS software (shapefiles) and the other compatible with Google Earth (KMZ files). Access to these datasets will enable users to incorporate the input layers, the infrastructure data and the reference data into their own applications and analyses. It will also allow them to explore and gain a better understanding of the risk data – the layers show different categories of exposure to flooding, landslide and erosion risk.

GIS data, just like the maps generated from it, are snapshots of discrete parts of the earth's surface at one moment in time but we must recognise that things change very quickly, in both time and space. That doesn't mean they are not useful as historic documents, and change-detection and monitoring are two very common uses for time-series GIS data. Another possibility might see scientists and GIS analysts 'tweaking' the data used for this study. Developing risk criteria always has some element of subjectivity about it, and it is quite reasonable to assume that other analysts might look at the same data from a

different perspective. They may be interested in re-classifying the input layers, introducing new input datasets, or assigning different risk values and weights to the data to re-calibrate the model. In this respect, outputs from the UNDP SSRI risk mapping study might become inputs to future studies which will hopefully further the understanding of vulnerability to weather- and climate- related hazards.

The user-friendly KMZ files are likely to find a wider and more general audience among the Google Earth community. Though KMZ data lacks much of the functionality of data used in the GIS environment, it is still a very powerful information resource. It has the big advantage of requiring few special skills and very little technical knowledge to make it useful. Members of the SSRI team involved in field activities are likely to find the KMZ data particularly useful. Overlaying polygons showing areas at risk of flooding, landslides and erosion on satellite imagery in Google Earth will enable users to immediately relate the somewhat abstract risk layers with field conditions they are already quite familiar with. Red polygons indicating high-risk for landslides make much more sense when you can the steep, sparsely vegetated slopes on the image displayed beneath them. Similarly, polygons showing flood-prone areas seem much more real when the image beneath them clearly shows land that is frequently inundated with water from the nearby river.

Risk Statistics - The risk statistics are presented in summary tables in this report. Eight tables in each Administrative Post Risk Profile provide a detailed numerical record of the numbers behind the maps. The tables give the following statistics for every *suco*-catchment in each of the 8 administrative posts:

- Its name and total area, in hectares
- The total number of houses, schools and health facilities
- The total length of road, in kilometres
- The number of hectares and percentage of total area at-risk of flooding
- The number and percentage of houses, schools and health facilities in flood prone areas
- The length and percentage of road in flood prone areas
- The number and percentage of houses, schools and health facilities at no, low, medium and high risk for landslides
- The length and percentage of road at no, low, medium and high risk for landslides
- The number and percentage of houses, schools and health facilities at low, medium and high risk for erosion
- The length and percentage of road at low, medium and high risk for erosion

The way these statistics have been presented is just one way of 'packaging' the results of the study. The use of the *suco*-catchment as the reporting unit was decided because of the importance of upstream-downstream linkages in natural hazard risk assessments of this nature. The statistics could have been calculated and presented for ***just*** *sucos* or ***just*** catchments, but that would have hidden key relationships between the administrative and the physical pieces of land. Alternatively, administrative post and catchment boundaries could have been intersected, producing a new set of features called 'AP-catchments', and generating risk statistics for those. However, doing that would have caused us to lose much of the detail and local variation revealed in *suco*-catchment-level statistics. Aggregating up from the detailed to the general is much easier to do than disaggregating down from the general to the detailed. By breaking down the data and presenting detailed risk statistics at *suco*-catchment level, the opportunity is available for users to aggregate up and summarize for *sucos,* administrative posts and catchments. For those wishing to do so, the data behind the statistics is also available in Excel spreadsheets, which have the advantage of allowing users to sort, select, summarize and package the numbers to meet their own needs.

2.3 Overview of Risks at Administrative Post Level

Flooding

Of the 186,548 hectares of land in the study area, almost 10,000 hectares is considered susceptible to flooding. Baucau, Vemasse, Hatulia and Maubara are the APs most at risk. Within these 4 APs, the areas at greatest risk are in the catchments of some of Timor-Leste's largest rivers: the Seiçal River in Baucau AP, the Vemasse River in Vemasse AP, and the Lois River in Hatulia and Maubara APs. These rivers pose the biggest threat from flooding because they have large catchments, they carry huge volumes of water during major rain events and extended wet periods, and they have broad, flat flood plains in their lower reaches. These flood plains make excellent farmland for both growing crops and for grazing livestock, and they are therefore attractive places to live. This exposes substantial numbers of houses and other structures to damage from flooding. According to the criteria used for this study, 1,402 houses, 10 schools, 4 health facilities and 45km of road are at risk.

In Quelicai, Ermera, Bazartete and Liquiçá, relatively small areas of land are at significant risk of flooding.

		Land Area		
		Total	In Flood Risk Zone	
Municipality	Administrative Post		Hectares	%
Baucau	Baucau	36,962	2,178	5.9%
	Quelicai	20,594	94	0.5%
	Vemasse	37,395	2,231	6.0%
Ermera	Ermera	9,338	244	2.6%
	Hatulia	27,350	2,251	8.2%
Liquiçá	Bazartete	18,693	198	1.1%
	Liquiçá	9,822	347	3.5%
	Maubara	26,394	2,153	8.2%
	SSRI APs	186,548	9,696	5.2%

		Houses			Schools		
		Total	In Flood Risk Zone		Total	In Flood Risk Zone	
Municipality	Administrative Post		Number	%		Number	%
Baucau	Baucau	7,390	296	4.0%	47	2	4%
	Quelicai	4,772	1	0.0%	36	0	0%
	Vemasse	2,159	456	21.1%	16	5	31%
Ermera	Ermera	5,618	362	6.4%	26	4	15%
	Hatulia	5,958	105	1.8%	28	0	0%
Liquiçá	Bazartete	3,869	238	6.2%	25	1	4%
	Liquiçá	3,627	65	1.8%	18	1	6%
	Maubara	4,003	412	10.3%	20	3	15%
	SSRI APs	37,396	1,935	5.2%	216	16	7%

		Health Facilities			Roads		
		Total	In Flood Risk Zone		Total	In Flood Risk Zone	
Municipality	Administrative Post		Number	%		Km	%
Baucau	Baucau	8	0	0%	169	8.2	4.9%
	Quelicai	5	0	0%	92	0.7	0.7%
	Vemasse	6	2	33%	47	11.4	24.4%
Ermera	Ermera	4	1	25%	93	4.8	5.1%
	Hatulia	9	0	0%	164	9	5.5%
Liquiçá	Bazartete	7	0	0%	119	7.1	6.0%
	Liquiçá	7	0	0%	93	2	1.8%
	Maubara	7	2	29%	116	16	13.9%
	SSRI APs	53	5	9%	893	59	6.6%

Table 1. Summary Statistics for Flood Risk in Administrative Posts

Landslides

Based on the criteria used for this study, there is potential for landslides to occur on some 14,000 hectares of land, representing 7.5% of the total area of the 8 SSRI APs. Of this total, 5,471 hectares (2.9%) are considered at low risk, 5,538 hectares (3.0%) at medium risk, and 2,926 hectares (1.6%) at high risk.

High-risk areas are concentrated in Quelicai AP, and especially on the extremely high, steep, poorly vegetated slopes of the Matebian Massif in the east. Landslide risk is more extensive in the 3 APs in Liquiçá Municipality – Bazartete, Liquiçá and Maubara – but the level of risk is generally lower here than it is in eastern Quelicai. Maubara AP has the largest area at some risk from landslides (3,681 hectares), Liquiçá AP has the highest proportion of its land area at-risk (16.4%), and Quelicai has the largest area of high-risk land (829 hectares). Differences in the nature and extent of the threat are explained by the contrasting nature of the terrain, which is less extreme in Liquiçá Municipality than it is in Quelicai. Elevation is an important factor – the Matebian Massif is much higher than the hills in Liquiçá Municipality. Certainly there are risks of landslides in many parts of Liquiçá, but the hills are lower, the slopes are less steep and vegetative cover tends to be better, so the threat posed by landslides is less severe here than it is in Quelicai.

Landslides also threaten parts of Ermera Municipality, especially in Hatulia AP. Generally, landslide-prone areas are smaller and less extensive here than they are in Quelicai and the Liquiçá APs, but still Hatulia ranks 4th in terms of overall area susceptible to landslides (Table 5). Baucau and Vemasse are relatively flat, low-lying APs and any areas that are prone to landslides are generally small, unpopulated and un-built.

Although the land in the 8 SSRI APs where landslides could potentially occur covers quite a large area, most of it doesn't have any infrastructure built on it at present. Of the 4 types of infrastructure considered in this study, private houses are most likely to be located in landslide-prone areas, but still only 1,104 (3%) of the 37,396 houses in the study area are considered at-risk for landslides. Only 2 schools are on potentially risky sites, and none of the area's 53 hospitals, clinics and health posts are at risk. Existing roads also generally avoid passing through areas where conditions might cause landslides, with only 35km (4%) of the total length of 893km being considered at-risk, and of these, only 6km are in high-risk areas. Of course, a landslide damaging just 1 short section of road can affect many kilometres of road either side of it, causing severe disruption to transport and communications. This means that, even though the sections of the road network under direct threat are quite short, the fact that parts of several roads do pass through landslide-prone areas means that larger sections of the network face some indirect risk.

Though landslides are a serious problem in parts of the SSRI APs, it is important not to lose sight of the fact that, for most of the study area, there is no potential for landslides at all. More than 90% of the land area has slopes of less than 25°, and most of the infrastructure in the area is safe from landslides.

Land Area		Area of Land in Each Landslide Risk Category							
		No Risk		Low Risk		Medium Risk		High Risk	
Administrative Post	Total Hectares	Hectares	%	Hectares	%	Hectares	%	Hectares	%
Baucau	36,962	36,626	99.1%	96	0.3%	183	0.5%	56	0.2%
Quelicai	20,594	18,295	88.8%	582	2.8%	888	4.3%	829	4.0%
Vemasse	37,395	36,339	97.2%	339	0.9%	510	1.4%	207	0.6%
Ermera	9,338	8,729	93.5%	176	1.9%	274	2.9%	159	1.7%
Hatulia	27,350	25,498	93.2%	673	2.5%	663	2.4%	516	1.9%
Bazartete	18,693	16,203	86.7%	1,156	6.2%	935	5.0%	399	2.1%
Liquiçá	9,822	8,209	83.6%	851	8.7%	471	4.8%	291	3.0%
Maubara	26,394	22,713	86.1%	1,598	6.1%	1,614	6.1%	469	1.8%
SSRI APs	**186,548**	**172,613**	**92.5%**	**5,471**	**2.9%**	**5,538**	**3.0%**	**2,926**	**1.6%**

Houses		Houses in Each Landslide Risk Category							
		No Risk		Low Risk		Medium Risk		High Risk	
Administrative Post	Total No. of Houses	Number	%	Number	%	Number	%	Number	%
Baucau	7,390	7,354	99.5%	11	0.1%	18	0.2%	7	0.1%
Quelicai	4,772	4,628	97.0%	39	0.8%	61	1.3%	44	0.9%
Vemasse	2,159	2,157	99.9%	0	0.0%	1	0.0%	1	0.0%
Ermera	5,618	5,537	98.6%	32	0.6%	25	0.4%	24	0.4%
Hatulia	5,958	5,782	97.0%	71	1.2%	63	1.1%	42	0.7%
Bazartete	3,869	3,664	94.7%	71	1.8%	56	1.4%	78	2.0%
Liquiçá	3,627	3,340	92.1%	158	4.4%	60	1.7%	69	1.9%
Maubara	4,003	3,830	95.7%	51	1.3%	73	1.8%	49	1.2%
SSRI APs	**37,396**	**36,292**	**97.0%**	**433**	**1.2%**	**357**	**1.0%**	**314**	**0.8%**

Schools		Schools in Each Landslide Risk Category							
		No Risk		Low Risk		Medium Risk		High Risk	
Administrative Post	Total No. of Schools	Number	%	Number	%	Number	%	Number	%
Baucau	47	47	100%	0	0%	0	0%	0	0%
Quelicai	36	35	97%	1	3%	0	0%	0	0%
Vemasse	16	16	100%	0	0%	0	0%	0	0%
Ermera	26	26	100%	0	0%	0	0%	0	0%
Hatulia	28	27	96%	0	0%	1	4%	0	0%
Bazartete	25	25	100%	0	0%	0	0%	0	0%
Liquiçá	18	18	100%	0	0%	0	0%	0	0%
Maubara	20	20	100%	0	0%	0	0%	0	0%
SSRI APs	**216**	**214**	**99.1%**	**1**	**0.5%**	**1**	**0.5%**	**0**	**0.0%**

Health Facilities		Health Facilities in Each Landslide Risk Category							
		No Risk		Low Risk		Medium Risk		High Risk	
Administrative Post	Total No. of Health Facilities	Number	%	Number	%	Number	%	Number	%
Baucau	8	8	100%	0	0%	0	0%	0	0%
Quelicai	5	5	100%	0	0%	0	0%	0	0%
Vemasse	6	6	100%	0	0%	0	0%	0	0%
Ermera	4	4	100%	0	0%	0	0%	0	0%
Hatulia	9	9	100%	0	0%	0	0%	0	0%
Bazartete	7	7	100%	0	0%	0	0%	0	0%
Liquiçá	7	7	100%	0	0%	0	0%	0	0%
Maubara	7	7	100%	0	0%	0	0%	0	0%
SSRI APs	**53**	**53**	**100%**	**0**	**0%**	**0**	**0%**	**0**	**0%**

Roads	Total Length of Roads (Km)	Length of Road in Each Landslide Risk Category							
		No Risk		Low Risk		Medium Risk		High Risk	
Administrative Post		Km	%	Km	%	Km	%	Km	%
Baucau	169.0	167.7	99.3%	0.4	0.2%	0.6	0.3%	0.3	0.2%
Quelicai	92.2	88.9	96.4%	1.3	1.4%	1.2	1.3%	0.9	1.0%
Vemasse	46.8	46.7	99.8%	0.0	0.0%	0.1	0.2%	0.0	0.0%
Ermera	93.0	90.3	97.0%	1.3	1.3%	1.1	1.2%	0.4	0.4%
Hatulia	164.4	159.4	97.0%	2.7	1.6%	1.7	1.1%	0.6	0.4%
Bazartete	119.1	111.9	94.0%	3.5	2.9%	2.1	1.8%	1.5	1.3%
Liquiçá	93.1	86.7	93.1%	3.4	3.6%	2.1	2.2%	1.0	1.1%
Maubara	115.6	106.2	91.9%	2.9	2.5%	4.8	4.2%	1.6	1.4%
SSRI APs	**893.3**	**857.9**	**96.0%**	**15.4**	**1.7%**	**13.7**	**1.5%**	**6.3**	**0.7%**

Table 2. Summary Statistics for Landslide Risk in Administrative Posts

Erosion

Based on percentage of land area, Ermera (49%), Bazartete (42%) and Liquiçá (39%) are the APs with the largest potential problems associated with soil erosion. In terms of area, Maubara has the most territory in the high risk category with 8,068 hectares, followed by Bazartete (7,929 ha.) and Hatulia (7,647 ha.). Quelicai has substantial erosion risk in the Matebian region – the same part of the AP that is at high risk for landslides – but most of its territory is lower, less steep and better vegetated, and falls into the medium risk category. Baucau (25,191 ha.; 68%) and Vemasse (21,518 ha.; 58%) APs are predominantly low risk for erosion in terms of both area and percentage of land area.

Interestingly, the risk of soil erosion was found to be generally higher in the 5 western APs than in the 3 eastern APs in Baucau Municipality. This is to be expected because, whereas Baucau, Vemasse and large parts of Quelicai are relatively flat and low-lying, and annual rainfall is relatively low, the western APs in Liquiçá and Ermera Municipalities are characterized by high hills with steep slopes and thin, friable soils, and they receive significantly more rainfall.

The relationship between the distribution of infrastructure and erosion risk is complex. Whereas people generally try to avoid building houses, schools and health clinics in areas prone to landslides and flooding, risks associated with soil erosion are less visible and less catastrophic. People don't consider soil erosion to be as direct or dangerous a threat as landslides and flooding, which of course, it isn't. They often live and build in areas with high potential for erosion, adding to the problem by clearing vegetation from the land, building on steep slopes and grazing livestock. Activities such as these frequently turn potential risk into actual soil loss. The results of the study appear to support this view.

Across the entire study area, only about a quarter of all infrastructure is built on land considered low risk for erosion. This is true for all 4 categories – houses (26%), schools (28%), health facilities (30%) and roads (27%). Approximately 50% of structures are built on medium-risk land, and the remaining 25% on high-risk land. These averages across all 8 SSRI APs disguise substantial variations among both APs and infrastructure categories, with Ermera AP being a notable outlier. Ermera stands out as having by far the biggest problems, with roughly half its land area and half its built structures on land that has high potential for soil erosion. In Baucau and Vemasse, on the other hand, very little infrastructure is built on land where erosion is considered a serious threat.

It is important to note that soil erosion generally has broader, more widespread impacts than landslides and flooding. The damage caused to infrastructure by landslides and floods is, to a large extent, confined to the site of the actual event and the immediate vicinity. Of course, a road or a health centre damaged by a landslide or a flood can cause problems for communities over a wide area, but the direct damage to the infrastructure itself is largely localized. With soil erosion, however, impacts of different kinds can be experienced both locally and remotely. At the site of the actual erosion, there may be little or no short-term impact on infrastructure, but farming communities might suffer in the long term from lower fertility and hence lower crop yields. It is often communities and infrastructure downstream that suffer the most damaging, expensive and long-term consequences of erosion occurring in high-risk areas upstream. These upstream-downstream relationships are discussed in more detail in the following section, which identifies the suco-catchments most at risk from the different threats in each of the 8 SSRI APs.

Land Area

Municipality	Administrative Post	Total Hectares	Area of Land in Each Erosion Risk Category					
			Low Risk		Medium Risk		High Risk	
			Hectares	%	Hectares	%	Hectares	%
Baucau	Baucau	36,962	25,191	68%	10,589	29%	1,182	3%
	Quelicai	20,594	2,753	13%	12,162	59%	5,680	28%
	Vemasse	37,395	21,518	58%	13,096	35%	2,780	7%
Ermera	Ermera	9,338	434	5%	4,371	47%	4,533	49%
	Hatulia	27,350	5,403	20%	14,301	52%	7,647	28%
Liquiçá	Bazartete	18,693	1,375	7%	9,389	50%	7,929	42%
	Liquiçá	9,822	901	9%	5,090	52%	3,831	39%
	Maubara	26,394	3,686	14%	14,640	55%	8,068	31%
		186,548	**61,261**	**33%**	**83,638**	**45%**	**41,649**	**22%**

Houses

Municipality	Administrative Post	Total No. of Houses	Houses in Each Erosion Risk Category					
			Low Risk		Medium Risk		High Risk	
			Number	%	Number	%	Number	%
Baucau	Baucau	7,390	5,560	75%	1,607	22%	223	3%
	Quelicai	4,772	870	18%	2,851	60%	1,051	22%
	Vemasse	2,159	1,144	53%	967	45%	48	2%
Ermera	Ermera	5,618	351	6%	2,542	45%	2,725	49%
	Hatulia	5,958	913	15%	2,772	47%	2,273	38%
Liquiçá	Bazartete	3,869	305	8%	2,290	59%	1,274	33%
	Liquiçá	3,627	315	9%	2,118	58%	1,194	33%
	Maubara	4,003	354	9%	2,595	65%	1,054	26%
		37,396	**9,812**	**26%**	**17,742**	**47%**	**9,842**	**26%**

Schools

Municipality	Administrative Post	Total No. of Schools	Schools in Each Erosion Risk Category					
			Low Risk		Medium Risk		High Risk	
			Number	%	Number	%	Number	%
Baucau	Baucau	47	36	77%	11	23%	0	0%
	Quelicai	36	6	17%	23	64%	7	19%
	Vemasse	16	8	50%	8	50%	0	0%
Ermera	Ermera	26	0	0%	11	42%	15	58%
	Hatulia	28	2	7%	14	50%	12	43%
Liquiçá	Bazartete	25	4	16%	12	48%	9	36%
	Liquiçá	18	2	11%	11	61%	5	28%
	Maubara	20	3	15%	12	60%	5	25%
		216	**61**	**28%**	**102**	**47%**	**53**	**25%**

Health Facilities

Municipality	Administrative Post	Total No. of Health Facilities	Health Facilities in Each Erosion Risk Category					
			Low Risk		Medium Risk		High Risk	
			Number	%	Number	%	Number	%
Baucau	Baucau	8	6	75%	2	25%	0	0%
	Quelicai	5	1	20%	3	60%	1	20%
	Vemasse	6	3	50%	3	50%	0	0%
Ermera	Ermera	4	0	0%	2	50%	2	50%
	Hatulia	9	3	33%	3	33%	3	33%
Liquiçá	Bazartete	7	1	14%	4	57%	2	29%
	Liquiçá	7	1	14%	1	14%	5	71%
	Maubara	7	1	14%	5	71%	1	14%
		53	**16**	**30.2%**	**23**	**43.4%**	**14**	**26.4%**

Roads

Municipality	Administrative Post	Total Length of Road (km)	Length of Road in Each Erosion Risk Category					
			Low Risk		Medium Risk		High Risk	
			Km	%	Km	%	Km	%
Baucau	Baucau	169.0	128.0	76%	37.2	22%	3.7	2%
	Quelicai	92.2	12.6	14%	53.9	58%	25.6	28%
	Vemasse	46.8	20.6	44%	24.5	52%	1.6	3%
Ermera	Ermera	93.0	5.8	6%	44.3	48%	42.9	46%
	Hatulia	164.4	34.9	21%	85.6	52%	43.9	27%
Liquiçá	Bazartete	119.1	16.1	14%	70.7	59%	32.2	27%
	Liquiçá	93.1	10.1	11%	59.0	63%	24.0	26%
	Maubara	115.6	14.2	12%	72.3	63%	29.0	25%
		893.3	**242.6**	**27.2%**	**447.6**	**50.1%**	**203.1**	**22.7%**

Table 3. Summary Statistics for Erosion Risk in Administrative Posts

2. 4 Risk Profiles

This section presents more detailed observations about threats to infrastructure from weather-related hazards in each of the 8 SSRI APs. The material is presented by administrative area because this is the structure most of Timor-Leste's development community is familiar with, and this is the framework within which most development programs are planned, financed, implemented and monitored. In dealing with natural hazards such as landslides, flooding and soil erosion, however, administrative boundaries have limited relevance, since natural phenomena don't generally conform to socio-political divisions. The causes of landslides and floods often don't come from within the *suco* or administrative post in which they occur. They might not come from the same municipality, and sometimes they don't even come from the same country.

In this study, the concept of the *suco*-catchment is used to help show relationships between conditions and events on administrative parcels of land (country, municipality, administrative post, *suco*) and conditions and events on parcels of land that are naturally defined, self-contained bio-physical units (river catchments). The natural, closed systems river catchments define are hugely influential on all aspects of the physical and human world. Everything that happens in the upper reaches of a catchment has impacts on the natural resources, people and infrastructure downstream in the lower reaches of that catchment. That is why it is important to promote the use of river catchments as the planning and implementation unit for all socio-economic development programs, including infrastructure development. The 8 SSRI APs are comprised of 79 *sucos*. These administrative areas intersect with 34 river catchments to form a total of 152 *suco*-catchments.[1]

This risk profile for each administrative post includes a narrative summary, a table listing the *suco*-catchments and giving their areas, and a map showing the locations of the *suco*-catchments. Following this, for each type of risk, there is a narrative summary, tables of risk statistics, risk maps and illustrative photographs. These profiles describe where infrastructure is most at risk in each AP, and highlight individual *suco*-catchments where infrastructure is likely to be most vulnerable.

2.4.1 Risk Profile – Baucau Administrative Post

Baucau AP has 11 *sucos* and is part of 3 catchments. These intersect to produce a total of 20 *suco*-catchments, listed with their areas in Table 4. All 3 of the catchments extend beyond the borders into other administrative areas. The largest is the Seiçal River Catchment, the upper reaches of which extend into Venilale and Ossu Administrative Posts to the south. The Baucau Aggregate Catchment is mostly in Baucau AP, but a small portion in the west does extend into Vemasse AP. The smallest catchment is the Boro Uai River Catchment, which is shared by 3 APs – Baucau, Laga and Quelicai. Using the Seiçal River Catchment as an example, reference to the tables and the maps shows how conditions and events in 11 different *sucos* in Baucau AP, neighbouring parts of Venilale AP, and even upland areas in a different municipality, Viqueque, all influence conditions and events in the downstream parts of the catchment that lies in Baucau AP.

[1] The 34 catchments used for this study are large aggregations of sub-catchments, taken from a set of 115 catchments the Timor-Leste GIS community generally uses as its standard for broad-scale catchment-based analysis and mAPping.

Suco -Catchment Code	*Suco* -Catchment		Total Area
10803	Bahu	Baucau Aggregate Catchment	688
10832	Bahu	Seiçal River Catchment	786
11003	Bucoli	Baucau Aggregate Catchment	2,727
11032	Bucoli	Seiçal River Catchment	35
11132	Buibau	Seiçal River Catchment	2,559
11203	Buruma	Baucau Aggregate Catchment	1,243
11232	Buruma	Seiçal River Catchment	195
11303	Caibada	Baucau Aggregate Catchment	3,045
11332	Caibada	Seiçal River Catchment	50
12303	Gariuai	Baucau Aggregate Catchment	151
12332	Gariuai	Seiçal River Catchment	4,227
16332	Samalari	Seiçal River Catchment	1,597
16503	Seiçal	Baucau Aggregate Catchment	210
16507	Seiçal	Boro Uai River Catchment	490
16532	Seiçal	Seiçal River Catchment	4,458
16803	Triloca	Baucau Aggregate Catchment	2,022
16832	Triloca	Seiçal River Catchment	1,625
16903	Tirilolo	Baucau Aggregate Catchment	2,855
16932	Tirilolo	Seiçal River Catchment	1,792
17832	Uailili	Seiçal River Catchment	6,206
		Totals Baucau AP	**36,962**

Table 4. Suco-Catchments in Baucau Administrative Post

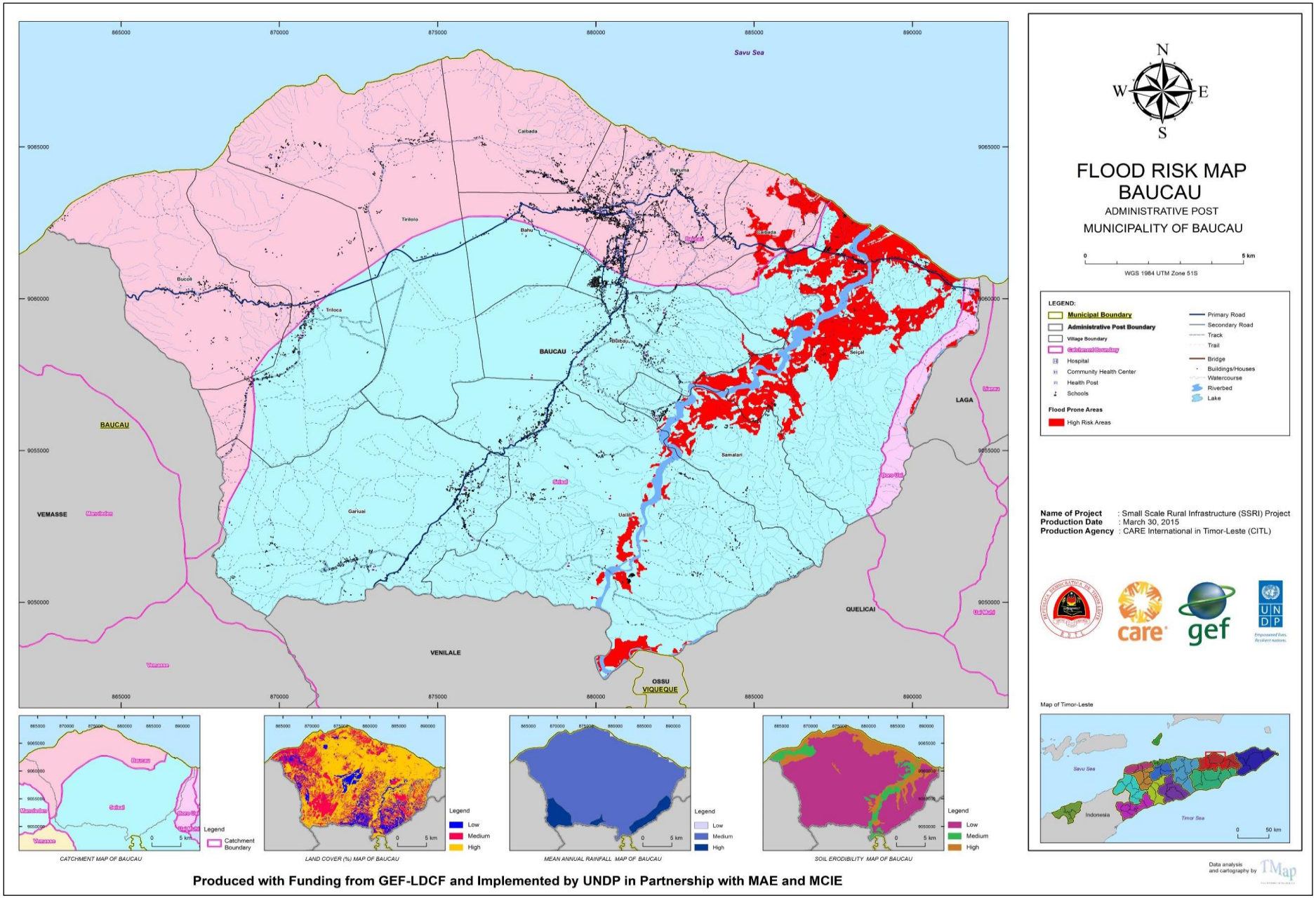
Flood Risk in Baucau Administrative Post

Flooding is the most serious of the three risks in Baucau AP, and as Map 2 shows very clearly, most of the problems associated with flooding are found in the lower reaches of the Seiçal River Catchment. Three *sucos* in this catchment face the biggest threat, with Seiçal *Suco* being most at-risk. The other 2 are Ualili and Samalari *Sucos.*

Seiçal-Seiçal is far and away the most at-risk *suco*-catchment, with 1,487 hectares of land susceptible to flooding. This represents 33% of the *suco*-catchment's total land area. Infrastructure faces serious threats in Seiçal-Seiçal, with 259 out of 353 houses (73%), 2 of the 3 schools (67%) and 7.4km of the 16km of roads (46%) all on the flood plain of the Seiçal River. Some parts of Seiçal *Suco* are located in other catchments, where flooding is likely to be less of a problem. Only 47 of 490 hectares in *Suco*-Catchment Seiçal-Boro Uai and 26 of 201 hectares in the Suco-Catchment Seiçal-Baucau are considered susceptible to flooding. This distinction illustrates why it is important to consider administrative areas and physical catchments together when planning and implementing development programs that might be influenced by catchment-based bio-physical processes.

Outside of Seiçal *Suco* but still in the Seiçal River Catchment, sizeable areas of land are also at risk of flooding in Uailili-Seiçal (232 hectares), Samalari-Seiçal (219 hectares) and Caibada-Baucau (156 hectares) *Suco*-

Catchments. A few families live in these areas, so some house are at risk, but otherwise there is very little infrastructure there.



MAP- 2. Flood Risk Map: Baucau Administrative Post

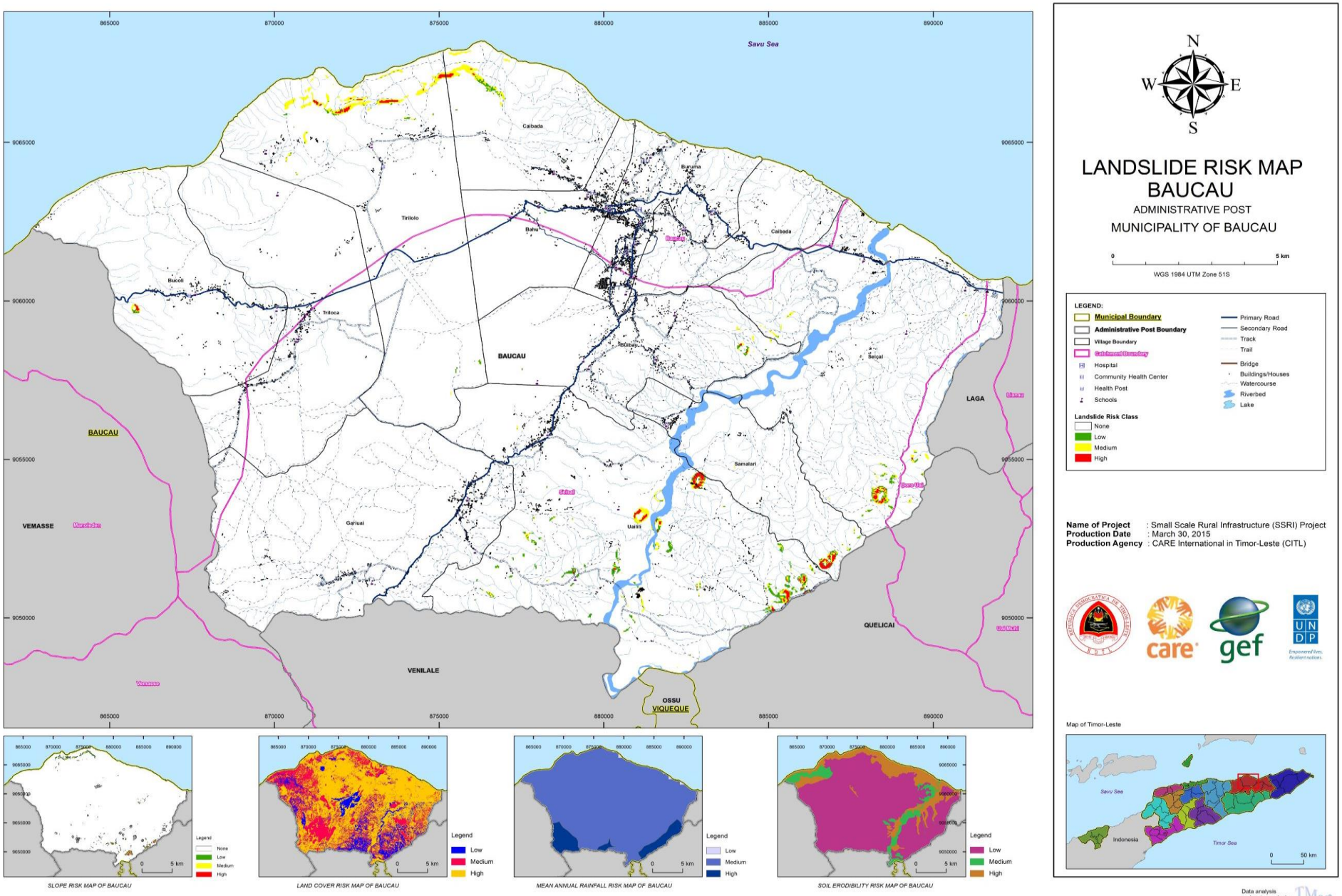
Landslide Risk in Baucau Administrative Post

The threat of landslides is not a serious concern in Baucau AP. Map 3 shows a narrow band of at-risk land on the north-facing edge of the Baucau Plateau. The total areas of low, medium and high risk land amount to only 85 hectares in Tirilolo-Baucau and 40 hectares in Caibada-Baucau *Suco* – Catchments (Table 5). These small areas are largely uninhabited and no infrastructure is at risk.

Some areas in the south-east of the AP appear as landslide risk areas on the map, but these are small and isolated, and several of them are likely to be mis-classified because of interference from cloud in the satellite data. Cloud formations typically appear as horseshoe or donut shapes on the maps. This means that even the small number of hectares shown to be at risk of landslides in Table 5 is likely to be an over-estimate.

			Land Area			Houses			Schools			Health Facilities			Roads		
Suco -Catchment Code	*Suco* -Catchment		Total Area	In Flood Risk Zone Hectares	In Flood Risk Zone %	Total Number	In Flood Risk Zone Number	In Flood Risk Zone %	Total Number	In Flood Risk Zone Number	In Flood Risk Zone %	Total Number	In Flood Risk Zone Number	In Flood Risk Zone %	Total Km	In Flood Risk Zone Km	In Flood Risk Zone %
10803	Bahu	Baucau Aggregate Catchment	688	0	0.0%	627	0	0.0%	3	0	0.0%	1	0	0.0%	5.5	0.0	0.0%
10832	Bahu	Seiçal River Catchment	786	0	0.0%	33	0	0.0%	0			0			3.5	0.0	0.0%
11003	Bucoli	Baucau Aggregate Catchment	2,727	0	0.0%	370	0	0.0%	2	0	0.0%	1	0	0.0%	6.3	0.0	0.0%
11032	Bucoli	Seiçal River Catchment	35	0	0.0%	10	0	0.0%	0			0			0.0		
11132	Buibau	Seiçal River Catchment	2,559	11	0.4%	620	1	0.2%	5	0	0.0%	0			17.4	0.0	0.2%
11203	Buruma	Baucau Aggregate Catchment	1,243	0	0.0%	1,785	0	0.0%	11	0	0.0%	3	0	0.0%	25.3	0.0	0.0%
11232	Buruma	Seiçal River Catchment	195	0	0.0%	551	0	0.0%	2	0	0.0%	0			3.4	0.0	0.0%
11303	Caibada	Baucau Aggregate Catchment	3,045	156	5.1%	541	13	2.4%	2	0	0.0%	0			9.2	0.2	2.1%
11332	Caibada	Seiçal River Catchment	50	0	0.0%	22	0	0.0%	0			0			0.4	0.0	0.0%
12303	Gariuai	Baucau Aggregate Catchment	151	0	0.0%	12	0	0.0%	0			0			0.9	0.0	0.0%
12332	Gariuai	Seiçal River Catchment	4,227	0	0.0%	685	0	0.0%	6	0	0.0%	0			17.7	0.0	0.0%
16332	Samalari	Seiçal River Catchment	1,597	219	13.7%	191	12	6.3%	1	0	0.0%	1	0	0.0%	2.3	0.0	1.3%
16503	Seiçal	Baucau Aggregate Catchment	210	26	12.3%	4	0	0.0%	0			0			0.8	0.1	13.5%
16507	Seiçal	Boro Uai River Catchment	490	47	9.6%	8	0	0.0%	0			0			1.3	0.3	25.2%
16532	Seiçal	Seiçal River Catchment	4,458	1,487	33.4%	353	259	73.4%	3	2	66.7%	0			16.0	7.4	46.1%
16803	Triloca	Baucau Aggregate Catchment	2,022	0	0.0%	159	0	0.0%	2	0	0.0%	0			3.6	0.0	0.0%
16832	Triloca	Seiçal River Catchment	1,625	0	0.0%	233	0	0.0%	2	0	0.0%	0			12.1	0.0	0.0%
16903	Tirilolo	Baucau Aggregate Catchment	2,855	0	0.0%	266	0	0.0%	2	0	0.0%	1	0	0.0%	6.5	0.0	0.0%
16932	Tirilolo	Seiçal River Catchment	1,792	0	0.0%	22	0	0.0%	0			0			12.0	0.0	0.0%
17832	Uailili	Seiçal River Catchment	6,206	232	3.7%	898	11	1.2%	6	0	0.0%	1	0	0.0%	24.7	0.1	0.6%
		Totals Baucau AP	**36,962**	**2,178**	**5.9%**	**7,390**	**296**	**4.0%**	**47**	**2**	**4.3%**	**8**	**0**	**0.0%**	**169**	**8.2**	**4.9%**

Table 5. Risk Statistics for Flooding in Baucau AP



Produced with Funding from GEF-LDCF and Implemented by UNDP in Partnership with MAE and MCIE

MAP- 3. Landslide Risk Map: Baucau Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%	Number	%
10803	Bahu	Baucau Aggregate Catchment	627	627	100.0%	0	0.0%	0	0.0%	0	0.0%
10832	Bahu	Seiçal River Catchment	33	33	100.0%	0	0.0%	0	0.0%	0	0.0%
11003	Bucoli	Baucau Aggregate Catchment	370	370	100.0%	0	0.0%	0	0.0%	0	0.0%
11032	Bucoli	Seiçal River Catchment	10	10	100.0%	0	0.0%	0	0.0%	0	0.0%
11132	Buibau	Seiçal River Catchment	620	620	100.0%	0	0.0%	0	0.0%	0	0.0%
11203	Buruma	Baucau Aggregate Catchment	1,785	1,782	99.8%	2	0.1%	1	0.1%	0	0.0%
11232	Buruma	Seiçal River Catchment	551	551	100.0%	0	0.0%	0	0.0%	0	0.0%
11303	Caibada	Baucau Aggregate Catchment	541	541	100.0%	0	0.0%	0	0.0%	0	0.0%
11332	Caibada	Seiçal River Catchment	22	22	100.0%	0	0.0%	0	0.0%	0	0.0%
12303	Gariuai	Baucau Aggregate Catchment	12	12	100.0%	0	0.0%	0	0.0%	0	0.0%
12332	Gariuai	Seiçal River Catchment	685	685	100.0%	0	0.0%	0	0.0%	0	0.0%
16332	Samalari	Seiçal River Catchment	191	191	100.0%	0	0.0%	0	0.0%	0	0.0%
16503	Seiçal	Baucau Aggregate Catchment	4	4	100.0%	0	0.0%	0	0.0%	0	0.0%
16507	Seiçal	Boro Uai River Catchment	8	8	100.0%	0	0.0%	0	0.0%	0	0.0%
16532	Seiçal	Seiçal River Catchment	353	353	100.0%	0	0.0%	0	0.0%	0	0.0%
16803	Triloca	Baucau Aggregate Catchment	159	159	100.0%	0	0.0%	0	0.0%	0	0.0%
16832	Triloca	Seiçal River Catchment	233	233	100.0%	0	0.0%	0	0.0%	0	0.0%
16903	Tirilolo	Baucau Aggregate Catchment	266	266	100.0%	0	0.0%	0	0.0%	0	0.0%
16932	Tirilolo	Seiçal River Catchment	22	22	100.0%	0	0.0%	0	0.0%	0	0.0%
17832	Uailili	Seiçal River Catchment	898	865	96.3%	9	1.0%	17	1.9%	7	0.8%
		Totals Baucau AP	**7,390**	**7,354**	**99.5%**	**11**	**0.1%**	**18**	**0.2%**	**7**	**0.1%**

Table 6. Houses at Risk of Landslides in Baucau AP

Suco -Catchment Code	*Suco* -Catchment		Total Hectares	Area of Land in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%	Hectares	%
10803	Bahu	Baucau Aggregate Catchment	688	688	100.0%	0	0.0%	0	0.0%	0	0.0%
10832	Bahu	Seiçal River Catchment	786	786	100.0%	0	0.0%	0	0.0%	0	0.0%
11003	Bucoli	Baucau Aggregate Catchment	2,727	2,722	99.8%	1	0.0%	3	0.1%	1	0.1%
11032	Bucoli	Seiçal River Catchment	35	35	100.0%	0	0.0%	0	0.0%	0	0.0%
11132	Buibau	Seiçal River Catchment	2,559	2,551	99.7%	3	0.1%	4	0.1%	1	0.0%
11203	Buruma	Baucau Aggregate Catchment	1,243	1,242	99.9%	0	0.0%	1	0.1%	0	0.0%
11232	Buruma	Seiçal River Catchment	195	195	100.0%	0	0.0%	0	0.0%	0	0.0%
11303	Caibada	Baucau Aggregate Catchment	3,045	3,005	98.7%	7	0.2%	30	1.0%	3	0.1%
11332	Caibada	Seiçal River Catchment	50	50	100.0%	0	0.0%	0	0.0%	0	0.0%
12303	Gariuai	Baucau Aggregate Catchment	151	151	100.0%	0	0.0%	0	0.0%	0	0.0%
12332	Gariuai	Seiçal River Catchment	4,227	4,227	100.0%	0	0.0%	0	0.0%	0	0.0%
16332	Samalari	Seiçal River Catchment	1,597	1,576	98.7%	5	0.3%	7	0.4%	9	0.6%
16503	Seiçal	Baucau Aggregate Catchment	210	210	100.0%	0	0.0%	0	0.0%	0	0.0%
16507	Seiçal	Boro Uai River Catchment	490	484	98.8%	2	0.3%	4	0.8%	0	0.1%
16532	Seiçal	Seiçal River Catchment	4,458	4,423	99.2%	11	0.3%	18	0.4%	6	0.1%
16803	Triloca	Baucau Aggregate Catchment	2,022	2,022	100.0%	0	0.0%	0	0.0%	0	0.0%
16832	Triloca	Seiçal River Catchment	1,625	1,625	100.0%	0	0.0%	0	0.0%	0	0.0%
16903	Tirilolo	Baucau Aggregate Catchment	2,855	2,771	97.0%	5	0.2%	68	2.4%	12	0.4%
16932	Tirilolo	Seiçal River Catchment	1,792	1,790	99.9%	1	0.1%	0	0.0%	0	0.0%
17832	Uailili	Seiçal River Catchment	6,206	6,072	97.8%	61	1.0%	50	0.8%	23	0.4%
		Totals Baucau AP	**36,962**	**36,626**	**99.1%**	**96**	**0.3%**	**183**	**0.5%**	**56**	**0.2%**

Table 7. Land Area at Risk of Landslides in Baucau AP

Figure 1 – Roadside landslide. Buruma Suco, Baucau Aggregate Catchment

Figure 2 – Limestone escarpment with medium-to-high exposure to landslide and erosion risk. Caibada Suco, Baucau Aggregate Catchment

Suco -Catchment Code	*Suco* -Catchment		Total Length of Roads (Km)	Length of Road in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Km	%	Km	%	Km	%	Km	%
10803	Bahu	Baucau Aggregate Catchment	5.5	5.5	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
10832	Bahu	Seiçal River Catchment	3.5	3.5	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
11003	Bucoli	Baucau Aggregate Catchment	6.3	6.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
11032	Bucoli	Seiçal River Catchment	0.0								
11132	Buibau	Seiçal River Catchment	17.4	17.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
11203	Buruma	Baucau Aggregate Catchment	25.3	25.0	98.7%	0.0	0.1%	0.3	1.2%	0.0	0.0%
11232	Buruma	Seiçal River Catchment	3.4	3.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
11303	Caibada	Baucau Aggregate Catchment	9.2	9.2	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
11332	Caibada	Seiçal River Catchment	0.4	0.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
12303	Gariuai	Baucau Aggregate Catchment	0.9	0.9	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
12332	Gariuai	Seiçal River Catchment	17.7	17.7	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
16332	Samalari	Seiçal River Catchment	2.3	2.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
16503	Seiçal	Baucau Aggregate Catchment	0.8	0.8	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
16507	Seiçal	Boro Uai River Catchment	1.3	1.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
16532	Seiçal	Seiçal River Catchment	16.0	16.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
16803	Triloca	Baucau Aggregate Catchment	3.6	3.6	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
16832	Triloca	Seiçal River Catchment	12.1	12.1	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
16903	Tirilolo	Baucau Aggregate Catchment	6.5	6.5	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
16932	Tirilolo	Seiçal River Catchment	12.0	12.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
17832	Uailili	Seiçal River Catchment	24.7	23.8	96.3%	0.4	1.5%	0.3	1.1%	0.3	1.1%
		Totals Baucau AP	**169.0**	**167.7**	**99.3%**	**0.4**	**0.2%**	**0.6**	**0.3%**	**0.3**	**0.2%**

Table 8. Roads at Risk of Landslides in Baucau

Erosion Risk in Baucau Administrative Post

Just as Baucau AP is considered very low risk for landslides, so too for erosion. This is not surprising since the contributory factors for the two types of risk are closely related, and landslides are actually a sudden and extreme form of erosion. More than 68% of the total area of Baucau PA is low risk for erosion, with 29% medium risk and only 3% considered high risk. Even this 3% is likely to be a bit high because of the cloud interference in parts of the satellite data.

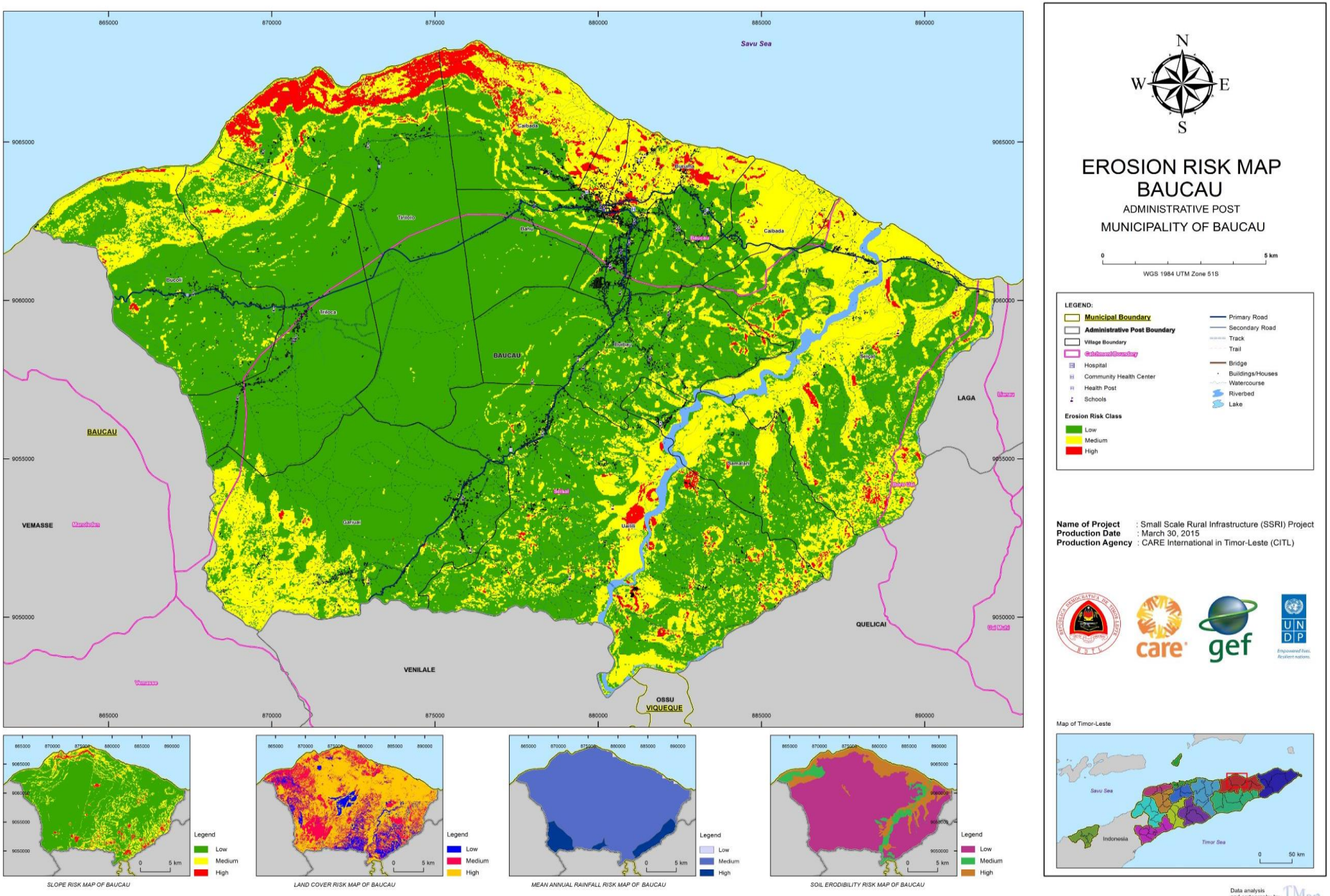
Map 4 shows that erosion risk in Baucau AP is distributed in 3 distinct areas. The flat, relatively stable land of the Baucau Plateau is shown in green, representing low risk for erosion. This part of Baucau AP is partly in the Seiçal River Catchment and partly in the Baucau Aggregate Catchment. Within these two catchments, the *Sucos* where erosion is least likely to be a problem include Bahu and the higher parts of Tirilolo Triloca.

Steeper, poorly vegetated slopes on the dry, north-facing escarpment are classified as medium-to-high-risk and show up in yellow and red. The high-risk areas are primarily on the limestone escarpment in Tirilolo *Suco* where the land slopes steeply down to the sea. This high-risk area covers 467 hectares in Tirilolo, representing 16.4% of the total land area of the *suco.* It also extends eastwards into Caibada *Suco*, where more than 50% of the total area is considered medium- to high-risk for erosion.

The third distinct area of Baucau AP for erosion potential is the flood plain of the Seiçal River, which shows up on Map 4 largely as medium risk. The primary contributing factors here are poor vegetation cover and the sandy, friable nature of the soils. *Sucos* in the Seiçal River Catchment where large areas of land are exposed to medium risk for erosion include 2,503 hectares in Seiçal *Suco* (56% of its total area), 1,738 hectares in Uailili *Suco* (28%), and 1,084 hectares in Gariuai *Suco* (25.6%).

Substantial numbers of people live in medium-risk areas, and probably have a direct impact in increasing risks there by clearing land for agriculture and by grazing animals. But the maps and the tables show very clearly that most people in Baucau AP live on land that is low risk for erosion and so direct impacts are likely to be minimal. It follows from this that most existing infrastructure is also on land that is not particularly susceptible to erosion. The proportion of houses, schools, health facilities and roads in low-risk areas is remarkably

consistent at around 75% each. There are substantial numbers of houses on medium-risk land in Bahu, Buruma, Seiçal and Uailili *Sucos*, and 4 of Buruma's 11 schools are in areas considered high risk for erosion. None of the 47 schools or 8 health facilities in Baucau AP are in areas with high potential for erosion.



Produced with Funding from GEF-LDCF and Implemented by UNDP in Partnership with MAE and MCIE

MAP- 4. Erosion Risk Map: Baucau Administrative Post

Figure 3 – Very low risk for erosion near the airport on the Baucau Plateau. Tirilolo Suco, Seiçal River Catchment

Figure 4 – Medium risk of erosion on poorly vegetated low hills. Seiçal Suco, Seiçal River Catchment

				Area of Land in Each Erosion Risk Category					
Suco -Catchment			Total	Low Risk		Medium Risk		High Risk	
Code	*Suco* -Catchment		Hectares	Hectares	%	Hectares	%	Hectares	%
10803	Bahu	Baucau Aggregate Catchment	688	416	60.5%	247	35.9%	25	3.6%
10832	Bahu	Seiçal River Catchment	786	780	99.2%	6	0.8%	0	0.0%
11003	Bucoli	Baucau Aggregate Catchment	2,727	2,121	77.8%	588	21.6%	17	0.6%
11032	Bucoli	Seiçal River Catchment	35	35	99.1%	0	0.9%	0	0.0%
11132	Buibau	Seiçal River Catchment	2,559	2,245	87.7%	302	11.8%	11	0.4%
11203	Buruma	Baucau Aggregate Catchment	1,243	529	42.6%	605	48.7%	109	8.7%
11232	Buruma	Seiçal River Catchment	195	187	96.2%	7	3.8%	0	0.0%
11303	Caibada	Baucau Aggregate Catchment	3,045	1,353	44.4%	1,448	47.6%	244	8.0%
11332	Caibada	Seiçal River Catchment	50	50	99.0%	0	1.0%	0	0.0%
12303	Gariuai	Baucau Aggregate Catchment	151	61	40.5%	90	59.5%	0	0.0%
12332	Gariuai	Seiçal River Catchment	4,227	3,137	74.2%	1,084	25.6%	7	0.2%
16332	Samalari	Seiçal River Catchment	1,597	960	60.1%	619	38.7%	19	1.2%
16503	Seiçal	Baucau Aggregate Catchment	210	126	59.7%	82	38.8%	3	1.5%
16507	Seiçal	Boro Uai River Catchment	490	220	45.0%	257	52.4%	13	2.6%
16532	Seiçal	Seiçal River Catchment	4,458	1,866	41.9%	2,503	56.1%	90	2.0%
16803	Triloca	Baucau Aggregate Catchment	2,022	1,595	78.9%	415	20.5%	13	0.6%
16832	Triloca	Seiçal River Catchment	1,625	1,609	99.0%	16	1.0%	0	0.0%
16903	Tirilolo	Baucau Aggregate Catchment	2,855	1,864	65.3%	524	18.4%	467	16.4%
16932	Tirilolo	Seiçal River Catchment	1,792	1,734	96.8%	58	3.2%	0	0.0%
17832	Uailili	Seiçal River Catchment	6,206	4,303	69.3%	1,738	28.0%	165	2.7%
		Totals Baucau AP	**36,962**	**25,191**	**68.2%**	**10,589**	**28.6%**	**1,182**	**3.2%**

Table 9. Land Area at Risk of Erosion in Baucau AP

Suco - Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Erosion Risk Category						Total Length of Roads	Length of Road in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Km	%	Km	%	Km	%
10803	Bahu	Baucau Aggregate Catchment	627	398	63.5%	221	35.2%	8	1.3%	5.5	4.6	83.6%	0.8	14.9%	0.1	1.5%
10832	Bahu	Seiçal River Catchment	33	33	100.0%	0	0.0%	0	0.0%	3.5	3.4	98.3%	0.1	1.7%	0.0	0.0%
11003	Bucoli	Baucau Aggregate Catchment	370	359	97.0%	11	3.0%	0	0.0%	6.3	6.1	96.4%	0.2	3.6%	0.0	0.0%
11032	Bucoli	Seiçal River Catchment	10	10	100.0%	0	0.0%	0	0.0%	0.0						
11132	Buibau	Seiçal River Catchment	620	579	93.4%	41	6.6%	0	0.0%	17.4	15.0	85.8%	2.5	14.2%	0.0	0.0%
11203	Buruma	Baucau Aggregate Catchment	1,785	1084	60.7%	552	30.9%	149	8.3%	25.3	12.6	49.8%	10.0	39.5%	2.7	10.7%
11232	Buruma	Seiçal River Catchment	551	537	97.5%	14	2.5%	0	0.0%	3.4	3.4	100.0%	0.0	0.0%	0.0	0.0%
11303	Caibada	Baucau Aggregate Catchment	541	418	77.3%	119	22.0%	4	0.7%	9.2	7.0	76.4%	2.2	23.6%	0.0	0.0%
11332	Caibada	Seiçal River Catchment	22	22	100.0%	0	0.0%	0	0.0%	0.4	0.4	100.0%	0.0	0.0%	0.0	0.0%
12303	Gariuai	Baucau Aggregate Catchment	12	10	83.3%	2	16.7%	0	0.0%	0.9	0.9	100.0%	0.0	0.0%	0.0	0.0%
12332	Gariuai	Seiçal River Catchment	685	591	86.3%	94	13.7%	0	0.0%	17.7	14.3	80.6%	3.4	19.1%	0.1	0.3%
16332	Samalari	Seiçal River Catchment	191	157	82.2%	34	17.8%	0	0.0%	2.3	2.1	91.1%	0.2	8.9%	0.0	0.0%
16503	Seiçal	Baucau Aggregate Catchment	4	4	100.0%	0	0.0%	0	0.0%	0.8	0.1	16.3%	0.7	83.7%	0.0	0.0%
16507	Seiçal	Boro Uai River Catchment	8	1	12.5%	7	87.5%	0	0.0%	1.3	0.1	10.6%	1.2	89.4%	0.0	0.0%
16532	Seiçal	Seiçal River Catchment	353	67	19.0%	286	81.0%	0	0.0%	16.0	7.9	49.1%	8.1	50.8%	0.0	0.1%
16803	Triloca	Baucau Aggregate Catchment	159	159	100.0%	0	0.0%	0	0.0%	3.6	3.6	100.0%	0.0	0.0%	0.0	0.0%
16832	Triloca	Seiçal River Catchment	233	233	100.0%	0	0.0%	0	0.0%	12.1	12.1	100.0%	0.0	0.0%	0.0	0.0%
16903	Tirilolo	Baucau Aggregate Catchment	266	254	95.5%	12	4.5%	0	0.0%	6.5	6.4	98.6%	0.1	1.4%	0.0	0.0%
16932	Tirilolo	Seiçal River Catchment	22	22	100.0%	0	0.0%	0	0.0%	12.0	12.0	100.0%	0.0	0.0%	0.0	0.0%
17832	Uailili	Seiçal River Catchment	898	622	69.3%	214	23.8%	62	6.9%	24.7	16.0	65.0%	7.8	31.5%	0.9	3.6%
		Totals Baucau AP	**7,390**	**5,560**	**75.2%**	**1,607**	**21.7%**	**223**	**3.0%**	**169.0**	**128.0**	**75.8%**	**37.2**	**22.0%**	**3.7**	**2.2%**

Table 10. Houses and Roads at Risk of Erosion in Baucau AP

Suco -Catchment Code	*Suco* -Catchment		Total No. of Schools	Schools in Each Erosion Risk Category						Total No. of Health Facilities	Health Facilities in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Number	%	Number	%	Number	%
10803	Bahu	Baucau Aggregate Catchment	3	3	100.0%	0	0.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
10832	Bahu	Seiçal River Catchment	0							0						
11003	Bucoli	Baucau Aggregate Catchment	2	2	100.0%	0	0.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
11032	Bucoli	Seiçal River Catchment	0							0						
11132	Buibau	Seiçal River Catchment	5	4	80.0%	1	20.0%	0	0.0%	0						
11203	Buruma	Baucau Aggregate Catchment	11	7	63.6%	4	36.4%	0	0.0%	3	1	33.3%	2	66.7%	0	0.0%
11232	Buruma	Seiçal River Catchment	2	2	100.0%	0	0.0%	0	0.0%	0						
11303	Caibada	Baucau Aggregate Catchment	2	2	100.0%	0	0.0%	0	0.0%	0						
11332	Caibada	Seiçal River Catchment	0							0						
12303	Gariuai	Baucau Aggregate Catchment	0							0						
12332	Gariuai	Seiçal River Catchment	6	4	66.7%	2	33.3%	0	0.0%	0						
16332	Samalari	Seiçal River Catchment	1	1	100.0%	0	0.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
16503	Seiçal	Baucau Aggregate Catchment	0							0						
16507	Seiçal	Boro Uai River Catchment	0							0						
16532	Seiçal	Seiçal River Catchment	3	1	33.3%	2	66.7%	0	0.0%	0						
16803	Triloca	Baucau Aggregate Catchment	2	1	50.0%	1	50.0%	0	0.0%	0						
16832	Triloca	Seiçal River Catchment	2	2	100.0%	0	0.0%	0	0.0%	0						
16903	Tirilolo	Baucau Aggregate Catchment	2	2	100.0%	0	0.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
16932	Tirilolo	Seiçal River Catchment	0							0						
17832	Uailili	Seiçal River Catchment	6	5	83.3%	1	16.7%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
		Totals Baucau AP	**47**	**36**	**76.6%**	**11**	**23.4%**	**0**	**0.0%**	**8**	**6**	**75.0%**	**2**	**25.0%**	**0**	**0.0%**

Table 11. Schools and Health Facilities at Risk of Erosion in Baucau AP

2.4.2 Risk Profile – Quelicai Administrative Post

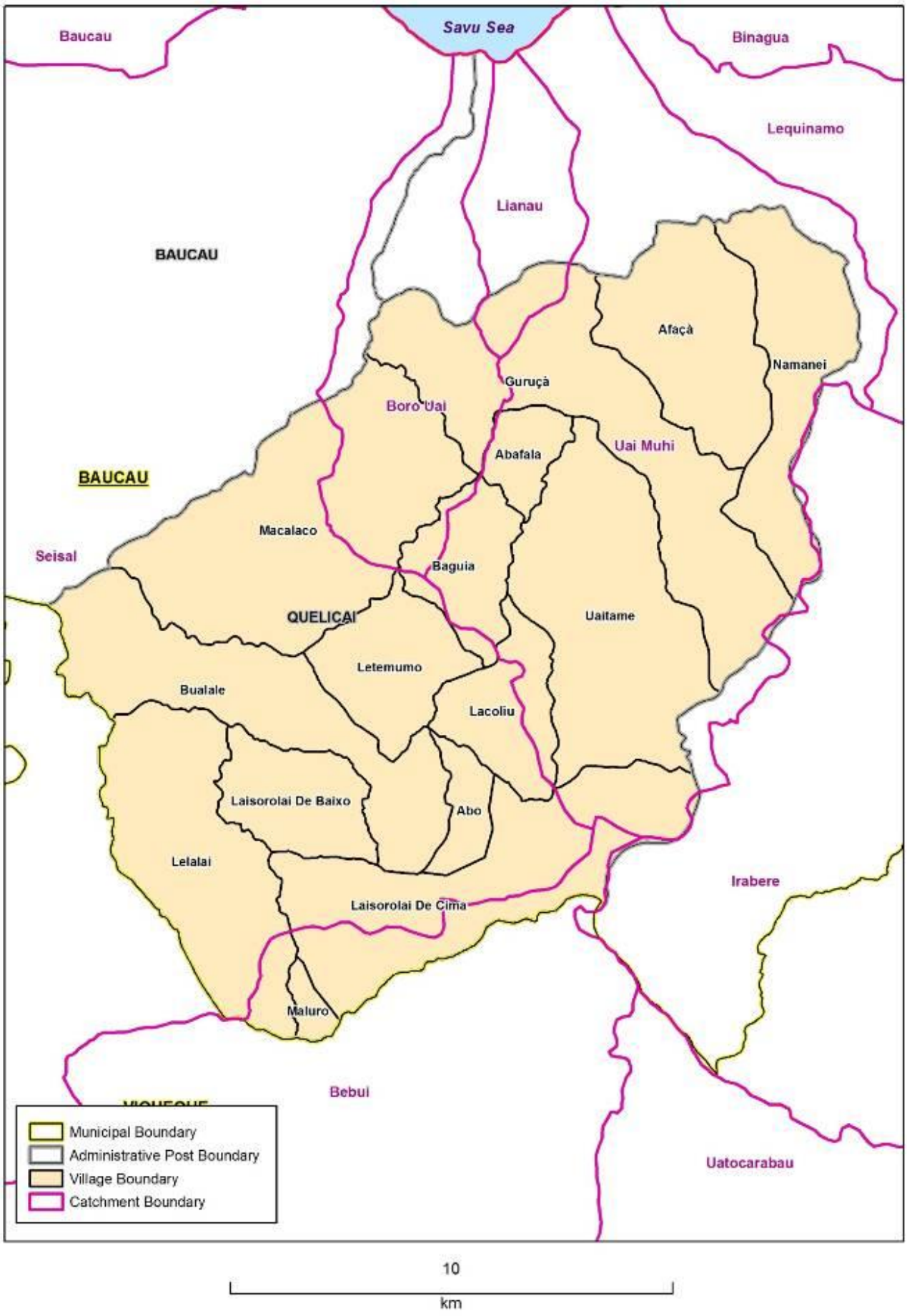
The 15 *sucos* that make up Quelicai AP are located in parts of 5 river catchments. Intersected together these form the 24 *suco*-catchments shown in Table 12. The Uai Muhi and the Seiçal River Catchments occupy most of the territory of Quelicai, each with approximately 40% of the total area. The Boro Uai River Catchment is significant in terms of size, but it is sparsely populated and has little in the way of infrastructure. The rest of the AP is in small parts of the Bebui River Catchment in the south and the Lianau Catchment in the north.

Suco -Catchment Code	*Suco* -Catchment		Total Area
20234	Abafala	Uai Muhi River Catchment	329
20332	Abo	Seiçal River Catchment	287
20434	Afaçà	Uai Muhi River Catchment	1,429
20707	Baguia	Boro Uai River Catchment	121
20732	Baguia	Seiçal River Catchment	92
20734	Baguia	Uai Muhi River Catchment	490
20932	Bualale	Seiçal River Catchment	1,918
22607	Guruçà	Boro Uai River Catchment	662
22621	Guruçà	Lianau River Catchment	232
22634	Guruçà	Uai Muhi River Catchment	1,841
23032	Laisorolai De Baixo	Seiçal River Catchment	754
23105	Laisorolai De Cima	Bebui River Catchment	771
23132	Laisorolai De Cima	Seiçal River Catchment	1,079
23134	Laisorolai De Cima	Uai Muhi River Catchment	411
23605	Lelalai	Bebui River Catchment	186
23632	Lelalai	Seiçal River Catchment	1,731
24032	Letemumo	Seiçal River Catchment	847
24332	Lacoliu	Seiçal River Catchment	464
24334	Lacoliu	Uai Muhi River Catchment	277
24707	Macalaco	Boro Uai River Catchment	1,017
24732	Macalaco	Seiçal River Catchment	1,877
24805	Maluro	Bebui River Catchment	121
25634	Namanei	Uai Muhi River Catchment	1,343
27934	Uaitame	Uai Muhi River Catchment	2,316
		Totals Quelicai AP	**20,594**

Table 12. Suco-Catchments in Quelicai Administrative Post

Apart from having the potential for very real, direct impacts within Quelicai AP, it is important to understand the linkages between the parts of catchments in Quelicai and the downstream parts of the same catchments, which are in Baucau and neighbouring Laga APs. This is a good example of why it would have been better to use catchments rather than administrative areas as the basis for defining the geographic extent covered by this mapping exercise. The upper sections of the Uai Muhi River Catchment are in Quelicai AP, and so they are within the study area; lower sections of the catchment are in Laga AP, and thus are outside the study area. Similarly, a small part of the upper Bebui River Catchment is in within the study area in Quelicai AP, but most of it is in Viqueque Municipality to the south. Upstream-downstream relationships are very clear, whereby physical conditions and land management practices in upper catchments affect exposure to natural hazards in lower catchments, but almost always development programs are funded, planned, implemented and monitored on the basis of administrative units. Though there are often solid programmatic and political reasons for managing projects in this way, from a technical point of view it frequently is not the best way to do it.

Looking at the three types of risk addressed in this study, Quelicai has little potential problem with flooding, but is a very high risk area for landslides and erosion. This is typical of interior, highland regions of Timor-Leste, which are characterized by high hills, large areas of very steeply sloping land, and large volumes of rainfall that often falls in very intense storms. In these respects, Quelicai has a lot in common with two other APs included in this study – Ermera and Hatulia.



MAP- 5. Sucos and Catchments of Quelicai Administrative Post

Flood Risk in Quelicai Administrative Post

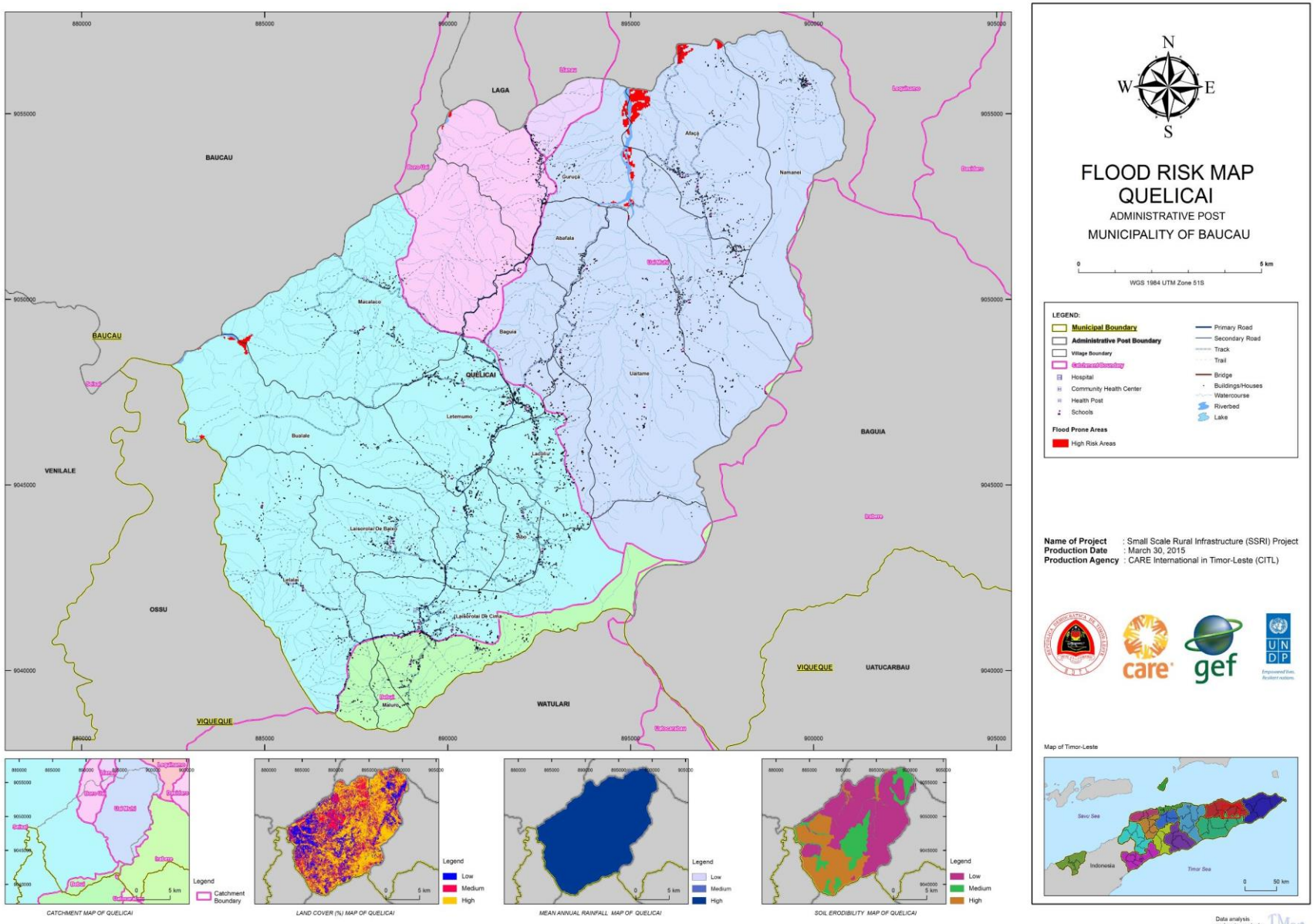
As already mentioned above, few parts of Quelicai AP are susceptible to flooding. The only hint of a threat is in the Afaçà *Suco* portion of the Uai Muhi River, where 54 hectares of land are considered at-risk for flooding, and in Guruçà *Suco* in the same catchment, where 26 hectares are at-risk. This poses virtually no threat to existing infrastructure, affecting only 1 house and a short, 500-meter section of road. It is farther downstream, in lower portions of the Seiçal River Catchment in Baucau AP and the Uai Muhi River Catchment in Laga AP that flooding is much more of a threat. The sediment carried down from areas prone to landslides and erosion in Quelicai AP has significant impacts on land, communities and infrastructure downstream in other jurisdictions, some of them negative and some of them positive. Among the negative impacts, it clogs river and drainage channels, increasing the likelihood and severity of flooding. The most important positive impact is that flood-waters regularly deposit nutrient-rich alluvium onto agricultural and grazing land.

Figure 5 – Small flood-prone area in Afaçà Suco, Uai Muhi Catchment

Figure 6 – Why Quelicai AP doesn't flood – nowhere is flat!

Suco -Catchment Code	*Suco* -Catchment		Land Area			Houses			Schools			Health Facilities			Roads		
			Total Area	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total Km	In Flood Risk Zone	
				Hectares	%	Number	Number	%	Number	Number	%	Number	Number	%		Km	%
20234	Abafala	Uai Muhi River Catchment	329	0	0.1%	44	0	0.0%	0			0			2.6	0.0	0.0%
20332	Abo	Seiçal River Catchment	287	0	0.0%	149	0	0.0%	1	0	0.0%	0			3.6	0.0	0.0%
20434	Afaçà	Uai Muhi River Catchment	1,429	54	3.8%	374	1	0.3%	4	0	0.0%	1	0	0.0%	8.5	0.5	6.3%
20707	Baguia	Boro Uai River Catchment	121	0	0.0%	39	0	0.0%	0			0			1.8	0.0	0.0%
20732	Baguia	Seiçal River Catchment	92	0	0.0%	142	0	0.0%	0			1	0	0.0%	3.1	0.0	0.0%
20734	Baguia	Uai Muhi River Catchment	490	0	0.0%	94	0	0.0%	0			0			2.2	0.0	0.0%
20932	Bualale	Seiçal River Catchment	1,918	8	0.4%	311	0	0.0%	1	0	0.0%	0			8.0	0.0	0.0%
22607	Guruçà	Boro Uai River Catchment	662	2	0.3%	150	0	0.0%	1	0	0.0%	0			3.9	0.0	0.0%
22621	Guruçà	Lianau River Catchment	232	0	0.0%	40	0	0.0%	0			0			0.3	0.0	0.0%
22634	Guruçà	Uai Muhi River Catchment	1,841	26	1.4%	285	0	0.0%	2	0	0.0%	0			4.5	0.1	3.3%
23032	Laisorolai De Baixo	Seiçal River Catchment	754	0	0.0%	206	0	0.0%	2	0	0.0%	0			3.8	0.0	0.0%
23105	Laisorolai De Cima	Bebui River Catchment	771	0	0.0%	252	0	0.0%	1	0	0.0%	0			3.8	0.0	0.0%
23132	Laisorolai De Cima	Seiçal River Catchment	1,079	0	0.0%	496	0	0.0%	4	0	0.0%	1	0	0.0%	9.8	0.0	0.0%
23134	Laisorolai De Cima	Uai Muhi River Catchment	411	0	0.0%	7	0	0.0%	0			0			0.0		
23605	Lelalai	Bebui River Catchment	186	0	0.0%	49	0	0.0%	0			0			1.0	0.0	0.0%
23632	Lelalai	Seiçal River Catchment	1,731	0	0.0%	309	0	0.0%	3	0	0.0%	1	0	0.0%	6.0	0.0	0.0%
24032	Letemumo	Seiçal River Catchment	847	0	0.0%	512	0	0.0%	8	0	0.0%	0			8.2	0.0	0.0%
24332	Lacoliu	Seiçal River Catchment	464	0	0.0%	382	0	0.0%	2	0	0.0%	0			3.6	0.0	0.0%
24334	Lacoliu	Uai Muhi River Catchment	277	0	0.0%	119	0	0.0%	0			0			0.0		0.0%
24707	Macalaco	Boro Uai River Catchment	1,017	0	0.0%	42	0	0.0%	0			0			4.1	0.0	0.0%
24732	Macalaco	Seiçal River Catchment	1,877	4	0.2%	225	0	0.0%	2	0	0.0%	1	0	0.0%	10.0	0.0	0.0%
24805	Maluro	Bebui River Catchment	121	0	0.0%	18	0	0.0%	0			0			0.0		
25634	Namanei	Uai Muhi River Catchment	1,343	0	0.0%	151	0	0.0%	1	0	0.0%	0			0.6	0.0	0.0%
27934	Uaitame	Uai Muhi River Catchment	2,316	0	0.0%	376	0	0.0%	4	0	0.0%	0			3.0	0.0	0.0%
		Totals Quelicai AP	**20,594**	**94**	**0.5%**	**4,772**	**1**	**0.0%**	**36**	**-**	**0.0%**	**5**	**0**		**92**	**0.7**	**0.7%**

Table 13.Risk Statistics for Flooding in Quelicai AP



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MAP- 6. Flood Risk Map: Quelicai Administrative Post

Landslide Risk in Quelicai Administrative Post

The eastern and southern parts of Quelicai AP are steep, often poorly vegetated, exposed to heavy rainfall, and highly susceptible to landslides. Having said that, the proportion of the total land area of the AP considered to be at no risk from landslides is still almost 90%, and that is why there is relatively little threat to existing infrastructure – most of the houses, schools, health facilities and roads are built in areas that are safe.

Landslide-prone areas are mostly associated with the Matebian Massif in the east of the AP. The band of medium and high-risk land shows up very clearly on Map 7. The river catchments most affected are the Uai Mui and the Seiçal, and the *sucos* with the most landslide-prone land are Namanei, Uaitame and Laisorolai de Cima. In the part of Laisorolai de Cima that lies in the Uai Muhi River Catchment, less than 30% of the area of is considered to be at no risk, and 254 hectares, representing more than 60% of the land area, is at either medium or high risk.

Almost 11% of the land area of Quelicai AP has some potential for landslides, but less than 1% of the infrastructure is considered at-risk. Clearly people have been careful to avoid investing in high-risk areas, which, as well as being potentially very dangerous, are also usually remote, inaccessible and not particularly fertile. Even so, 144 houses are built on potentially hazardous sites, most of these being in Guruçà (21), Lacolui (36), Namanei (19) and Uitame (21) *Sucos.*

Roads also generally stay away from the steepest, most unstable terrain, and so only 3.4km are follow potentially risky routes.

One school is potentially at-risk from landslide damage, and this is on a low-risk site in Uaitame *Suco.* Though a visit to this particular site to verify it was not possible, it appears this might also be incorrectly classified due to cloud interference with the satellite data. It is quite possible that the school in Uaitame is located on a no-risk site.

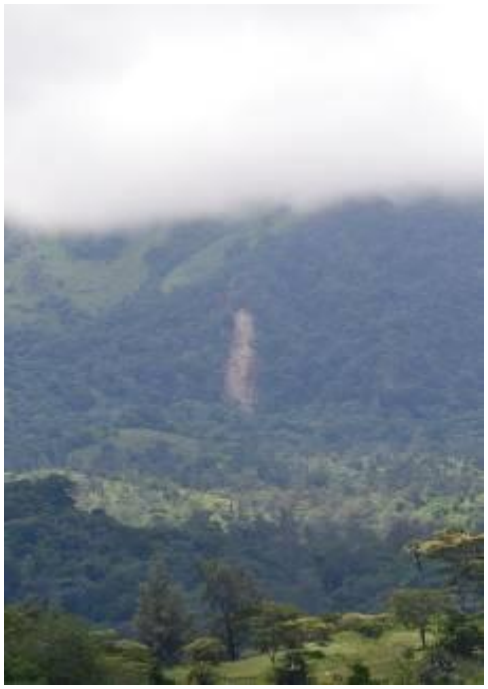
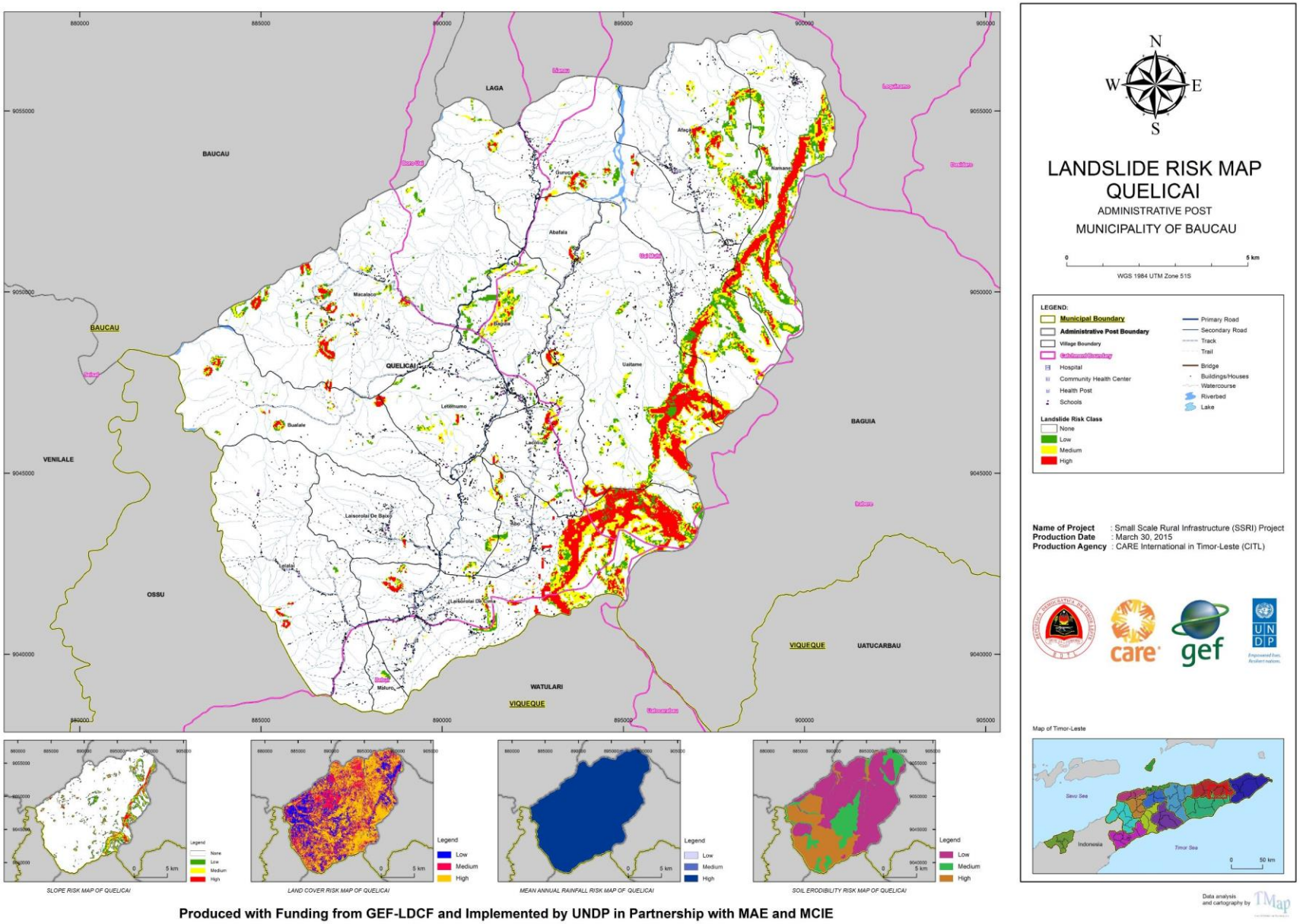


Figure 7 – Landslide on very steep slope. Afaçà Suco, Uai Muhi Catchment

Figure 8 – Landslide closing road and threatening bridge, caused by steep slope, unconsolidated rock, thin vegetation. Baguia Suco, Boro Uai Catchment



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MAP- 7. Landslide Risk Map: Quelicai Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Total Hectares	Area of Land in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%	Hectares	%
20234	Abafala	Uai Muhi River Catchment	329	321	97.6%	1	0.3%	3	0.9%	4	1.1%
20332	Abo	Seiçal River Catchment	287	269	93.8%	7	2.4%	8	2.9%	2	0.9%
20434	Afaçà	Uai Muhi River Catchment	1,429	1,244	87.1%	66	4.6%	83	5.8%	36	2.5%
20707	Baguia	Boro Uai River Catchment	121	96	79.2%	17	14.1%	8	6.7%	0	0.0%
20732	Baguia	Seiçal River Catchment	92	85	91.7%	7	7.1%	1	1.2%	0	0.0%
20734	Baguia	Uai Muhi River Catchment	490	422	86.2%	19	4.0%	43	8.8%	5	1.0%
20932	Bualale	Seiçal River Catchment	1,918	1,859	96.9%	18	0.9%	25	1.3%	17	0.9%
22607	Guruçà	Boro Uai River Catchment	662	644	97.3%	5	0.7%	10	1.5%	3	0.4%
22621	Guruçà	Lianau River Catchment	232	230	99.5%	0	0.2%	1	0.3%	0	0.0%
22634	Guruçà	Uai Muhi River Catchment	1,841	1,585	86.1%	85	4.6%	104	5.7%	67	3.6%
23032	Laisorolai De Baixo	Seiçal River Catchment	754	751	99.7%	0	0.0%	1	0.1%	1	0.2%
23105	Laisorolai De Cima	Bebui River Catchment	771	646	83.8%	31	4.0%	55	7.1%	39	5.1%
23132	Laisorolai De Cima	Seiçal River Catchment	1,079	850	78.8%	28	2.6%	89	8.3%	112	10.4%
23134	Laisorolai De Cima	Uai Muhi River Catchment	411	120	29.3%	37	9.0%	87	21.1%	167	40.6%
23605	Lelalai	Bebui River Catchment	186	186	100.0%	0	0.0%	0	0.0%	0	0.0%
23632	Lelalai	Seiçal River Catchment	1,731	1,720	99.4%	3	0.2%	2	0.1%	6	0.4%
24032	Letemumo	Seiçal River Catchment	847	820	96.8%	10	1.2%	13	1.5%	4	0.5%
24332	Lacoliu	Seiçal River Catchment	464	433	93.2%	8	1.7%	14	3.0%	10	2.1%
24334	Lacoliu	Uai Muhi River Catchment	277	253	91.5%	2	0.7%	13	4.7%	9	3.1%
24707	Macalaco	Boro Uai River Catchment	1,017	995	97.9%	15	1.5%	5	0.5%	1	0.1%
24732	Macalaco	Seiçal River Catchment	1,877	1,765	94.1%	35	1.9%	37	2.0%	39	2.1%
24805	Maluro	Bebui River Catchment	121	118	97.1%	3	2.3%	1	0.6%	0	0.0%
25634	Namanei	Uai Muhi River Catchment	1,343	925	68.9%	116	8.7%	149	11.1%	153	11.4%
27934	Uaitame	Uai Muhi River Catchment	2,316	1,955	84.4%	68	3.0%	137	5.9%	155	6.7%
		Totals Quelicai AP	**20,594**	**18,295**	**88.8%**	**582**	**2.8%**	**888**	**4.3%**	**829**	**4.0%**

Table 14. Land Area at Risk of Landslides in Quelicai AP

Suco -Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%	Number	%
20234	Abafala	Uai Muhi River Catchment	44	32	72.7%	2	4.5%	6	13.6%	4	9.1%
20332	Abo	Seiçal River Catchment	149	148	99.3%	0	0.0%	0	0.0%	1	0.7%
20434	Afaçà	Uai Muhi River Catchment	374	368	98.4%	0	0.0%	5	1.3%	1	0.3%
20707	Baguia	Boro Uai River Catchment	39	39	100.0%	0	0.0%	0	0.0%	0	0.0%
20732	Baguia	Seiçal River Catchment	142	139	97.9%	3	2.1%	0	0.0%	0	0.0%
20734	Baguia	Uai Muhi River Catchment	94	94	100.0%	0	0.0%	0	0.0%	0	0.0%
20932	Bualale	Seiçal River Catchment	311	303	97.4%	3	1.0%	5	1.6%	0	0.0%
22607	Guruçà	Boro Uai River Catchment	150	149	99.3%	0	0.0%	1	0.7%	0	0.0%
22621	Guruçà	Lianau River Catchment	40	40	100.0%	0	0.0%	0	0.0%	0	0.0%
22634	Guruçà	Uai Muhi River Catchment	285	265	93.0%	8	2.8%	10	3.5%	2	0.7%
23032	Laisorolai De Baixo	Seiçal River Catchment	206	206	100.0%	0	0.0%	0	0.0%	0	0.0%
23105	Laisorolai De Cima	Bebui River Catchment	252	250	99.2%	2	0.8%	0	0.0%	0	0.0%
23132	Laisorolai De Cima	Seiçal River Catchment	496	492	99.2%	2	0.4%	1	0.2%	1	0.2%
23134	Laisorolai De Cima	Uai Muhi River Catchment	7	7	100.0%	0	0.0%	0	0.0%	0	0.0%
23605	Lelalai	Bebui River Catchment	49	49	100.0%	0	0.0%	0	0.0%	0	0.0%
23632	Lelalai	Seiçal River Catchment	309	309	100.0%	0	0.0%	0	0.0%	0	0.0%
24032	Letemumo	Seiçal River Catchment	512	511	99.8%	0	0.0%	1	0.2%	0	0.0%
24332	Lacoliu	Seiçal River Catchment	382	362	94.8%	4	1.0%	10	2.6%	6	1.6%
24334	Lacoliu	Uai Muhi River Catchment	119	103	86.6%	1	0.8%	6	5.0%	9	7.6%
24707	Macalaco	Boro Uai River Catchment	42	42	100.0%	0	0.0%	0	0.0%	0	0.0%
24732	Macalaco	Seiçal River Catchment	225	215	95.6%	4	1.8%	2	0.9%	4	1.8%
24805	Maluro	Bebui River Catchment	18	18	100.0%	0	0.0%	0	0.0%	0	0.0%
25634	Namanei	Uai Muhi River Catchment	151	132	87.4%	4	2.6%	4	2.6%	11	7.3%
27934	Uaitame	Uai Muhi River Catchment	376	355	94.4%	6	1.6%	10	2.7%	5	1.3%
		Totals Quelicai AP	**4,772**	**4,628**	**97.0%**	**39**	**0.8%**	**61**	**1.3%**	**44**	**0.9%**

Table 15. Houses at Risk of Landslides in Quelicai AP

Figure 9 – Evidence of flash-floods, landslides and erosion, and engineering efforts to protect road.

Figure 10 – Example of moderate slope and sparse vegetation contributing to the risk of landslides. Abafala Suco, Uai Muhi Catchment

Suco -Catchment Code	*Suco* -Catchment		Total Length of Roads (Km)	Length of Road in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Km	%	Km	%	Km	%	Km	%
20234	Abafala	Uai Muhi River Catchment	2.6	2.4	94.2%	0.0	0.0%	0.1	4.8%	0.0	1.0%
20332	Abo	Seiçal River Catchment	3.6	3.5	98.1%	0.0	0.3%	0.1	1.6%	0.0	0.0%
20434	Afaçà	Uai Muhi River Catchment	8.5	8.0	94.5%	0.1	1.0%	0.0	0.4%	0.3	4.1%
20707	Baguia	Boro Uai River Catchment	1.8	1.6	92.7%	0.1	5.1%	0.0	2.2%	0.0	0.0%
20732	Baguia	Seiçal River Catchment	3.1	3.0	99.2%	0.0	0.0%	0.0	0.8%	0.0	0.0%
20734	Baguia	Uai Muhi River Catchment	2.2	2.0	87.7%	0.0	0.5%	0.2	10.4%	0.0	1.5%
20932	Bualale	Seiçal River Catchment	8.0	8.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
22607	Guruçà	Boro Uai River Catchment	3.9	3.9	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
22621	Guruçà	Lianau River Catchment	0.3	0.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
22634	Guruçà	Uai Muhi River Catchment	4.5	4.3	96.2%	0.1	1.6%	0.0	0.7%	0.1	1.6%
23032	Laisorolai De Baixo	Seiçal River Catchment	3.8	3.7	97.6%	0.0	0.0%	0.0	0.0%	0.1	2.4%
23105	Laisorolai De Cima	Bebui River Catchment	3.8	3.8	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
23132	Laisorolai De Cima	Seiçal River Catchment	9.8	9.8	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
23134	Laisorolai De Cima	Uai Muhi River Catchment	0.0								
23605	Lelalai	Bebui River Catchment	1.0	1.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
23632	Lelalai	Seiçal River Catchment	6.0	6.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
24032	Letemumo	Seiçal River Catchment	8.2	8.2	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
24332	Lacoliu	Seiçal River Catchment	3.6	3.5	95.3%	0.1	1.7%	0.1	3.0%	0.0	0.0%
24334	Lacoliu	Uai Muhi River Catchment	0.0								
24707	Macalaco	Boro Uai River Catchment	4.1	3.4	82.4%	0.4	9.5%	0.3	6.3%	0.1	1.8%
24732	Macalaco	Seiçal River Catchment	10.0	9.1	91.2%	0.4	3.8%	0.2	2.4%	0.3	2.5%
24805	Maluro	Bebui River Catchment	0.0								
25634	Namanei	Uai Muhi River Catchment	0.6	0.6	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
27934	Uaitame	Uai Muhi River Catchment	3.0	2.8	93.3%	0.2	5.6%	0.0	1.0%	0.0	0.0%
		Totals Quelicai AP	**92.2**	**88.9**	**96.4%**	**1.3**	**1.4%**	**1.2**	**1.3%**	**0.9**	**1.0%**

Table 16. Roads at Risk of Landslides in Quelicai AP

Erosion Risk in Quelicai Administrative Post

Eight-seven percent of the land area of Quelicai AP is susceptible to medium- to high-levels of erosion. The terrain is typically high, steep and poorly vegetated, and soils are highly erodible, unconsolidated materials with low clay and organic content. Erosion potential is highest in the Seiçal, Uai Muhi and Bebui River Catchments, and within these catchments, in Laisorolai de Cima, Maluro and Laisorolai de Baixo *Sucos*. The two catchments in the northern part of the AP, Boro Uai and Lianau River Catchments, generally show less potential for erosion because they are at lower elevations and are less steep.

As pointed out in the previous section, most of the infrastructure is not considered to be at high-risk for landslides, but the field work confirmed that many structures suffer damage from various kinds of earth movements. The photographs on this page and in the previous section show clear evidence that Quelicai is a tough place in which to build schools, houses and roads strong enough to withstand the forces of nature. More than 80% of the houses in Quelicai are in areas with medium-to-high risks of erosion, whilst for roads, the percentage is even higher at almost 90%. Only 6 of the AP's 36 schools and 1 of its 5 health facilities are on land with low risk for erosion. Figure 12 shows the damage earth movement has caused to the primary school in Abo *Suco*.

Roads throughout the Quelicai AP are also badly affected by erosion. The risks are highest in *sucos* closest to the Matebian Massif, including Laisorolai de Cima, where 12.9km out of 13.6km of road are in medium-to-high risk areas, and Afaçà, where it is 6.1km out of 8.5km. The part of Laisorolai de Cima in the upper Uai Muhi River Catchment is so steep, remote and inaccessible that there are only 7 houses, and no roads. It is striking to note, however, that erosion poses significant threats on lower lying land away from Matebian. In Bualale and Macalaco *Sucos,* erosion is still a major threat to roads, with all 8km of the roads in Bualale and 10.3km out of 14.1km in Macalaco in medium-to-high risk areas.

Figure 11 –Erosion on moderate slopes with sparse vegetation to protect unconsolidated materials. Afaçà Suco, Uai Muhi Catchment

Figure 12 – Damage to primary school caused by erosion and slumping. Abo Suco, Seiçal River Catchment

Suco -Catchment Code	*Suco* -Catchment		Total Hectares	Area of Land in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%
20234	Abafala	Uai Muhi River Catchment	329	57	17.4%	257	78.1%	15	4.4%
20332	Abo	Seiçal River Catchment	287	11	3.8%	148	51.6%	128	44.6%
20434	Afaçà	Uai Muhi River Catchment	1,429	272	19.0%	964	67.5%	193	13.5%
20707	Baguia	Boro Uai River Catchment	121	28	23.4%	78	64.8%	14	11.8%
20732	Baguia	Seiçal River Catchment	92	11	11.4%	64	69.5%	18	19.0%
20734	Baguia	Uai Muhi River Catchment	490	53	10.8%	320	65.3%	117	24.0%
20932	Bualale	Seiçal River Catchment	1,918	127	6.6%	1,093	57.0%	698	36.4%
22607	Guruçà	Boro Uai River Catchment	662	148	22.3%	439	66.3%	75	11.4%
22621	Guruçà	Lianau River Catchment	232	42	18.3%	184	79.4%	5	2.3%
22634	Guruçà	Uai Muhi River Catchment	1,841	286	15.5%	1,292	70.2%	263	14.3%
23032	Laisorolai De Baixo	Seiçal River Catchment	754	20	2.7%	332	44.1%	401	53.2%
23105	Laisorolai De Cima	Bebui River Catchment	771	28	3.7%	361	46.8%	381	49.5%
23132	Laisorolai De Cima	Seiçal River Catchment	1,079	5	0.5%	320	29.6%	754	69.9%
23134	Laisorolai De Cima	Uai Muhi River Catchment	411	16	3.9%	144	35.0%	251	61.1%
23605	Lelalai	Bebui River Catchment	186	14	7.4%	116	62.0%	57	30.6%
23632	Lelalai	Seiçal River Catchment	1,731	305	17.6%	734	42.4%	693	40.0%
24032	Letemumo	Seiçal River Catchment	847	198	23.4%	522	61.6%	126	14.9%
24332	Lacoliu	Seiçal River Catchment	464	33	7.2%	287	61.9%	144	30.9%
24334	Lacoliu	Uai Muhi River Catchment	277	18	6.6%	154	55.8%	104	37.6%
24707	Macalaco	Boro Uai River Catchment	1,017	322	31.7%	656	64.5%	39	3.8%
24732	Macalaco	Seiçal River Catchment	1,877	371	19.8%	1,095	58.3%	411	21.9%
24805	Maluro	Bebui River Catchment	121	2	1.3%	43	35.1%	77	63.6%
25634	Namanei	Uai Muhi River Catchment	1,343	125	9.3%	926	69.0%	292	21.7%
27934	Uaitame	Uai Muhi River Catchment	2,316	260	11.2%	1,633	70.5%	423	18.3%
		Totals Quelicai AP	**20,594**	**2,753**	**13.4%**	**12,162**	**59.1%**	**5,680**	**27.6%**

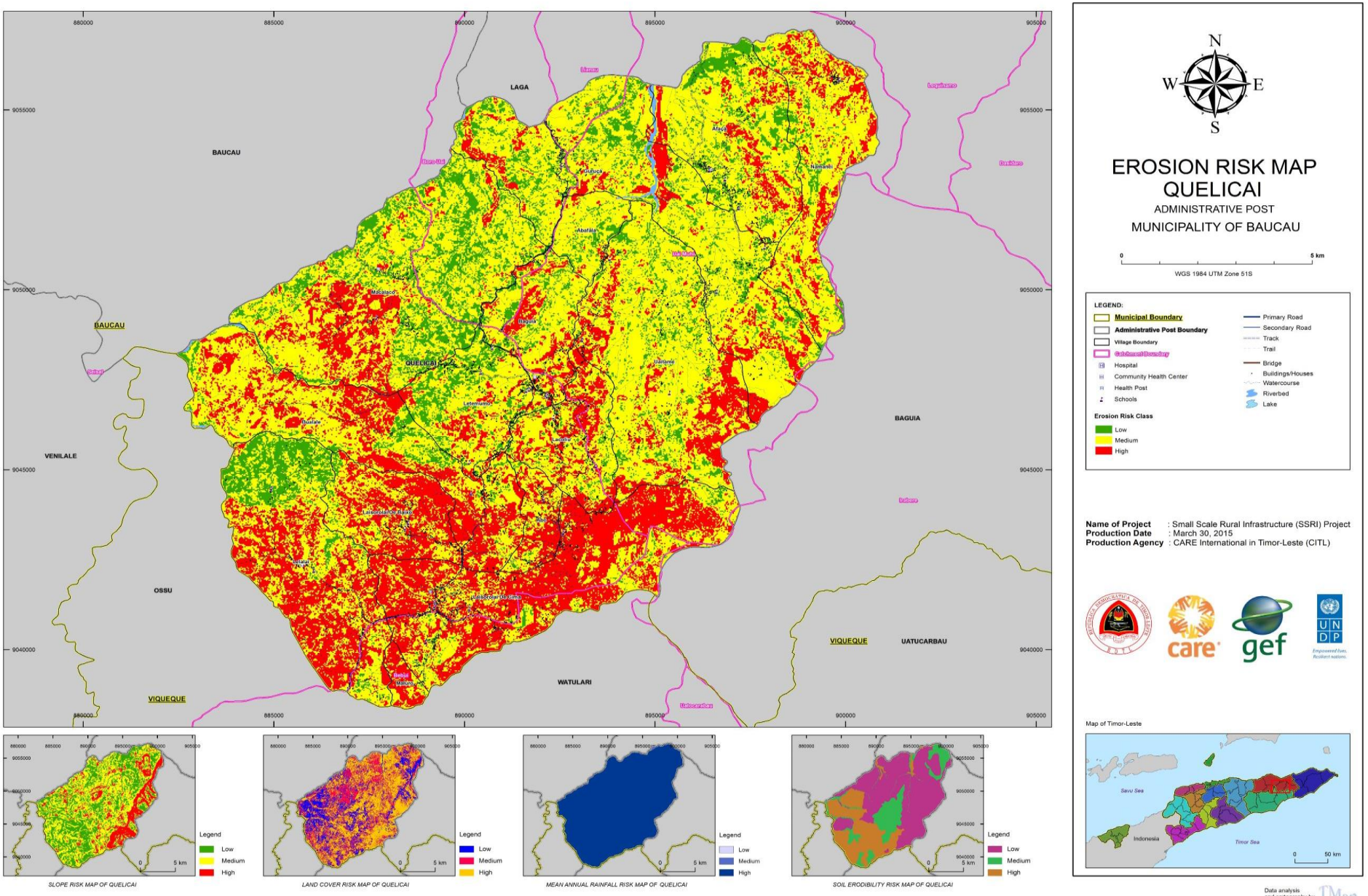
Table 17. Land Area at Risk of Erosion in Quelicai AP

Suco - Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Erosion Risk Category						Total Length of Roads	Length of Road in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Km	%	Km	%	Km	%
20234	Abafala	Uai Muhi River Catchment	44	7	15.9%	30	68.2%	7	15.9%	2.6	0.8	30.9%	1.8	68.0%	0.0	1.2%
20332	Abo	Seiçal River Catchment	149	3	2.0%	90	60.4%	56	37.6%	3.6	0.0	1.2%	1.2	33.6%	2.3	65.2%
20434	Afaçà	Uai Muhi River Catchment	374	122	32.6%	227	60.7%	25	6.7%	8.5	2.3	27.5%	5.8	68.5%	0.3	4.1%
20707	Baguia	Boro Uai River Catchment	39	24	61.5%	15	38.5%	0	0.0%	1.8	0.7	38.3%	1.0	55.4%	0.1	6.4%
20732	Baguia	Seiçal River Catchment	142	22	15.5%	95	66.9%	25	17.6%	3.1	0.7	21.5%	2.0	64.8%	0.4	13.7%
20734	Baguia	Uai Muhi River Catchment	94	16	17.0%	59	62.8%	19	20.2%	2.2	0.1	2.3%	1.4	64.1%	0.8	33.7%
20932	Bualale	Seiçal River Catchment	311	42	13.5%	201	64.6%	68	21.9%	8.0	0.0	0.6%	3.9	48.7%	4.1	50.8%
22607	Guruçà	Boro Uai River Catchment	150	58	38.7%	91	60.7%	1	0.7%	3.9	1.3	34.2%	2.6	65.8%	0.0	0.0%
22621	Guruçà	Lianau River Catchment	40	8	20.0%	32	80.0%	0	0.0%	0.3	0.0	0.0%	0.3	100.0%	0.0	0.0%
22634	Guruçà	Uai Muhi River Catchment	285	67	23.5%	203	71.2%	15	5.3%	4.5	0.4	9.4%	3.0	67.7%	1.0	22.9%
23032	Laisorolai De Baixo	Seiçal River Catchment	206	1	0.5%	126	61.2%	79	38.3%	3.8	0.0	0.0%	1.8	48.0%	2.0	52.0%
23105	Laisorolai De Cima	Bebui River Catchment	252	19	7.5%	160	63.5%	73	29.0%	3.8	0.5	14.6%	2.3	61.8%	0.9	23.5%
23132	Laisorolai De Cima	Seiçal River Catchment	496	7	1.4%	233	47.0%	256	51.6%	9.8	0.0	0.2%	5.2	53.7%	4.5	46.2%
23134	Laisorolai De Cima	Uai Muhi River Catchment	7	0	0.0%	7	100.0%	0	0.0%	0.0						
23605	Lelalai	Bebui River Catchment	49	9	18.4%	32	65.3%	8	16.3%	1.0	0.0	0.0%	0.5	49.0%	0.5	51.0%
23632	Lelalai	Seiçal River Catchment	309	48	15.5%	183	59.2%	78	25.2%	6.0	0.0	0.1%	3.4	55.9%	2.7	44.0%
24032	Letemumo	Seiçal River Catchment	512	191	37.3%	268	52.3%	53	10.4%	8.2	1.9	22.6%	5.6	67.8%	0.8	9.7%
24332	Lacoliu	Seiçal River Catchment	382	43	11.3%	225	58.9%	114	29.8%	3.6	0.1	3.5%	2.0	53.7%	1.6	42.8%
24334	Lacoliu	Uai Muhi River Catchment	119	13	10.9%	65	54.6%	41	34.5%	0.0						
24707	Macalaco	Boro Uai River Catchment	42	16	38.1%	26	61.9%	0	0.0%	4.1	1.4	33.7%	2.3	57.6%	0.4	8.7%
24732	Macalaco	Seiçal River Catchment	225	66	29.3%	108	48.0%	51	22.7%	10.0	2.1	20.9%	5.3	52.8%	2.6	26.2%
24805	Maluro	Bebui River Catchment	18	1	5.6%	12	66.7%	5	27.8%	0.0						
25634	Namanei	Uai Muhi River Catchment	151	4	2.6%	120	79.5%	27	17.9%	0.6	0.0	0.0%	0.5	81.2%	0.1	18.8%
27934	Uaitame	Uai Muhi River Catchment	376	83	22.1%	243	64.6%	50	13.3%	3.0	0.3	9.5%	2.1	71.0%	0.6	19.4%
		Totals Quelicai AP	**4,772**	**870**	**18.2%**	**2,851**	**59.7%**	**1,051**	**22.0%**	**92.2**	**12.6**	**13.7%**	**53.9**	**58.5%**	**25.6**	**27.8%**

Table 18. Houses and Roads at Risk of Erosion in Quelicai AP

Suco -Catchment Code	*Suco* -Catchment		Total No. of Schools	Schools in Each Erosion Risk Category						Total No. of Health Facilities	Health Facilities in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Number	%	Number	%	Number	%
20234	Abafala	Uai Muhi River Catchment	0							0						
20332	Abo	Seiçal River Catchment	1	0	0.0%	1	100.0%	0	0.0%	0						
20434	Afaçà	Uai Muhi River Catchment	4	1	25.0%	3	75.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
20707	Baguia	Boro Uai River Catchment	0							0						
20732	Baguia	Seiçal River Catchment	0							1	0	0.0%	1	100.0%	0	0.0%
20734	Baguia	Uai Muhi River Catchment	0							0						
20932	Bualale	Seiçal River Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
22607	Guruçà	Boro Uai River Catchment	1	0	0.0%	1	100.0%	0	0.0%	0						
22621	Guruçà	Lianau River Catchment	0							0						
22634	Guruçà	Uai Muhi River Catchment	2	0	0.0%	2	100.0%	0	0.0%	0						
23032	Laisorolai De Baixo	Seiçal River Catchment	2	0	0.0%	2	100.0%	0	0.0%	0						
23105	Laisorolai De Cima	Bebui River Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
23132	Laisorolai De Cima	Seiçal River Catchment	4	0	0.0%	2	50.0%	2	50.0%	1	0	0.0%	1	100.0%	0	0.0%
23134	Laisorolai De Cima	Uai Muhi River Catchment	0							0						
23605	Lelalai	Bebui River Catchment	0							0						
23632	Lelalai	Seiçal River Catchment	3	2	66.7%	1	33.3%	0	0.0%	1	0	0.0%	0	0.0%	1	100.0%
24032	Letemumo	Seiçal River Catchment	8	3	37.5%	5	62.5%	0	0.0%	0						
24332	Lacoliu	Seiçal River Catchment	2	0	0.0%	1	50.0%	1	50.0%	0						
24334	Lacoliu	Uai Muhi River Catchment	0							0						
24707	Macalaco	Boro Uai River Catchment	0							0						
24732	Macalaco	Seiçal River Catchment	2	0	0.0%	0	0.0%	2	100.0%	1	1	100.0%	0	0.0%	0	0.0%
24805	Maluro	Bebui River Catchment	0							0						
25634	Namanei	Uai Muhi River Catchment	1	0	0.0%	1	100.0%	0	0.0%	0						
27934	Uaitame	Uai Muhi River Catchment	4	0	0.0%	4	100.0%	0	0.0%	0						
		Totals Quelicai AP	**36**	**6**	**16.7%**	**23**	**63.9%**	**7**	**19.4%**	**5**	**1**	**20.0%**	**3**	**60.0%**	**1**	**20.0%**

Table 19. Schools and Health Facilities at Risk of Erosion in Quelicai AP



Produced with Funding from GEF-LDCF and Implemented by UNDP in Partnership with MAE and MCIE

MAP- 8. Erosion Risk Map: Quelicai Administrative Post

2.4.3 Risk Profile – Vemasse Administrative Post

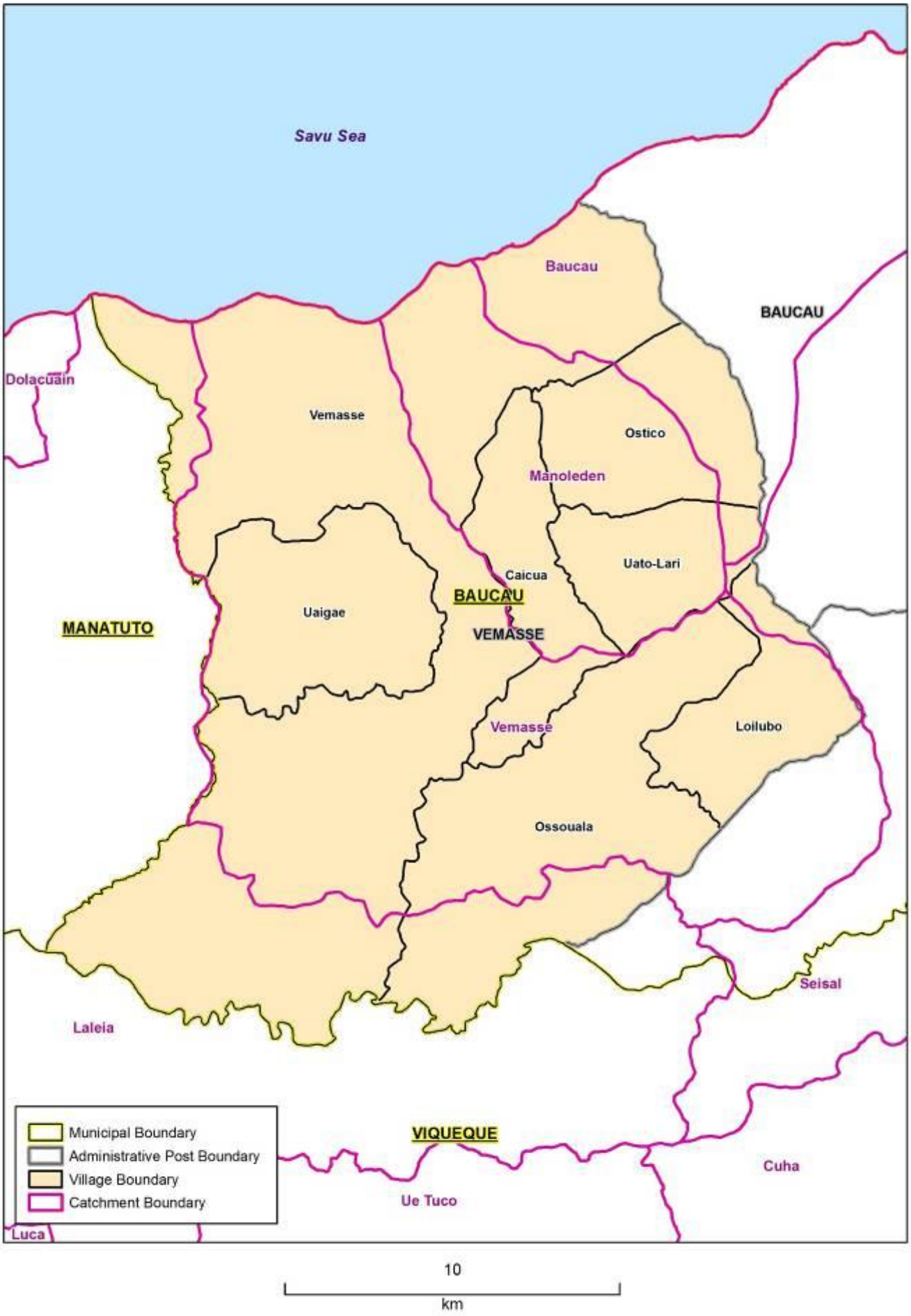
Vemasse is part of 15 catchments and has 7 *sucos,* which together form a total of 15 *suco*-catchments. The biggest *suco*-catchment is where Vemasse *Suco* intersects with the Vemasse River Catchment. This catchment is 9,534 hectares in size, and it is where most of the people in the AP live, and where most of the infrastructure is. It is also where the highest potential for all three types of risk is found.

***Suco* -Catchment Code**	***Suco* -Catchment**		**Total Area**
31423	Caicua	Manoleden River Catchment	2,295
34532	Loilubo	Seiçal River Catchment	253
34535	Loilubo	Vemasse River Catchment	1,967
35720	Ossouala	Laleia River Catchment	1,947
35723	Ossouala	Manoleden River Catchment	4,561
35803	Ostico	Baucau Aggregate Catchment	1,147
35823	Ostico	Manoleden River Catchment	1,683
37035	Uaigae	Vemasse River Catchment	3,424
37103	Uato-Lari	Baucau Aggregate Catchment	184
37123	Uato-Lari	Manoleden River Catchment	1,672
37132	Uato-Lari	Seiçal River Catchment	54
37703	Vemasse	Baucau Aggregate Catchment	1,915
37720	Vemasse	Laleia River Catchment	4,590
37723	Vemasse	Manoleden River Catchment	2,169
37735	Vemasse	Vemasse River Catchment	9,534
		Totals Vemasse AP	**37,395**

Table 20. Suco-Catchments in Vemasse Administrative Post

Vemasse has similar bio-physical characteristics to its neighbouring AP to the east, and as in Baucau AP, flooding is the biggest threat here. The valley, flood plain and channel of the Vemasse River are the dominant physical features in the area, and it is here that flooding poses the biggest problems. The largest areas at-risk for flooding are in the lower catchment, down near the coast. Some parts of the upper catchment are prone to landslides and erosion. In other parts of Vemasse AP, conditions are relatively benign and threats from weather-related hazards relatively small.

Figure 13 – Regular flooding threatens roads and electricity infrastructure. Vemasse Suco, lower Vemasse River Catchment



MAP- 9. Sucos and Catchments of Vemasse Administrative Post

Flood Risk in Vemasse Administrative Post

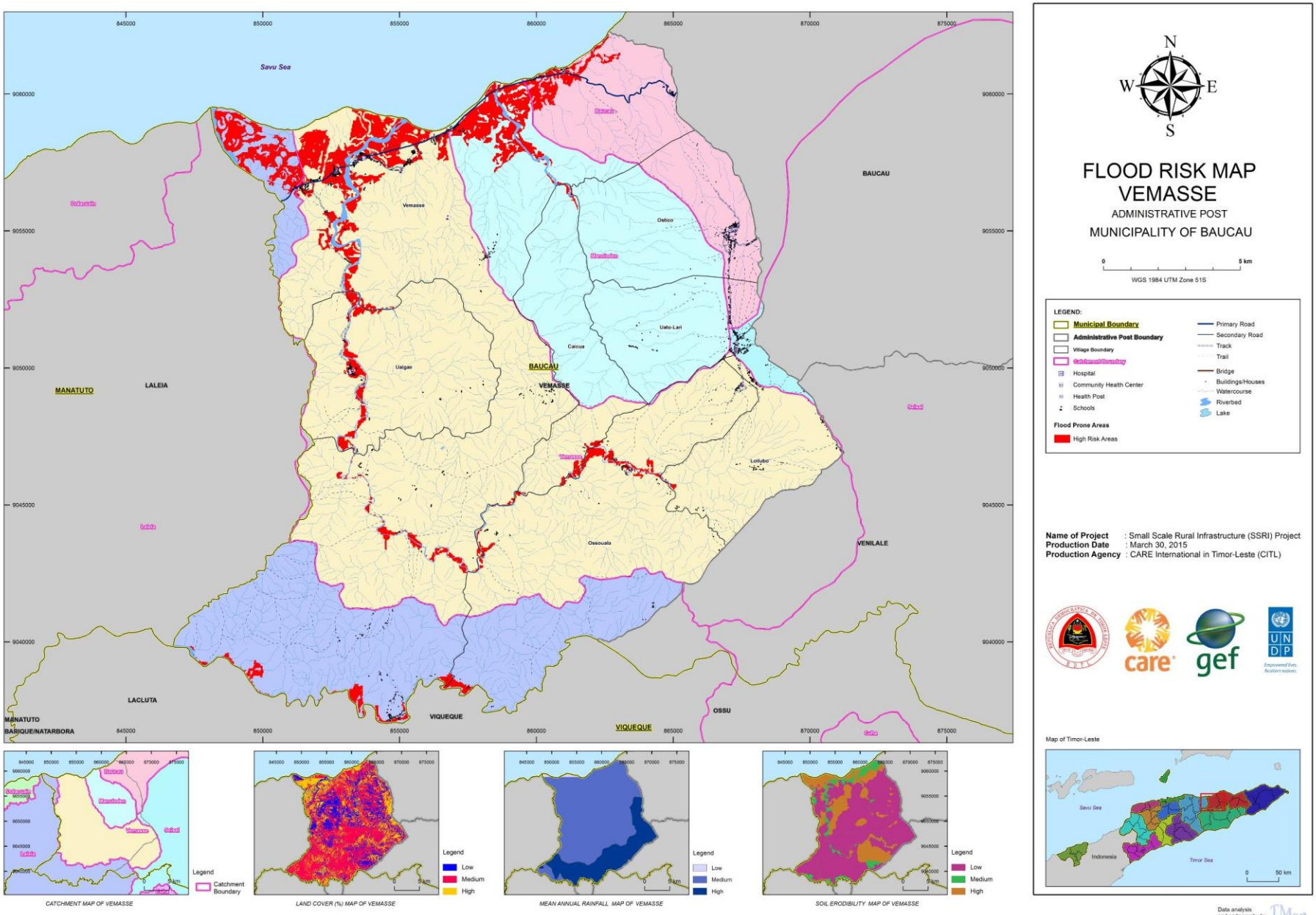
There is potential for flooding on 2,231 hectares in Vemasse AP, representing just 6% of the total area of 37,395 hectares. The flood-prone areas are on the coastal plain in the north and adjacent to the main channels of the two largest rivers, the Vemasse and the Laleia Rivers. Vemasse River Catchment has the most flood-prone land, with 1,045 hectares, the Manoleden River Catchment is next with 556 hectares, and the Laleia River Catchment is third with 464 hectares. Though similar in many ways to the flood-prone parts of the Seiçal River Catchment in Baucau AP, here there is much more of a concentration on the coastal plain. There is potential for flooding upstream in the Vemasse and the Laleia Catchments, but both these rivers have relatively narrow flood plains which tend to confine flooding to areas close to the rivers. Less water escaping the river channel upstream of course means more water being carried downstream, which increases the likelihood of flooding down towards the coast. The Seiçal, on the other hand, has a much broader floodplain much higher up in its catchment. This means that its flood waters are prone to spreading out higher up in the catchment, covering much more extensive tracts of land farther from the river channel and farther from the coast.

Though flood-prone areas cover only a 6% of Vemasse's land area, this is where many of its people live and where much of its infrastructure is built. Twenty-one percent of the houses are in the flood-risk zone, and 24% of the roads. Five of the APs 16 schools and 2 of its 6 health facilities are also under threat from flooding. The main communities affected by flooding are in Vemasse and Uaigae *Sucos.* As discussed elsewhere in this report, regular flooding has both positive and negative impacts. On the positive side, flat land near to large rivers is good for farming, with water readily available and frequent deposits of nutrient-rich alluvium when flood waters recede. This is what attracts people to live in such areas. But with the advantages come serious threats, including possible damage to property and crops, loss of livestock, cuts in transportation and communications links, and even risks to peoples' lives.

Figure 14 – Flood damage and erosion close to houses in Ossouala Suco, upper Vemasse River Catchment

Suco -Catchment Code	*Suco* -Catchment		Land Area			Houses			Schools			Health Facilities			Roads		
			Total Area	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total Km	In Flood Risk Zone	
				Hectares	%	Number	Number	%	Number	Number	%	Number	Number	%		Km	%
31423	Caicua	Manoleden River Catchment	2,295	37	1.6%	5	0	0.0%	0			0			0.0		
34532	Loilubo	Seiçal River Catchment	253	0	0.0%	120	0	0.0%	2	0	0.0%	1	0	0.0%	1.4	0.0	0.0%
34535	Loilubo	Vemasse River Catchment	1,967	6	0.3%	166	0	0.0%	0			0			0.9	0.0	0.0%
35720	Ossouala	Laleia River Catchment	1,947	25	1.3%	24	6	25.0%	0			0			0.0		
35735	Ossouala	Vemasse River Catchment	4,561	96	2.1%	177	17	9.6%	2	0	0.0%	1	0	0.0%	2.0	0.0	0.0%
35803	Ostico	Baucau Aggregate Catchment	1,147	0	0.0%	240	0	0.0%	1	0	0.0%	1	0	0.0%	8.1	0.0	0.0%
35823	Ostico	Manoleden River Catchment	1,683	1	0.1%	1	0	0.0%	0			0			0.0		
37035	Uaigae	Vemasse River Catchment	3,424	140	4.1%	144	84	58.3%	1	1	100.0%	1	1	100.0%	5.4	1.8	34.1%
37103	Uato-Lari	Baucau Aggregate Catchment	184	0	0.0%	55	0	0.0%	0			0			1.9	0.0	0.0%
37123	Uato-Lari	Manoleden River Catchment	1,672	0	0.0%	51	0	0.0%	0			0			0.0		
37132	Uato-Lari	Seiçal River Catchment	54	0	0.0%	70	0	0.0%	0			0			0.5	0.0	0.0%
37703	Vemasse	Baucau Aggregate Catchment	1,915	165	8.6%	84	35	41.7%	2	1	50.0%	0			7.2	2.0	27.5%
37720	Vemasse	Laleia River Catchment	4,590	439	9.6%	149	18	12.1%	1	0	0.0%	1	0	0.0%	0.8	0.2	29.0%
37723	Vemasse	Manoleden River Catchment	2,169	422	19.5%	79	26	32.9%	0			0			3.4	1.3	38.0%
37735	Vemasse	Vemasse River Catchment	9,534	899	9.4%	794	270	34.0%	7	3	42.9%	1	1	100.0%	15.2	6.1	40.0%
		Totals Vemasse AP	**37,395**	**2,231**	**6.0%**	**2,159**	**456**	**21.1%**	**16**	**5**	**31.3%**	**6**	**2**	**33.3%**	**47**	**11.4**	**24.4%**

Table 21. Risk Statistics for Flooding in Vemasse AP



Produced with Funding from GEF-LDCF and Implemented by UNDP in Partnership with MAE and MCIE

MAP- 10. Flood Risk Map: Vemasse Administrative Post

Landslide Risk in Vemasse Administrative Post

Landslides are generally not a serious threat in Vemasse AP, with 97% of the land area considered at no risk. Though most of the land is flat or gently rolling, there are some exceptions. There is a sizeable landslide-prone area in upper Vemasse River Catchment, spilling over the ridge into the upper Laleia River Catchment. This steep, poorly vegetated area is in Ossouala *Suco,* where 253 hectares (7.4% of total area) are considered medium risk and 161 hectares (4.4%) are considered high risk for landslides. Another 'hotspot' for landslides is lower down the same catchment in Uaigae *Suco.*

Infrastructures in Vemasse AP are almost entirely outside of areas at risk of landslides. Just 2 out of 2,159 houses are considered to be on at-risk sites, and only a 100-metre section of road, out of a total length of 46.8km, is potentially at-risk. No schools or health facilities in Vemasse AP are built on landslide-prone sites.

				Area of Land in Each Landslide Risk Category							
Suco -Catchment Code	*Suco* -Catchment		Total Hectares	No Risk		Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%	Hectares	%
31423	Caicua	Manoleden River Catchment	2,295	2,258	98.4%	10	0.4%	24	1.0%	3	0.2%
34532	Loilubo	Seiçal River Catchment	253	253	100.0%	0	0.0%	0	0.0%	0	0.0%
34535	Loilubo	Vemasse River Catchment	1,967	1,964	99.8%	1	0.1%	2	0.1%	0	0.0%
35720	Ossouala	Laleia River Catchment	1,947	1,830	94.0%	23	1.2%	62	3.2%	32	1.6%
35735	Ossouala	Vemasse River Catchment	4,561	4,142	90.8%	99	2.2%	191	4.2%	129	2.8%
35803	Ostico	Baucau Aggregate Catchment	1,147	1,146	99.9%	1	0.1%	0	0.0%	0	0.0%
35823	Ostico	Manoleden River Catchment	1,683	1,681	99.9%	2	0.1%	0	0.0%	0	0.0%
37035	Uaigae	Vemasse River Catchment	3,424	3,200	93.5%	87	2.5%	120	3.5%	17	0.5%
37103	Uato-Lari	Baucau Aggregate Catchment	184	184	100.0%	0	0.0%	0	0.0%	0	0.0%
37123	Uato-Lari	Manoleden River Catchment	1,672	1,671	99.9%	1	0.0%	0	0.0%	0	0.0%
37132	Uato-Lari	Seiçal River Catchment	54	54	100.0%	0	0.0%	0	0.0%	0	0.0%
37703	Vemasse	Baucau Aggregate Catchment	1,915	1,915	100.0%	0	0.0%	0	0.0%	0	0.0%
37720	Vemasse	Laleia River Catchment	4,590	4,521	98.5%	35	0.8%	25	0.5%	9	0.2%
37723	Vemasse	Manoleden River Catchment	2,169	2,115	97.5%	14	0.6%	32	1.5%	9	0.4%
37735	Vemasse	Vemasse River Catchment	9,534	9,404	98.6%	68	0.7%	53	0.6%	9	0.1%
		Totals Vemasse AP	**37,395**	**36,339**	**97.2%**	**339**	**0.9%**	**510**	**1.4%**	**207**	**0.6%**

Table 22. Land Area at Risk of Landslides in Vemasse AP

Erosion Risk in Vemasse Administrative Post

Though landslides pose little threat in most parts of Vemasse AP, the potential for erosion is substantially higher and more widespread. [See erosion risk tables on p. 40.] This is because soil erosion is a more general phenomenon, requiring less extreme contributing conditions than landslides. One of the biggest factors is slope – whereas landslides will only occur on very steep slopes, soil will erode from gentle slopes and even from virtually flat land, under certain circumstances. Thus, even though the process of soil erosion may be more difficult to observe, the consequences can still be dramatic and damaging, and they will affect people and infrastructure over much larger areas of land.

General impacts of erosion on infrastructure include the undermining roads, buildings and other structures, the clogging of water-control structures such as irrigation canals and drains, and the polluting of domestic water supplies. Identifying specific problem sites and assessing the extent to which erosion is damaging individual structures are beyond the scope of this study, but from the maps and the statistics it is possible to see which places are likely to be most susceptible to erosion, and which places, lower down the catchments, are likely to experience both the positive and the negative impacts.

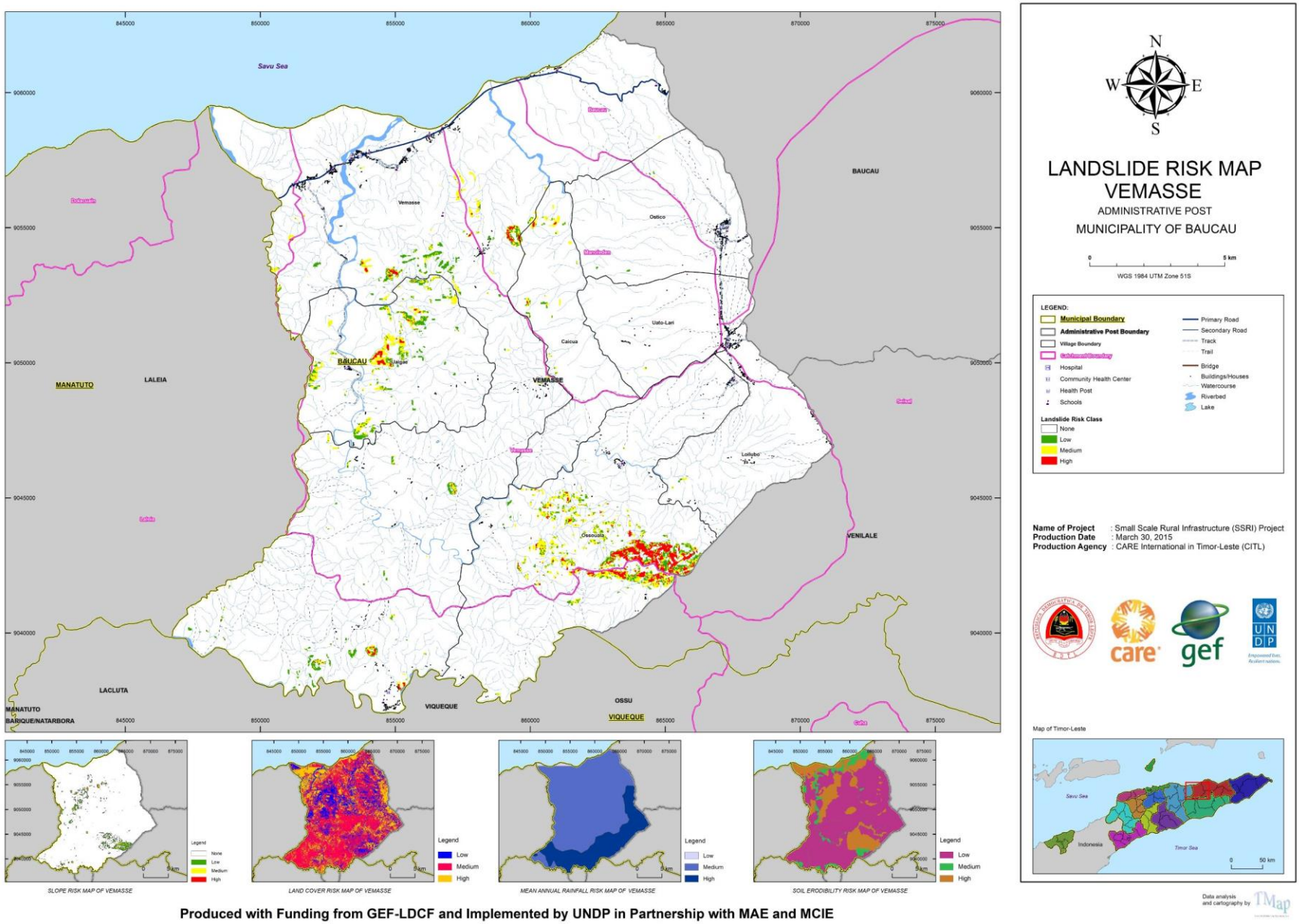
Again, the highest risks are in the upper Vemasse River Catchment in Ossouala *Suco*, and lower down the same catchment in Uaigae *Suco*, extending further to the north into Vemasse *Suco.* As in the Seiçal River Catchment in Baucau AP, heavy erosion upstream has important influences on conditions downstream, and undoubtedly increases the likelihood of flooding in communities living on the broad flood plains and coastal plains in the north.

				Houses in Each Landslide Risk Category							
Suco -Catchment Code	*Suco* -Catchment		Total No. of Houses	No Risk		Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%	Number	%
31423	Caicua	Manoleden River Catchment	5	5	100.0%	0	0.0%	0	0.0%	0	0.0%
34532	Loilubo	Seiçal River Catchment	120	120	100.0%	0	0.0%	0	0.0%	0	0.0%
34535	Loilubo	Vemasse River Catchment	166	166	100.0%	0	0.0%	0	0.0%	0	0.0%
35720	Ossouala	Laleia River Catchment	24	24	100.0%	0	0.0%	0	0.0%	0	0.0%
35735	Ossouala	Vemasse River Catchment	177	177	100.0%	0	0.0%	0	0.0%	0	0.0%
35803	Ostico	Baucau Aggregate Catchment	240	240	100.0%	0	0.0%	0	0.0%	0	0.0%
35823	Ostico	Manoleden River Catchment	1	1	100.0%	0	0.0%	0	0.0%	0	0.0%
37035	Uaigae	Vemasse River Catchment	144	144	100.0%	0	0.0%	0	0.0%	0	0.0%
37103	Uato-Lari	Baucau Aggregate Catchment	55	55	100.0%	0	0.0%	0	0.0%	0	0.0%
37123	Uato-Lari	Manoleden River Catchment	51	51	100.0%	0	0.0%	0	0.0%	0	0.0%
37132	Uato-Lari	Seiçal River Catchment	70	70	100.0%	0	0.0%	0	0.0%	0	0.0%
37703	Vemasse	Baucau Aggregate Catchment	84	84	100.0%	0	0.0%	0	0.0%	0	0.0%
37720	Vemasse	Laleia River Catchment	149	147	98.7%	0	0.0%	1	0.7%	1	0.7%
37723	Vemasse	Manoleden River Catchment	79	79	100.0%	0	0.0%	0	0.0%	0	0.0%
37735	Vemasse	Vemasse River Catchment	794	794	100.0%	0	0.0%	0	0.0%	0	0.0%
		Totals Vemasse AP	**2,159**	**2,157**	**99.9%**	**0**	**0.0%**	**1**	**0.0%**	**1**	**0.0%**

Table 23. Houses at Risk of Landslides in Vemasse AP

				Length of Road in Each Landslide Risk Category							
Suco -Catchment Code	*Suco* -Catchment		Total Length of Roads (Km)	No Risk		Low Risk		Medium Risk		High Risk	
				Km	%	Km	%	Km	%	Km	%
31423	Caicua	Manoleden River Catchment	0.0								
34532	Loilubo	Seiçal River Catchment	1.4	1.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
34535	Loilubo	Vemasse River Catchment	0.9	0.9	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
35720	Ossouala	Laleia River Catchment	0.0								
35735	Ossouala	Vemasse River Catchment	2.0	2.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
35803	Ostico	Baucau Aggregate Catchment	8.1	8.1	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
35823	Ostico	Manoleden River Catchment	0.0								
37035	Uaigae	Vemasse River Catchment	5.4	5.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
37103	Uato-Lari	Baucau Aggregate Catchment	1.9	1.9	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
37123	Uato-Lari	Manoleden River Catchment	0.0								
37132	Uato-Lari	Seiçal River Catchment	0.5	0.5	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
37703	Vemasse	Baucau Aggregate Catchment	7.2	7.2	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
37720	Vemasse	Laleia River Catchment	0.8	0.8	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
37723	Vemasse	Manoleden River Catchment	3.4	3.3	97.2%	0.0	0.0%	0.1	2.8%	0.0	0.0%
37735	Vemasse	Vemasse River Catchment	15.2	15.2	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
		Totals Vemasse AP	**46.8**	**46.7**	**99.8%**	**0.0**	**0.0%**	**0.1**	**0.2%**	**0.0**	**0.0%**

Table 24. Roads at Risk of Landslides in Vemasse AP



MAP- 11. Landslide Risk Map: Vemasse Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Total Hectares	Area of Land in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%
31423	Caicua	Manoleden River Catchment	2,295	1,627	70.9%	541	23.6%	128	5.6%
34532	Loilubo	Seiçal River Catchment	253	78	31.0%	175	69.0%	0	0.0%
34535	Loilubo	Vemasse River Catchment	1,967	841	42.8%	1,055	53.7%	71	3.6%
35720	Ossouala	Laleia River Catchment	1,947	620	31.8%	1,111	57.0%	216	11.1%
35735	Ossouala	Vemasse River Catchment	4,561	1,852	40.6%	1,416	31.0%	1,293	28.4%
35803	Ostico	Baucau Aggregate Catchment	1,147	875	76.3%	270	23.6%	2	0.2%
35823	Ostico	Manoleden River Catchment	1,683	1,503	89.3%	173	10.3%	7	0.4%
37035	Uaigae	Vemasse River Catchment	3,424	2,068	60.4%	877	25.6%	479	14.0%
37103	Uato-Lari	Baucau Aggregate Catchment	184	32	17.4%	152	82.6%	0	0.0%
37123	Uato-Lari	Manoleden River Catchment	1,672	1,357	81.2%	303	18.1%	12	0.7%
37132	Uato-Lari	Seiçal River Catchment	54	22	40.3%	32	59.7%	0	0.0%
37703	Vemasse	Baucau Aggregate Catchment	1,915	1,069	55.8%	837	43.7%	8	0.4%
37720	Vemasse	Laleia River Catchment	4,590	2,048	44.6%	2,445	53.3%	97	2.1%
37723	Vemasse	Manoleden River Catchment	2,169	1,163	53.6%	902	41.6%	104	4.8%
37735	Vemasse	Vemasse River Catchment	9,534	6,363	66.7%	2,807	29.4%	364	3.8%
		Totals Vemasse AP	**37,395**	**21,518**	**57.5%**	**13,097**	**35.0%**	**2,780**	**7.4%**

Table 25. Land Area at Risk of Erosion in Vemasse AP

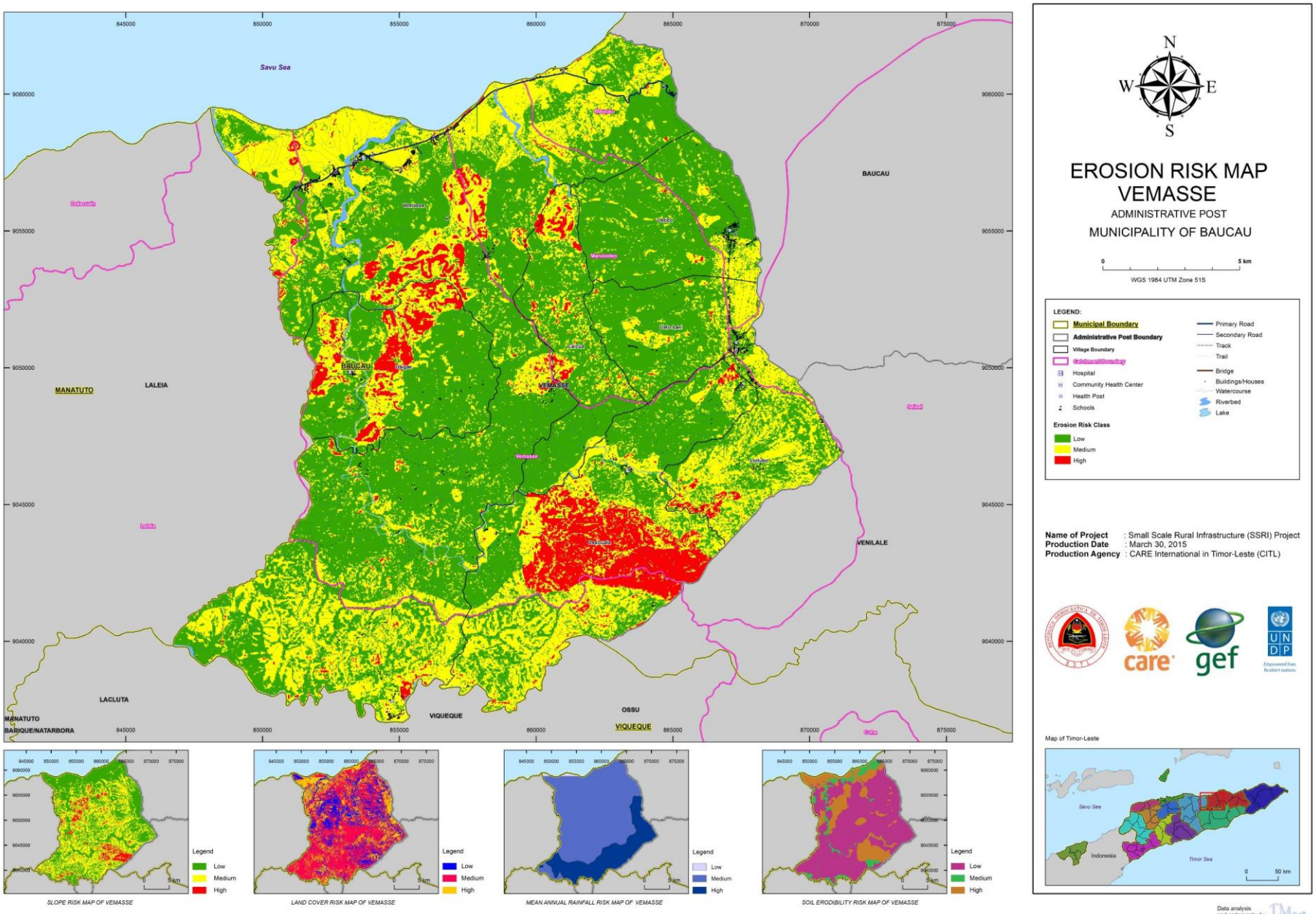
Figure 15 – Road in poor condition in high-risk area for erosion. Ossuala Suco, upper Vemasse River Catchment

Suco - Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Erosion Risk Category						Total Length of Roads	Length of Road in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Km	%	Km	%	Km	%
31423	Caicua	Manoleden River Catchment	5	5	100.0%	0	0.0%	0	0.0%	0.0						
34532	Loilubo	Seiçal River Catchment	120	70	58.3%	50	41.7%	0	0.0%	1.4	0.9	62.7%	0.5	37.3%	0.0	0.0%
34535	Loilubo	Vemasse River Catchment	166	78	47.0%	80	48.2%	8	4.8%	0.9	0.5	55.8%	0.4	44.2%	0.0	0.0%
35720	Ossouala	Laleia River Catchment	24	12	50.0%	12	50.0%	0	0.0%	0.0						
35735	Ossouala	Vemasse River Catchment	177	106	59.9%	67	37.9%	4	2.3%	2.0	1.3	68.2%	0.6	31.8%	0.0	0.0%
35803	Ostico	Baucau Aggregate Catchment	240	175	72.9%	65	27.1%	0	0.0%	8.1	5.1	63.3%	3.0	36.7%	0.0	0.0%
35823	Ostico	Manoleden River Catchment	1	1	100.0%	0	0.0%	0	0.0%	0.0						
37035	Uaigae	Vemasse River Catchment	144	79	54.9%	65	45.1%	0	0.0%	5.4	3.0	55.4%	1.9	35.1%	0.5	9.5%
37103	Uato-Lari	Baucau Aggregate Catchment	55	31	56.4%	24	43.6%	0	0.0%	1.9	0.5	27.8%	1.3	72.2%	0.0	0.0%
37123	Uato-Lari	Manoleden River Catchment	51	34	66.7%	16	31.4%	1	2.0%	0.0						
37132	Uato-Lari	Seiçal River Catchment	70	36	51.4%	34	48.6%	0	0.0%	0.5	0.2	50.4%	0.2	49.6%	0.0	0.0%
37703	Vemasse	Baucau Aggregate Catchment	84	38	45.2%	46	54.8%	0	0.0%	7.2	2.4	32.6%	4.7	65.9%	0.1	1.5%
37720	Vemasse	Laleia River Catchment	149	32	21.5%	110	73.8%	7	4.7%	0.8	0.7	85.7%	0.1	14.3%	0.0	0.0%
37723	Vemasse	Manoleden River Catchment	79	37	46.8%	39	49.4%	3	3.8%	3.4	0.2	5.7%	2.4	72.0%	0.8	22.3%
37735	Vemasse	Vemasse River Catchment	794	410	51.6%	359	45.2%	25	3.1%	15.2	5.8	37.7%	9.2	60.6%	0.2	1.6%
		Totals Vemasse AP	**2,159**	**1,144**	**53.0%**	**967**	**44.8%**	**48**	**2.2%**	**46.8**	**20.6**	**44.1%**	**24.5**	**52.4%**	**1.6**	**3.5%**

Table 26. Houses and Roads at Risk of Erosion in Vemasse AP

Suco -Catchment Code	*Suco* -Catchment		Total No. of Schools	Schools in Each Erosion Risk Category						Total No. of Health Facilities	Health Facilities in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Number	%	Number	%	Number	%
31423	Caicua	Manoleden River Catchment	0							0						
34532	Loilubo	Seiçal River Catchment	2	0	0.0%	2	100.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
34535	Loilubo	Vemasse River Catchment	0							0						
35720	Ossouala	Laleia River Catchment	0							0						
35735	Ossouala	Vemasse River Catchment	2	0	0.0%	2	100.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
35803	Ostico	Baucau Aggregate Catchment	1	1	100.0%	0	0.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
35823	Ostico	Manoleden River Catchment	0							0						
37035	Uaigae	Vemasse River Catchment	1	1	100.0%	0	0.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
37103	Uato-Lari	Baucau Aggregate Catchment	0							0						
37123	Uato-Lari	Manoleden River Catchment	0							0						
37132	Uato-Lari	Seiçal River Catchment	0							0						
37703	Vemasse	Baucau Aggregate Catchment	2	1	50.0%	1	50.0%	0	0.0%	0						
37720	Vemasse	Laleia River Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
37723	Vemasse	Manoleden River Catchment	0							0						
37735	Vemasse	Vemasse River Catchment	7	5	71.4%	2	28.6%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
		Totals Vemasse AP	**16**	**8**	**50.0%**	**8**	**50.0%**	**0**	**0.0%**	**6**	**3**	**50.0%**	**3**	**50.0%**	**0**	**0.0%**

Table 27. Schools and Health Facilities at Risk of Erosion in Vemasse AP



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MAP- 12. Erosion Risk Map: Vemasse Administrative Post

2.4.4 Risk Profile – Ermera Administrative Post

Ermera AP is entirely within the Lois River Catchment. This is a big generalization because within the Lois Catchment there are numerous small sub-catchments. The main Lois Catchment was chosen as the principal unit for analysis in this study for three reasons. First, Lois is a name that everyone is familiar with, and dealing with familiar places and features usually makes what can be complex, abstract analyses more accessible to interested parties. Second, the terrain within this part of the Lois Catchment is extremely complex. The heavily dissected terrain and the dense network of streams and rivers produces hundreds of small sub-catchments, all of them eventually feeding into the Lois River. Dividing the Lois up into sub-catchments would have made the spatial analysis cumbersome and unwieldy, it would have been very difficult to interpret the results in any meaningful way, and it would have been impossible to present them clearly and concisely. Finally, the GIS dataset for catchments used in this study is the best currently available for Timor-Leste. It is most accurate, it names every catchment with names many people are familiar with, and it draws a neat, practical line between too much detail and not enough. For broad-scale analyses such as this one, where the focus is general distributions across large areas, it was the best 'version' of catchment boundaries to use.

There are 10 *sucos* in Ermera AP, and in this part of the Lois River Catchment. Table 28 lists them alphabetically, and gives their areas in hectares and their unique *suco*-catchment codes. Map 13 shows the distribution of the *sucos* within the AP.

***Suco* -Catchment Code**	***Suco* -Catchment**		**Total Area**
41822	Estado	Lois River Catchment	1,264
42922	Humboe	Lois River Catchment	565
43222	Lauala	Lois River Catchment	1,454
43422	Leguimea	Lois River Catchment	850
45422	Mertutu	Lois River Catchment	714
45922	Poetete	Lois River Catchment	1,730
46022	Ponilala	Lois River Catchment	847
46122	Raimerhei	Lois River Catchment	808
46222	Riheu	Lois River Catchment	657
46622	Talimoro	Lois River Catchment	450
		Totals Ermera AP	**9,338**

Table 28. Suco-Catchments in Ermera Administrative Post

Of the three risks explored in this study, erosion poses the biggest threat in Ermera AP. There are 'hotspots' for flooding and landslides, but these tend to be relatively small and isolated. The potential for erosion is everywhere throughout the AP.

MAP- 13. Sucos and Catchments of Ermera Administrative Post

Flood Risk in Ermera Administrative Post

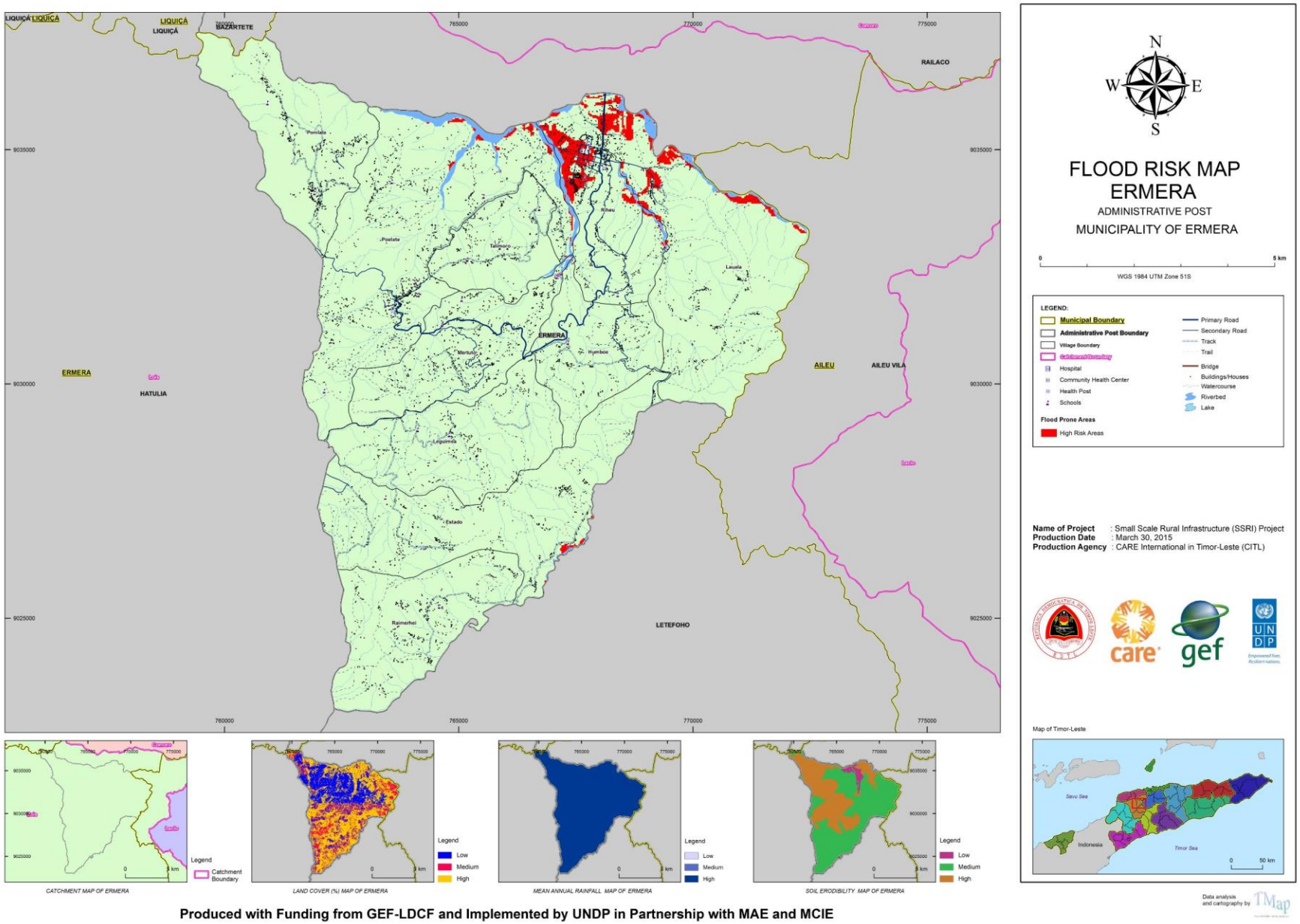
The only major threat from flooding in Ermera AP is in and around the major settlement, Gleno (Map 14). This is in Riheu and Lauala *Sucos* in the northern part of the AP. The area is, of course, in the Lois River Catchment, but flooding in Riheu and Lauala is associated with one of the Lois's major tributaries, the Gleno River.

The flood-prone area here is not extensive, but a good deal of infrastructure is at risk because of the location, in the heart of the district capital of Gleno. Riheu has the largest area of potential flooding, with 101 hectares, representing just over 15% of its total area. Lauala, with 97 hectares, has a similar area of flood-prone land, but it is a larger *suco* than Riheu, so this represents less than 7% of its area. Elsewhere in Ermera, flooding poses few threats.

Within the small, 200-hectare flood zone in Riheu and Lauala *Sucos* there are a relatively large number of houses, schools, health facilities and other structures. In Riheu alone some 318 houses are prone to flooding, representing 31% of all the houses in the *suco.* Two of the 5 schools are at-risk of flooding, as are almost 4km of the *suco's* 20km of roads. Lauala *Suco* is less developed, and most of the flood-risk land is away from people and infrastructure. Even so, 40 houses and almost 1km of the *suco's* 4km of road are threatened.

Mertutu *Suco* provides an example of an administrative area with very little flood-prone land – it has only 1 hectare at risk – but with a substantial threat to some key infrastructure. According to the analysis, 1 of the *suco's* 3 schools and its only health facility – the Lodudu Health Post – are both built on that 1 hectare site. This site was visited and verified that the two buildings are indeed at risk, with the river eating away at the bank and getting ever closer to the structures. Members of the community make great efforts to divert the river from its destructive course every year, but long term prevention is beyond their capacity – eventually the river bank will erode away and the buildings will be inundated.

Figure 16 – School and health post threatened by river erosion and flooding. Mertutu Suco, Lois River Catchment



MAP- 14. Flood Risk Map: Ermera Administrative Post

Figure 17 – Flood-prone area in Gleno, showing at-risk infrastructure. Riheu Suco, Lois River Catchment

Figure 18 – Floodplain of the Gleno River. Lauala Suco, Lois River Catchment

Suco -Catchment Code	*Suco* -Catchment		Land Area			Houses			Schools			Health Facilities			Roads		
			Total Area	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total Km	In Flood Risk Zone	
				Hectares	%	Number	Number	%	Number	Number	%	Number	Number	%		Km	%
41822	Estado	Lois River Catchment	1,264	7	0.5%	500	0	0.0%	2	1	50.0%	1	0	0.0%	10.7	0.0	0.0%
42922	Humboe	Lois River Catchment	565	1	0.2%	322	0	0.0%	1	0	0.0%	0			8.2	0.0	0.0%
43222	Lauala	Lois River Catchment	1,454	97	6.7%	522	40	7.7%	1	0	0.0%	0			4.0	0.7	18.7%
43422	Leguimea	Lois River Catchment	850	0	0.0%	295	0	0.0%	2	0	0.0%	0			8.7	0.0	0.0%
45422	Mertutu	Lois River Catchment	714	1	0.2%	644	0	0.0%	3	1	33.3%	1	1	100.0%	10.3	0.0	0.0%
45922	Poetete	Lois River Catchment	1,730	36	2.1%	1,139	4	0.4%	7	0	0.0%	1	0	0.0%	12.7	0.2	1.5%
46022	Ponilala	Lois River Catchment	847	0	0.0%	479	0	0.0%	2	0	0.0%	0			8.8	0.0	0.0%
46122	Raimerhei	Lois River Catchment	808	0	0.0%	396	0	0.0%	1	0	0.0%	0			3.3	0.0	0.0%
46222	Riheu	Lois River Catchment	657	101	15.4%	1,029	318	30.9%	5	2	40.0%	1	0	0.0%	19.8	3.8	19.3%
46622	Talimoro	Lois River Catchment	450	0	0.0%	292	0	0.0%	2	0	0.0%	0			6.5	0.0	0.0%
		Totals Ermera AP	**9,338**	**244**	**2.6%**	**5,618**	**362**	**6.4%**	**26**	**4**	**15.4%**	**4**	**1**	**25.0%**	**93**	**4.8**	**5.1%**

Table 29. Risk Statistics for Flooding in Ermera AP

Landslide Risk in Ermera Administrative Post

Landslide-risk is spread throughout Ermera AP. It does not cover a particularly large area, but as would be expected in the steep, deeply incised landscape typical of this area, there is significant potential for landslides in parts of most of Ermera APs 10 *sucos* (Map 15).

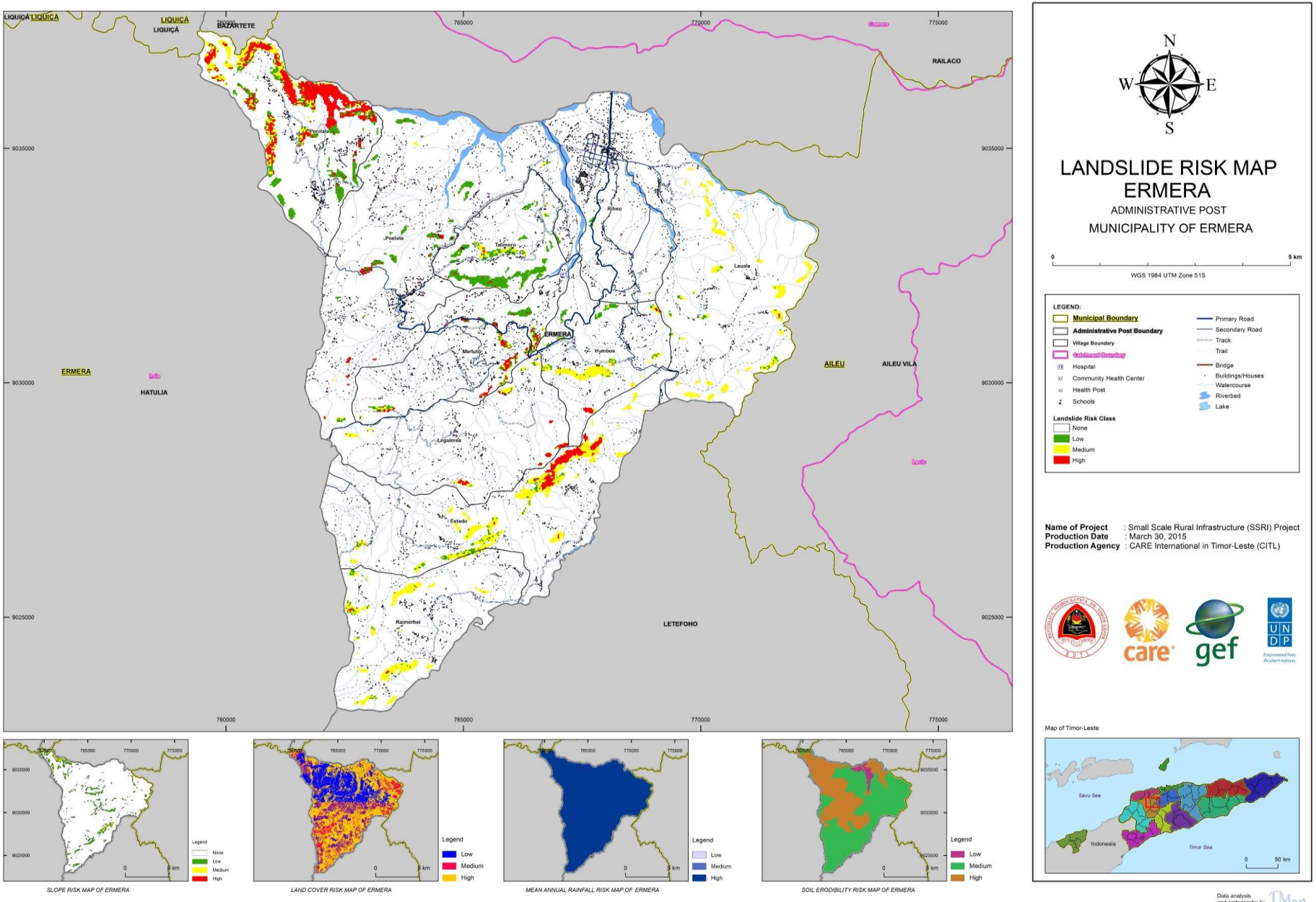
Ponilala *Suco* in the northwest corner of Ermera AP is the most at risk area for landslides. More than 200 hectares here face either a low, medium or high threat, representing 25% of the total area of the *suco*. This is an extremely large proportion of an administrative area to face the possibility of potentially damaging and dangerous catastrophic events. Ponilala is not, however, a heavily populated *suco*, and the 479 households that do live here generally live well outside the landslide risk zone – only 10 of them live inside it. Similarly, only 100 metres out of a total of almost 9km in Ponilala are considered to be in the landslide risk zone. Clearly the almost vertical slopes leading down to the Gleno River are not suitable for habitation or the building of any kind of infrastructure.

Estado *Suco* is another medium-to high-risk area for landslides. Here the area at-risk is much less than it is in Ponilala, with only 112 hectares, or 9% of the total area, within the landslide risk zone. Again, communities generally avoid living on or building roads on such steep, inaccessible terrain, and only 3 houses and 300 metres of road are found there in Estado.

Mertutu again proves to be an interesting anomaly. Though only 40 hectares of land out of a total area of 714 hectares is considered at risk for landslides, 1.1km, or more than 11%, of the *suco's* roads pass through landslide-risk areas. This is an unusually high proportion in comparison to other *sucos* included in this study; evidence of Ermera's notoriously challenging terrain for road-builders and travellers alike.

Figure 19 – Part of main road from Letefoho to Gleno, removed by landslide. Humboe Suco, Lois

Figure 20 – The nature of Ermera landslides – small, isolated, right next to a house. Poetete



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MAP- 15. Landslide Risk Map: Ermera Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Total Hectares	Area of Land in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%	Hectares	%
41822	Estado	Lois River Catchment	1,264	1,151	91.1%	10	0.8%	79	6.3%	23	1.9%
42922	Humboe	Lois River Catchment	565	525	92.9%	10	1.8%	28	4.9%	3	0.4%
43222	Lauala	Lois River Catchment	1,454	1,405	96.7%	4	0.3%	44	3.1%	0	0.0%
43422	Leguimea	Lois River Catchment	850	834	98.1%	1	0.1%	9	1.0%	6	0.7%
45422	Mertutu	Lois River Catchment	714	674	94.5%	17	2.3%	10	1.3%	13	1.9%
45922	Poetete	Lois River Catchment	1,730	1,697	98.1%	24	1.4%	2	0.1%	7	0.4%
46022	Ponilala	Lois River Catchment	847	636	75.0%	54	6.4%	52	6.2%	105	12.4%
46122	Raimerhei	Lois River Catchment	808	761	94.2%	5	0.6%	41	5.1%	1	0.1%
46222	Riheu	Lois River Catchment	657	655	99.8%	2	0.2%	0	0.0%	0	0.0%
46622	Talimoro	Lois River Catchment	450	390	86.8%	49	11.0%	9	1.9%	1	0.3%
		Totals Ermera AP	**9,338**	**8,729**	**93.5%**	**176**	**1.9%**	**274**	**2.9%**	**159**	**1.7%**

Table 30. Land Area at Risk of Landslides in Ermera AP

Suco -Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%	Number	%
41822	Estado	Lois River Catchment	500	497	99.4%	0	0.0%	3	0.6%	0	0.0%
42922	Humboe	Lois River Catchment	322	314	97.5%	0	0.0%	8	2.5%	0	0.0%
43222	Lauala	Lois River Catchment	522	521	99.8%	0	0.0%	1	0.2%	0	0.0%
43422	Leguimea	Lois River Catchment	295	288	97.6%	0	0.0%	5	1.7%	2	0.7%
45422	Mertutu	Lois River Catchment	644	624	96.9%	5	0.8%	2	0.3%	13	2.0%
45922	Poetete	Lois River Catchment	1,139	1,126	98.9%	8	0.7%	0	0.0%	5	0.4%
46022	Ponilala	Lois River Catchment	479	469	97.9%	7	1.5%	1	0.2%	2	0.4%
46122	Raimerhei	Lois River Catchment	396	395	99.7%	0	0.0%	1	0.3%	0	0.0%
46222	Riheu	Lois River Catchment	1,029	1,029	100.0%	0	0.0%	0	0.0%	0	0.0%
46622	Talimoro	Lois River Catchment	292	274	93.8%	12	4.1%	4	1.4%	2	0.7%
		Totals Ermera AP	**5,618**	**5,537**	**98.6%**	**32**	**0.6%**	**25**	**0.4%**	**24**	**0.4%**

Table 31. Roads at Risk of Landslides in Ermera AP

Suco -Catchment Code	*Suco* -Catchment		Total Length of Roads (Km)	Length of Road in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Km	%	Km	%	Km	%	Km	%
41822	Estado	Lois River Catchment	10.7	10.4	97.4%	0.0	0.1%	0.3	2.5%	0.0	0.0%
42922	Humboe	Lois River Catchment	8.2	7.8	95.1%	0.1	0.7%	0.3	4.2%	0.0	0.0%
43222	Lauala	Lois River Catchment	4.0	4.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
43422	Leguimea	Lois River Catchment	8.7	8.7	99.9%	0.0	0.0%	0.0	0.1%	0.0	0.0%
45422	Mertutu	Lois River Catchment	10.3	9.2	88.9%	0.5	4.9%	0.3	3.1%	0.3	3.1%
45922	Poetete	Lois River Catchment	12.7	12.4	97.8%	0.2	1.8%	0.0	0.0%	0.1	0.4%
46022	Ponilala	Lois River Catchment	8.8	8.7	98.2%	0.1	1.2%	0.0	0.4%	0.0	0.2%
46122	Raimerhei	Lois River Catchment	3.3	3.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
46222	Riheu	Lois River Catchment	19.8	19.6	99.2%	0.2	0.8%	0.0	0.0%	0.0	0.0%
46622	Talimoro	Lois River Catchment	6.5	6.2	95.4%	0.2	2.7%	0.1	1.9%	0.0	0.0%
		Totals Ermera AP	**93.0**	**90.3**	**97.0%**	**1.3**	**1.3%**	**1.1**	**1.2%**	**0.4**	**0.4%**

Table 32. Houses at Risk of Landslides in Ermera AP

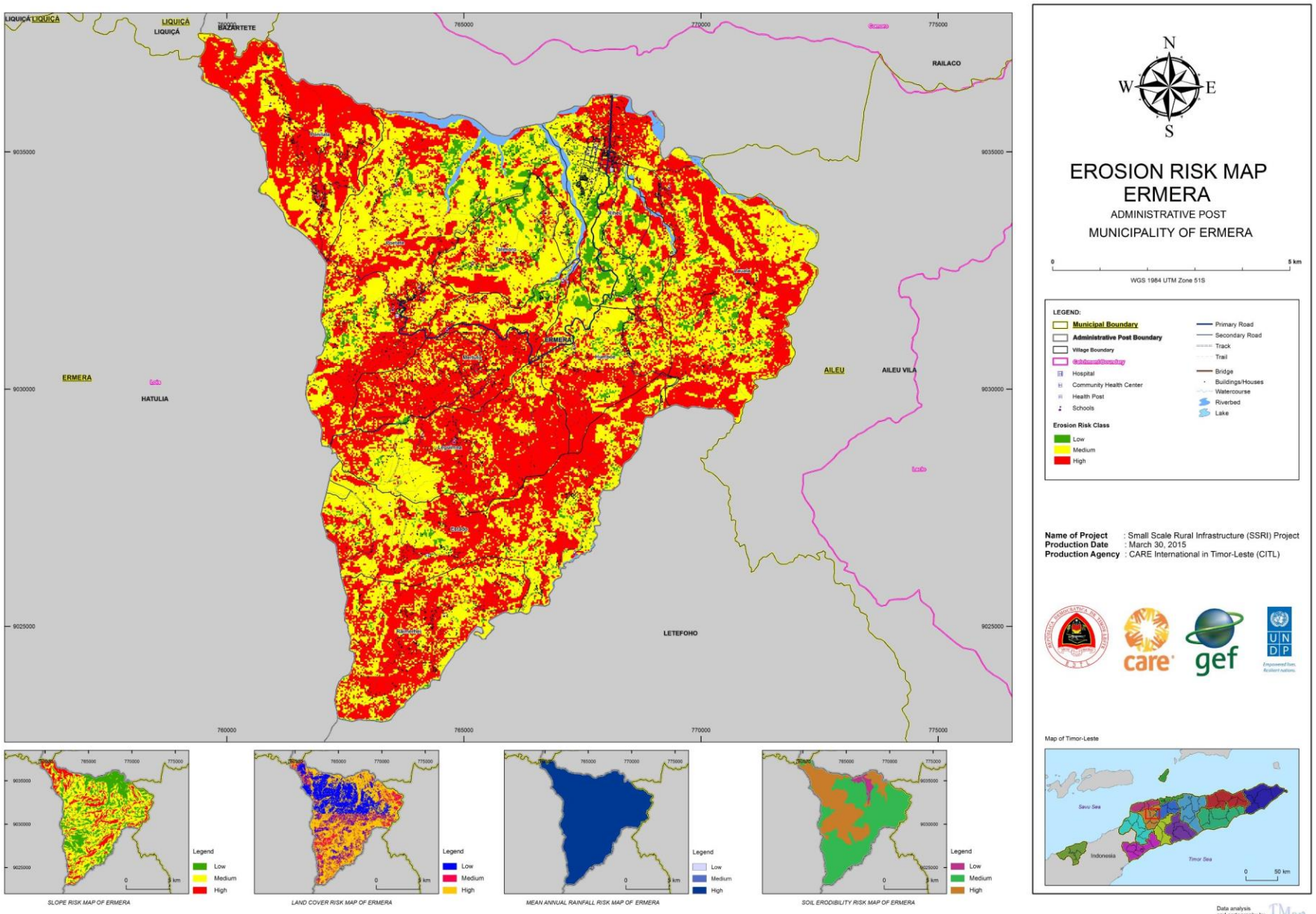
Erosion Risk in Ermera Administrative Post

One of the most striking things about the erosion map of Ermera AP (Map 16) is how red it is! Almost half the land area is considered high-risk for erosion, with almost as much in the yellow, medium-risk category. A mere 434 hectares, or only 4.6% of the total area, is considered to have low potential for erosion. Not surprisingly, most of Ermera AP's infrastructure is on land which is medium or highly susceptible to erosion, including 94% of its houses and roads and all of its schools and health facilities. Given the extreme nature of Ermera's topography and rainfall regime, and its relatively high population density, extensive areas of high-level risk are to be expected.

A significant factor that makes Ermera stand out from other parts of the country is the influence of human activity. Ermera is one of the most densely settled parts of the country, and large numbers of people put pressure on the land. One manifestation of this in Ermera AP, and in neighbouring Hatulia AP, is severe degradation of natural vegetative cover. As trees, shrubs, grass and other vegetation have been cleared for agriculture, soil is exposed to the forces of rain and wind. As Figure 21 shows, when this occurs on steep slopes, soil is readily washed away. This is a very common scenario in Ermera AP.

Though all of Ermera AP's 10 *sucos* are highly susceptible to soil erosion, 4 *sucos* stand out as being particularly extreme. These are Leguimea, Mertutu, Ponilala and Raimerhei *Sucos*. Of these, Ponilala has the highest proportion of its land area in the medium- or high-risk categories, with 99.6%. Leguimea is next (99.1%) followed by Raimerhei (98.4%) and Mertutu (98.1%). In absolute terms, Poetete is the *suco* with the largest area of land susceptible to medium and high levels of erosion, with 1,606 hectares.

Figure 21 – Cultivating maize and cassava on very steep, friable slopes. Mertutu Suco, Lois River Catchment



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MAP- 16. Erosion Risk Map: Ermera Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Total Hectares	Area of Land in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%
41822	Estado	Lois River Catchment	1,264	29	2.3%	623	49.3%	612	48.4%
42922	Humboe	Lois River Catchment	565	31	5.4%	275	48.6%	260	46.0%
43222	Lauala	Lois River Catchment	1,454	58	4.0%	641	44.1%	754	51.9%
43422	Leguimea	Lois River Catchment	850	8	0.9%	311	36.6%	531	62.5%
45422	Mertutu	Lois River Catchment	714	13	1.9%	247	34.6%	454	63.6%
45922	Poetete	Lois River Catchment	1,730	124	7.2%	983	56.8%	623	36.0%
46022	Ponilala	Lois River Catchment	847	3	0.4%	281	33.1%	564	66.5%
46122	Raimerhei	Lois River Catchment	808	13	1.6%	341	42.3%	453	56.1%
46222	Riheu	Lois River Catchment	657	107	16.3%	380	57.8%	170	25.9%
46622	Talimoro	Lois River Catchment	450	48	10.7%	290	64.4%	112	24.9%
		Totals Ermera AP	**9,338**	**434**	**4.6%**	**4,371**	**46.8%**	**4,533**	**48.5%**

Table 33. Land Area at Risk of Erosion in Ermera AP

Suco - Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Erosion Risk Category						Total Length of Roads	Length of Road in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Km	%	Km	%	Km	%
41822	Estado	Lois River Catchment	500	4	0.8%	291	58.2%	205	41.0%	10.7	0.2	1.6%	7.1	66.2%	3.4	32.2%
42922	Humboe	Lois River Catchment	322	24	7.5%	128	39.8%	170	52.8%	8.2	0.4	5.1%	4.3	52.3%	3.5	42.6%
43222	Lauala	Lois River Catchment	522	14	2.7%	168	32.2%	340	65.1%	4.0	0.1	2.6%	1.6	41.2%	2.2	56.3%
43422	Leguimea	Lois River Catchment	295	3	1.0%	114	38.6%	178	60.3%	8.7	0.1	1.7%	4.1	46.7%	4.5	51.7%
45422	Mertutu	Lois River Catchment	644	33	5.1%	235	36.5%	376	58.4%	10.3	0.1	0.6%	2.5	24.3%	7.8	75.1%
45922	Poetete	Lois River Catchment	1,139	99	8.7%	576	50.6%	464	40.7%	12.7	1.3	10.4%	6.1	47.6%	5.3	42.0%
46022	Ponilala	Lois River Catchment	479	3	0.6%	151	31.5%	325	67.8%	8.8	0.0	0.0%	2.5	28.8%	6.3	71.2%
46122	Raimerhei	Lois River Catchment	396	1	0.3%	119	30.1%	276	69.7%	3.3	0.0	0.0%	1.1	34.4%	2.1	65.6%
46222	Riheu	Lois River Catchment	1,029	133	12.9%	579	56.3%	317	30.8%	19.8	3.0	15.0%	11.2	56.8%	5.6	28.3%
46622	Talimoro	Lois River Catchment	292	37	12.7%	181	62.0%	74	25.3%	6.5	0.7	10.1%	3.8	57.8%	2.1	32.1%
		Totals Ermera AP	**5,618**	**351**	**6.2%**	**2,542**	**45.2%**	**2,725**	**48.5%**	**93.0**	**5.8**	**6.3%**	**44.3**	**47.6%**	**42.9**	**46.1%**

Table 34. Houses and Roads at Risk of Erosion in Ermera AP

Figure 22 – Sediment deposited by Gleno River; evidence of heavy erosion upstream. Riheu Suco, Lois

Figure 23 – Soil eroding from very steep cassava field. Mertutu Suco, Lois River Catchment

Figure 24 – Gully erosion on sparsely vegetated pasture. Mertutu Suco, Lois River Catchment

				Schools in Each Erosion Risk Category						Total No.	Health Facilities in Each Erosion Risk Category					
Suco -Catchment			Total No.	Low Risk		Medium Risk		High Risk		of Health	Low Risk		Medium Risk		High Risk	
Code	*Suco* -Catchment		of Schools	Number	%	Number	%	Number	%	Facilities	Number	%	Number	%	Number	%
41822	Estado	Lois River Catchment	2	0	0.0%	1	50.0%	1	50.0%	1	0	0.0%	1	100.0%	0	0.0%
42922	Humboe	Lois River Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
43222	Lauala	Lois River Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
43422	Leguimea	Lois River Catchment	2	0	0.0%	0	0.0%	2	100.0%	0						
45422	Mertutu	Lois River Catchment	3	0	0.0%	1	33.3%	2	66.7%	1	0	0.0%	0	0.0%	1	100.0%
45922	Poetete	Lois River Catchment	7	0	0.0%	1	14.3%	6	85.7%	1	0	0.0%	1	100.0%	0	0.0%
46022	Ponilala	Lois River Catchment	2	0	0.0%	1	50.0%	1	50.0%	0						
46122	Raimerhei	Lois River Catchment	1	0	0.0%	1	100.0%	0	0.0%	0						
46222	Riheu	Lois River Catchment	5	0	0.0%	4	80.0%	1	20.0%	1	0	0.0%	0	0.0%	1	100.0%
46622	Talimoro	Lois River Catchment	2	0	0.0%	2	100.0%	0	0.0%	0						
		Totals Ermera AP	**26**	**0**	**0.0%**	**11**	**42.3%**	**15**	**57.7%**	**4**	**0**	**0.0%**	**2**	**50.0%**	**2**	**50.0%**

Table 35. Schools and Health Facilities at Risk of Erosion in Ermera AP

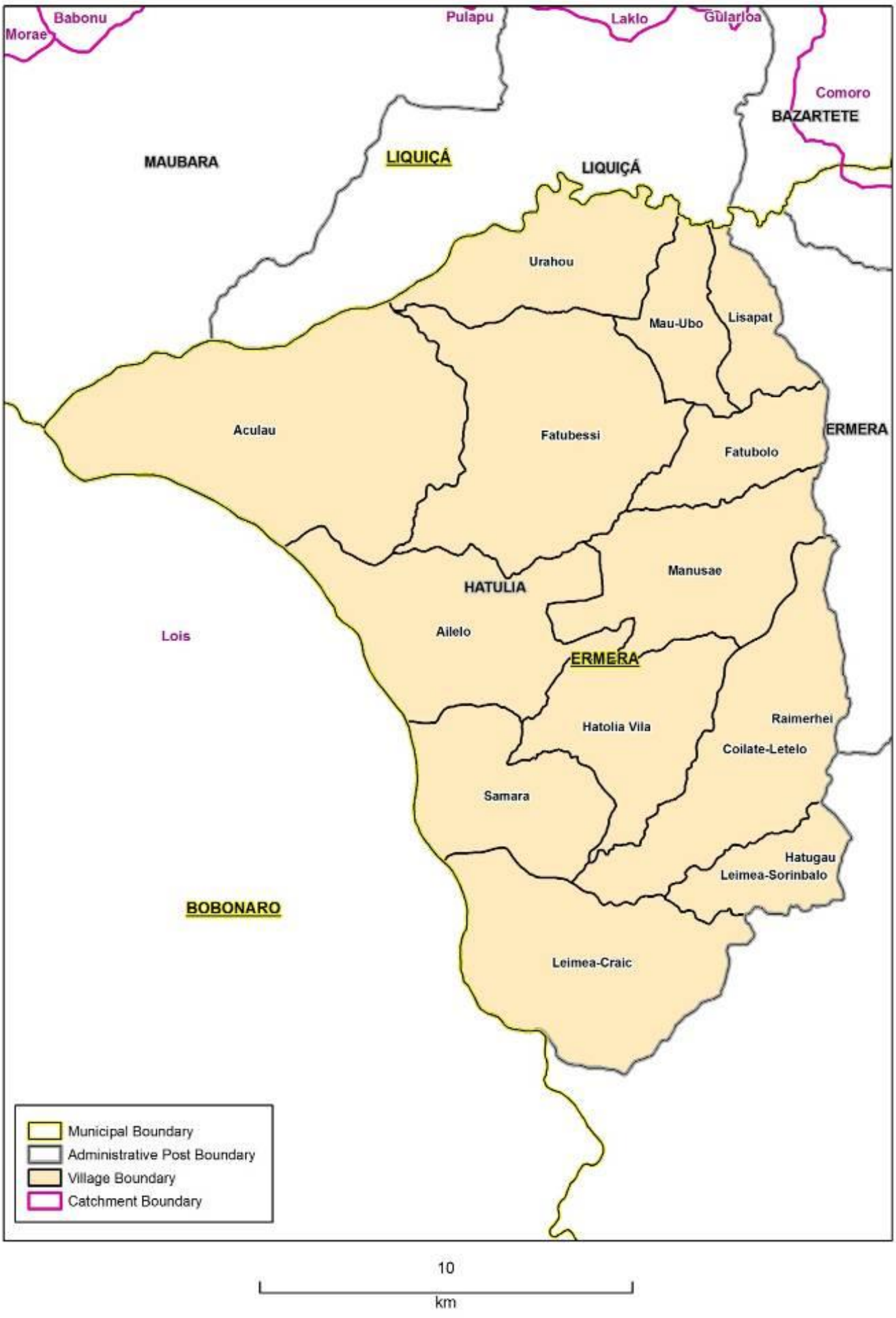
2.4.5 Risk Profile – Hatulia Administrative Post

Hatulia AP covers a total area of 27,350 hectares and is comprised of 13 *sucos.* Like Ermera AP, Hatulia AP lies entirely within the Lois River Catchment, so, combined with its 13 *sucos*, this produces 13 *suco*-catchments. In terms of risk exposure, Hatulia AP has a lot in common with its neighbours in Liquiçá AP to the north, and especially with Maubara AP. The diversity of the topography, hydrology and geomorphology here means that Hatulia has high-risk areas for all three hazards in different parts of its territory. In the lowlands to the west, along the banks of the Marobo, Lauveli, Gamerama and Malerehio Rivers, flooding is a threat to large areas of land. Landslides are a threat to scattered sites on steeper land and at higher elevations to the east. The distribution of erosion risk shows a very sharp dividing line between almost exclusively low to medium risk in the western half of the AP and predominantly high risk in the eastern half.

Population distribution is interesting in Hatulia, and only with an understanding the economy of the area does it make sense. Most people live in the highlands here, in areas that are steep, inaccessible and susceptible to landslides and flooding. Transportation here is very difficult, with roads frequently washed out by flash floods or blocked and otherwise damaged by landslides. But it is the opportunity to make a living that attracts people to the hills of Hatulia. Land near the rivers to the east is fertile, but it is prone to flooding. The middle slopes are dry and soils are poor, so farming is difficult. In the higher hills, 500 metres or more above sea level, abundant rainfall makes agriculture more viable, and conditions are perfect for growing coffee. People can grow food to sustain them and coffee to generate a little income. As is the case in Ermera AP, population pressure on the uplands of Hatulia AP is partially responsible for the extensive areas of land at high risk for erosion.

***Suco* -Catchment Code**	***Suco* -Catchment**		**Total Area**
50522	Ailelo	Lois River Catchment	2,629
50622	Aculau	Lois River Catchment	4,755
51522	Coilate-Letelo	Lois River Catchment	2,688
52022	Fatubolo	Lois River Catchment	1,038
52122	Fatubessi	Lois River Catchment	3,541
52722	Hatolia Vila	Lois River Catchment	1,758
53522	Leimea-Craic	Lois River Catchment	2,875
53722	Leimea-Sorinbalo	Lois River Catchment	859
54222	Lisapat	Lois River Catchment	730
54922	Manusae	Lois River Catchment	2,123
55222	Mau-Ubo	Lois River Catchment	889
56422	Samara	Lois River Catchment	1,729
57322	Urahou	Lois River Catchment	1,736
		Totals Hatulia AP	**27,350**

Table 36. Suco-Catchments in Hatulia Administrative Post



MAP- 17. Sucos and Catchments of Hatulia Administrative Post

Flood Risk in Hatulia Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Land Area			Houses			Schools			Health Facilities			Roads		
			Total Area	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total Km	In Flood Risk Zone	
				Hectares	%	Number	Number	%	Number	Number	%	Number	Number	%		Km	%
50522	Ailelo	Lois River Catchment	2,629	271	10.3%	368	5	1.4%	5	0	0.0%	0			11.2	0.6	5.4%
50622	Aculau	Lois River Catchment	4,755	1,353	28.4%	362	73	20.2%	1	0	0.0%	1	0	0.0%	21.0	7.3	34.7%
51522	Coilate-Letelo	Lois River Catchment	2,688	1	0.0%	606	0	0.0%	0			2	0	0.0%	16.2	0.0	0.0%
52022	Fatubolo	Lois River Catchment	1,038	0	0.0%	599	0	0.0%	1	0	0.0%	1	0	0.0%	9.3	0.0	0.0%
52122	Fatubessi	Lois River Catchment	3,541	20	0.6%	679	0	0.0%	4	0	0.0%	1	0	0.0%	28.5	0.1	0.3%
52722	Hatolia Vila	Lois River Catchment	1,758	0	0.0%	570	0	0.0%	2	0	0.0%	1	0	0.0%	12.5	0.0	0.0%
53522	Leimea-Craic	Lois River Catchment	2,875	192	6.7%	273	18	6.6%	2	0	0.0%	1	0	0.0%	1.3	0.3	19.2%
53722	Leimea-Sorinbalo	Lois River Catchment	859	0	0.0%	120	0	0.0%	0			0			3.8	0.0	0.0%
54222	Lisapat	Lois River Catchment	730	0	0.0%	442	0	0.0%	3	0	0.0%	0			7.7	0.0	0.0%
54922	Manusae	Lois River Catchment	2,123	0	0.0%	762	0	0.0%	4	0	0.0%	1	0	0.0%	26.5	0.0	0.0%
55222	Mau-Ubo	Lois River Catchment	889	0	0.0%	516	0	0.0%	1	0	0.0%	1	0	0.0%	9.1	0.0	0.0%
56422	Samara	Lois River Catchment	1,729	397	22.9%	125	9	7.2%	2	0	0.0%	0			6.2	0.6	9.6%
57322	Urahou	Lois River Catchment	1,736	18	1.0%	536	0	0.0%	3	0	0.0%	0			11.1	0.2	1.6%
		Totals Hatulia AP	**27,350**	**2,251**	**8.2%**	**5,958**	**105**	**1.8%**	**28**	**-**	**0.0%**	**9**	**0**	**0.0%**	**164**	**9.0**	**5.5%**

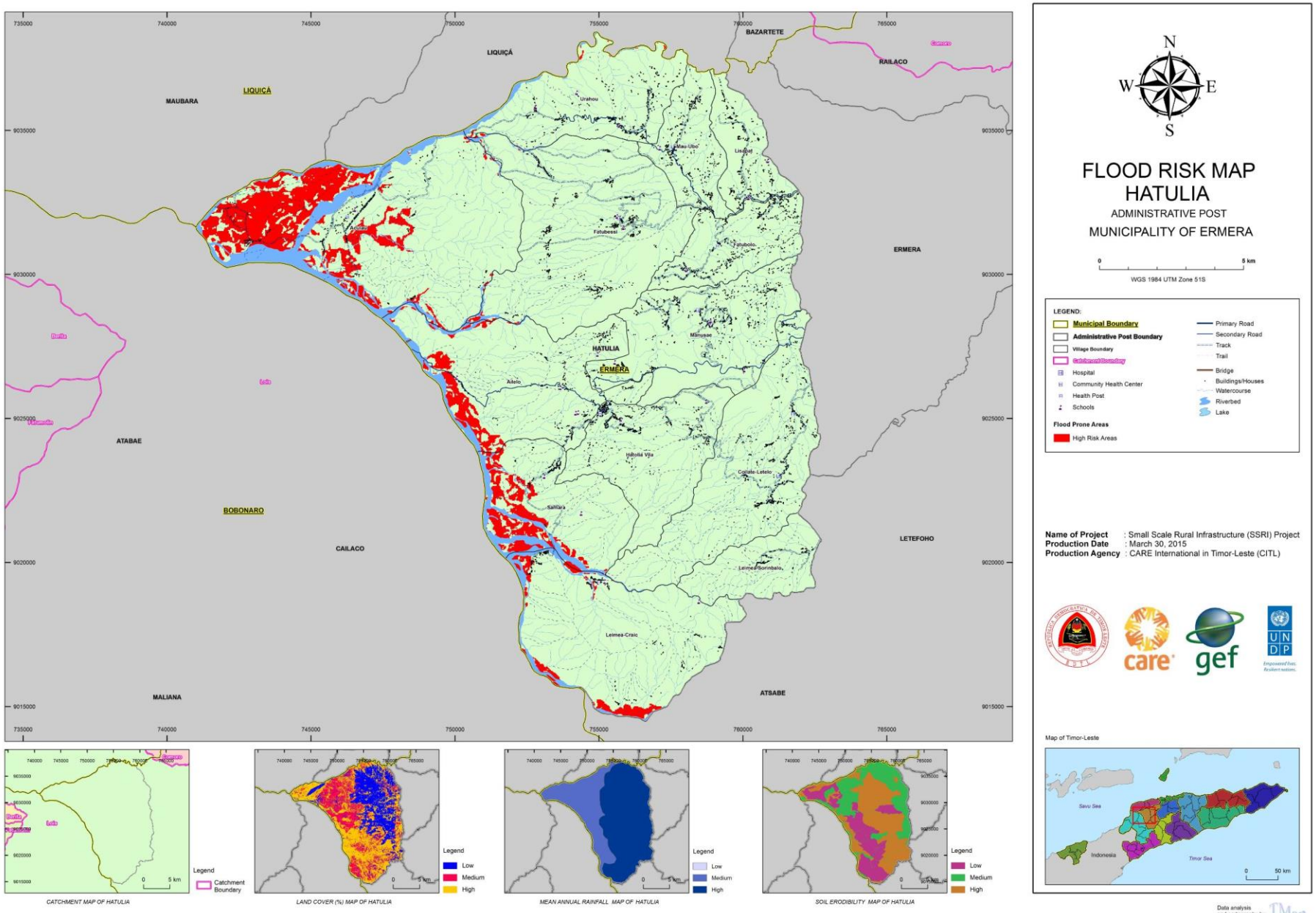
Table 37. Risk Statistics for Flooding in Hatulia AP

Areas at high risk for flooding are distributed along the banks of the Marobo River and its tributaries in western Hatulia AP (Map 18). Aculau *Suco* has by far the largest area of land in the flood zone, with 1,353 hectares, or 28.4% of its total area. Much of the land prone to flooding in Aculau is on an island at the confluence of the Luaveli and Marobo Rivers. Many of the 73 houses in the flood zone are on this island. Others are across the Lauveli River in Aculau Vila. More than 20% of all the houses in the *suco* are under threat of flooding, and for roads, the percentage is even higher. Out of a total length of 21.0 km in Acualu *Suco*, 7.3 km (34.7%) follow routes that are susceptible to inundation. +

Elsewhere in Hatulia AP, flooding is generally much less of a threat. Sizeable parts of Samara *Suco* are at risk, with 397 hectares out of 1,729 hectares (22.9%) at risk. Again, much of this land is on islands formed by the confluence of two rivers, in this case the Marobo and the Garai. Fewer people live in this part of the AP, but still, 9 houses are located on the floodplain, representing 7.2% of the total number of houses in Samara *Suco.* Leimea-Craic is also located on the banks of the Marobo River, and here, 18 houses are at risk of flooding out of a total of 273 (6.65).

None of Hatulia AP's 28 schools or 9 health facilities are located in flood prone areas. This probably reflects the fact that the majority of people live well above the flood plains in the highlands to the east.

Figure 25 – Elevated above the floodplain - one of the few places near a river in Aculau Suco <u>not</u> prone to flooding. Aculau Suco, Lois River Catchment



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MAP- 18. Flood Risk Map: Hatulia Administrative Post

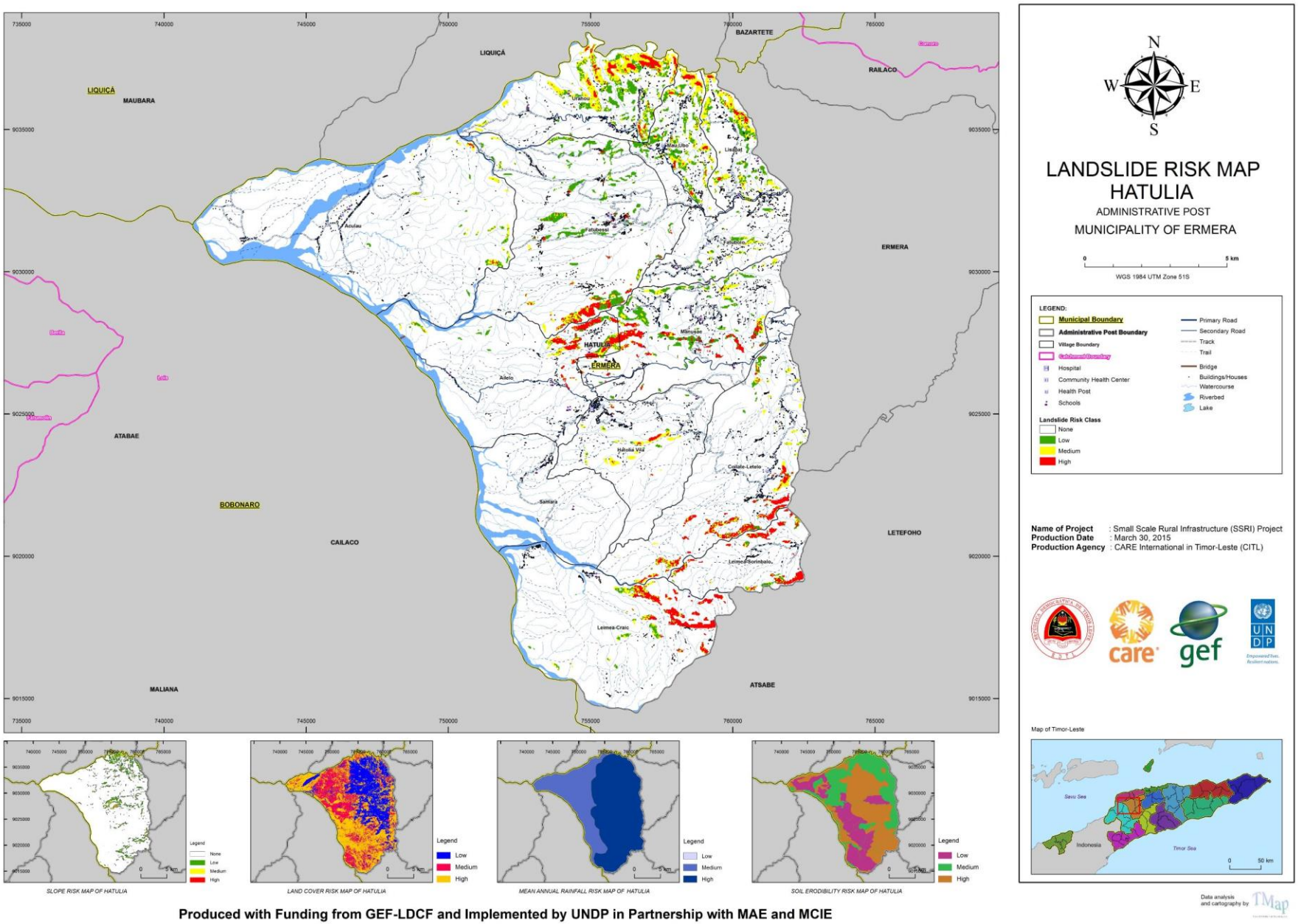
Landslide Risk in Hatulia Administrative Post

Of the 1,852 hectares at risk for landslides in all of Hatulia, 516 hectares (27.9%) are high risk areas. As Map 19 shows, at risk areas are mostly in eastern Hatulia AP and so landslides are a potential problem for most of the *sucos* here. Urahou *Suco* has the most medium and high risk land, with 247 hectares. This represents 14.2% of its total land area of 1,736 hectares. With 125 hectares at low risk for landslides in Urahou, the *suco* has a total of 372 hectares under some level of threat, a very high 21.4% of its total land area. Other *sucos* with substantial areas of land under threat from landslides include Mau-Ubo *Suco*, with 204 hectares (22.9%) and Lisapat *Suco*, with 152 hectares (20.9%).

Fatubessi *Suco* also has a large at risk for landslides, with 246 hectares, and it is here that most houses are under threat. Twenty-seven houses are in the high-risk zone here, which is 4% of the total number of houses in the *suco.* Lisapat and Samara *Sucos* have large numbers of houses at risk for landslides, with 20 and 16 respectively in the medium risk category. Looking at all three landslide categories together, Urahou has the most at risk houses with 42 (7.9%) followed by Fatubessi with 37 (5.4%), Lisapat with 32 (7.2%) and Mau-Ubo with 30 (5.8%).

As far as the roads in Hatulia are concerned, this AP is notable for the large percentage that are not at risk for landslides. Out of a total length of 164.4 km, only 5 km (3.0%) are considered at risk for landslides. This is a surprisingly small percentage in an AP with a reputation for having roads in bad condition. The two *sucos* in which the roads face the biggest potential problem are Fatubessi, with a total of 1.8km (6.7%) at risk for landslides, and Manusae, with 0.9km (3.3%) at risk.

Figure 26 – Very steep slope and sparse vegetation in high-risk landslide area. Hatulia Vila Suco, Lois River Catchment



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MAP- 19. Landslide Risk Map: Hatulia Administrative Post

Landslide Risk in Hatulia Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Total Hectares	Area of Land in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%	Hectares	%
50522	Ailelo	Lois River Catchment	2,629	2,503	95.2%	28	1.0%	33	1.3%	66	2.5%
50622	Aculau	Lois River Catchment	4,755	4,710	99.0%	19	0.4%	25	0.5%	3	0.1%
51522	Coilate-Letelo	Lois River Catchment	2,688	2,515	93.6%	23	0.8%	63	2.3%	87	3.2%
52022	Fatubolo	Lois River Catchment	1,038	1,001	96.5%	21	2.0%	16	1.5%	0	0.0%
52122	Fatubessi	Lois River Catchment	3,541	3,296	93.1%	152	4.3%	41	1.2%	53	1.5%
52722	Hatolia Vila	Lois River Catchment	1,758	1,709	97.2%	7	0.4%	35	2.0%	7	0.4%
53522	Leimea-Craic	Lois River Catchment	2,875	2,728	94.9%	23	0.8%	34	1.2%	90	3.1%
53722	Leimea-Sorinbalo	Lois River Catchment	859	778	90.6%	14	1.6%	15	1.7%	52	6.1%
54222	Lisapat	Lois River Catchment	730	578	79.1%	59	8.1%	81	11.1%	12	1.7%
54922	Manusae	Lois River Catchment	2,123	1,902	89.6%	106	5.0%	46	2.2%	69	3.2%
55222	Mau-Ubo	Lois River Catchment	889	685	77.1%	98	11.0%	86	9.6%	20	2.2%
56422	Samara	Lois River Catchment	1,729	1,729	100.0%	0	0.0%	0	0.0%	0	0.0%
57322	Urahou	Lois River Catchment	1,736	1,364	78.6%	125	7.2%	190	10.9%	57	3.3%
		Totals Hatulia AP	**27,350**	**25,498**	**93.2%**	**673**	**2.5%**	**663**	**2.4%**	**516**	**1.9%**

Table 38. Land Area at Risk of Landslides in Hatulia AP

Figure 27 –Landslide triggered by road construction on sparsely-vegetated moderate slope. Ailelo Suco, Lois River Catchment

Figure 28. Erosion on moderate slopes with sparse vegetation cover. In medium risk area for erosion. Samara Suco, Lois River Catchment

Suco -Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%	Number	%
50522	Ailelo	Lois River Catchment	368	367	99.7%	0	0.0%	0	0.0%	1	0.3%
50622	Aculau	Lois River Catchment	362	362	100.0%	0	0.0%	0	0.0%	0	0.0%
51522	Coilate-Letelo	Lois River Catchment	606	605	99.8%	0	0.0%	0	0.0%	1	0.2%
52022	Fatubolo	Lois River Catchment	599	592	98.8%	4	0.7%	3	0.5%	0	0.0%
52122	Fatubessi	Lois River Catchment	679	642	94.6%	7	1.0%	3	0.4%	27	4.0%
52722	Hatolia Vila	Lois River Catchment	570	568	99.6%	0	0.0%	2	0.4%	0	0.0%
53522	Leimea-Craic	Lois River Catchment	273	273	100.0%	0	0.0%	0	0.0%	0	0.0%
53722	Leimea-Sorinbalo	Lois River Catchment	120	119	99.2%	0	0.0%	0	0.0%	1	0.8%
54222	Lisapat	Lois River Catchment	442	410	92.8%	11	2.5%	20	4.5%	1	0.2%
54922	Manusae	Lois River Catchment	762	739	97.0%	6	0.8%	7	0.9%	10	1.3%
55222	Mau-Ubo	Lois River Catchment	516	486	94.2%	17	3.3%	12	2.3%	1	0.2%
56422	Samara	Lois River Catchment	125	125	100.0%	0	0.0%	0	0.0%	0	0.0%
57322	Urahou	Lois River Catchment	536	494	92.2%	26	4.9%	16	3.0%	0	0.0%
		Totals Hatulia AP	**5,958**	**5,782**	**97.0%**	**71**	**1.2%**	**63**	**1.1%**	**42**	**0.7%**

Table 39. Houses at Risk of Landslides in Hatulia AP

Suco -Catchment Code	*Suco* -Catchment		Total Length of Roads (Km)	Length of Road in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Km	%	Km	%	Km	%	Km	%
50522	Ailelo	Lois River Catchment	11.2	11.2	99.7%	0.0	0.0%	0.0	0.0%	0.0	0.3%
50622	Aculau	Lois River Catchment	21.0	20.7	98.5%	0.0	0.1%	0.3	1.3%	0.0	0.0%
51522	Coilate-Letelo	Lois River Catchment	16.2	16.2	99.6%	0.0	0.0%	0.1	0.4%	0.0	0.0%
52022	Fatubolo	Lois River Catchment	9.3	9.2	98.9%	0.1	1.1%	0.0	0.0%	0.0	0.0%
52122	Fatubessi	Lois River Catchment	28.5	26.6	93.3%	1.5	5.4%	0.1	0.5%	0.2	0.8%
52722	Hatolia Vila	Lois River Catchment	12.5	12.5	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
53522	Leimea-Craic	Lois River Catchment	1.3	1.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
53722	Leimea-Sorinbalo	Lois River Catchment	3.8	3.8	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
54222	Lisapat	Lois River Catchment	7.7	7.3	94.3%	0.1	1.2%	0.3	4.5%	0.0	0.0%
54922	Manusae	Lois River Catchment	26.5	25.6	96.7%	0.5	1.8%	0.1	0.5%	0.3	1.0%
55222	Mau-Ubo	Lois River Catchment	9.1	8.1	89.0%	0.4	4.3%	0.5	5.5%	0.1	1.2%
56422	Samara	Lois River Catchment	6.2	6.2	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
57322	Urahou	Lois River Catchment	11.1	10.9	97.4%	0.0	0.3%	0.3	2.4%	0.0	0.0%
		Totals Hatulia AP	**164.4**	**159.4**	**97.0%**	**2.7**	**1.6%**	**1.7**	**1.1%**	**0.6**	**0.4%**

Table 40. Roads at Risk of Landslides in Hatulia AP

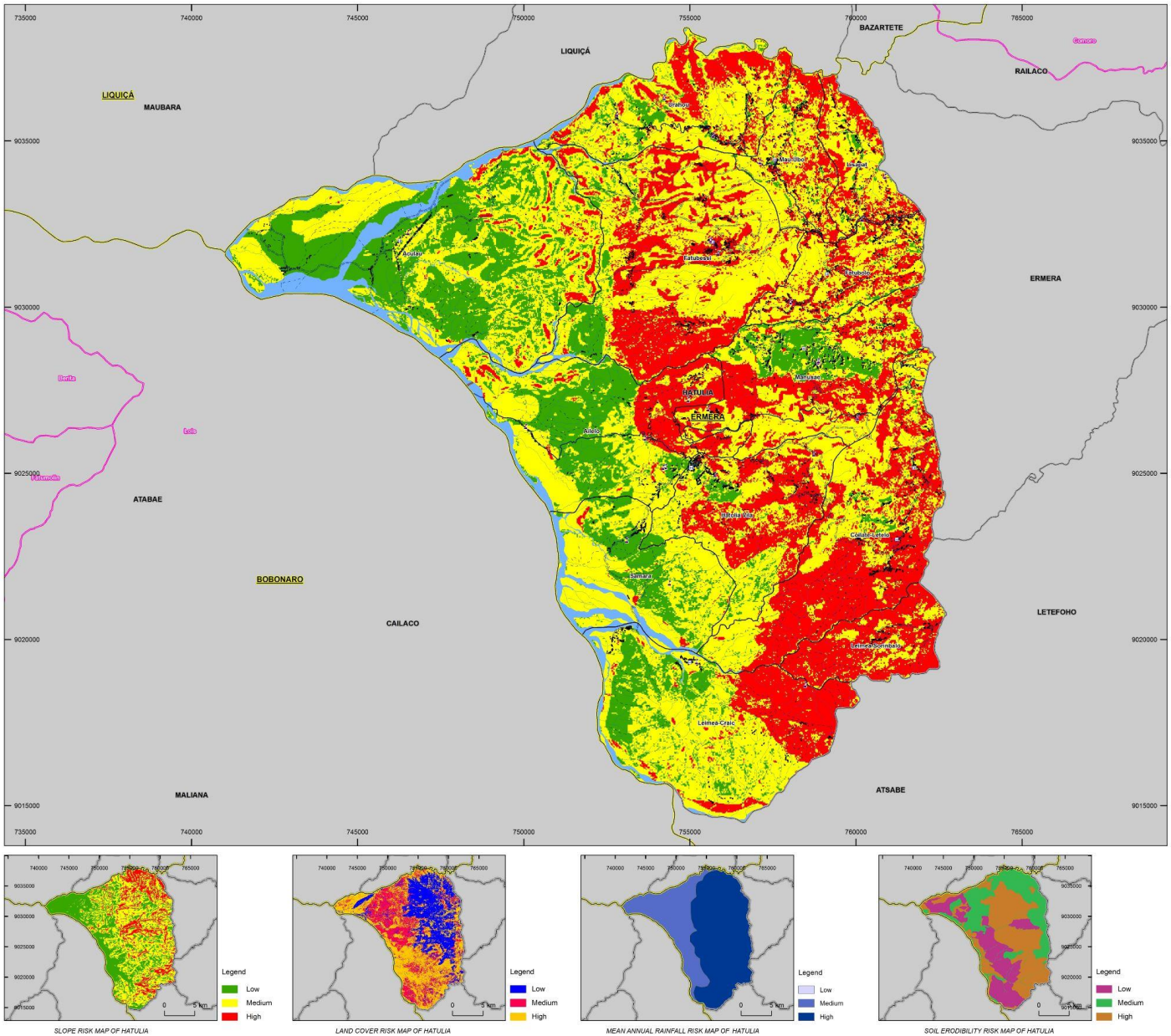
Erosion Risk in Hatulia Administrative Post

Soil erosion is potentially a big problem in upland eastern parts of Hatulia AP (Map 20), partly because of bio-physical factors (steep slopes, high annual rainfall) and partly because of population pressure, which has degraded much of the protective natural vegetation. For the AP as a whole, almost 22,000 hectares are at medium to high risk for erosion, representing slightly more than 80% of the total area. Coilate-Letelo *Suco* with 1,486 hectares (55.3%) and Fatubessi *Suco* with 1,300 hectares (36.7%) have the largest areas in the high risk category, but it is Leimea-Sorinbalo that has the largest proportion of its area at high risk for erosion, with 663 hectares representing 77.3% of its total area.

A large proportion of Hatulia's infrastructure is built in erosion-prone areas. This probably points to the close link between high population density and land degradation. Almost 85% of the houses and 78% of the roads are located in medium or high risk areas. Schools have an unusually strong association with erosion risk, with 26 out of 28 schools in Hatulia AP located in areas that are medium or high risk.

				Area of Land in Each Erosion Risk Category					
***Suco* -Catchment Code**	***Suco* -Catchment**		**Total Hectares**	**Low Risk**		**Medium Risk**		**High Risk**	
				Hectares	**%**	**Hectares**	**%**	**Hectares**	**%**
50522	Ailelo	Lois River Catchment	2,629	926	35.2%	1,239	47.1%	465	17.7%
50622	Aculau	Lois River Catchment	4,755	2,327	48.9%	2,241	47.1%	187	3.9%
51522	Coilate-Letelo	Lois River Catchment	2,688	63	2.3%	1,139	42.4%	1,486	55.3%
52022	Fatubolo	Lois River Catchment	1,038	39	3.8%	644	62.0%	355	34.2%
52122	Fatubessi	Lois River Catchment	3,541	245	6.9%	1,996	56.4%	1,300	36.7%
52722	Hatolia Vila	Lois River Catchment	1,758	142	8.1%	928	52.8%	687	39.1%
53522	Leimea-Craic	Lois River Catchment	2,875	563	19.6%	1,616	56.2%	695	24.2%
53722	Leimea-Sorinbalo	Lois River Catchment	859	0	0.0%	195	22.7%	663	77.3%
54222	Lisapat	Lois River Catchment	730	30	4.1%	420	57.5%	280	38.4%
54922	Manusae	Lois River Catchment	2,123	334	15.7%	1,065	50.2%	725	34.1%
55222	Mau-Ubo	Lois River Catchment	889	41	4.6%	570	64.1%	279	31.4%
56422	Samara	Lois River Catchment	1,729	499	28.8%	1,211	70.0%	20	1.1%
57322	Urahou	Lois River Catchment	1,736	193	11.1%	1,038	59.8%	505	29.1%
		Totals Hatulia AP	**27,350**	**5,403**	**19.8%**	**14,301**	**52.3%**	**7,647**	**28.0%**

Table 41. Land Area at Risk of Erosion in Hatulia AP

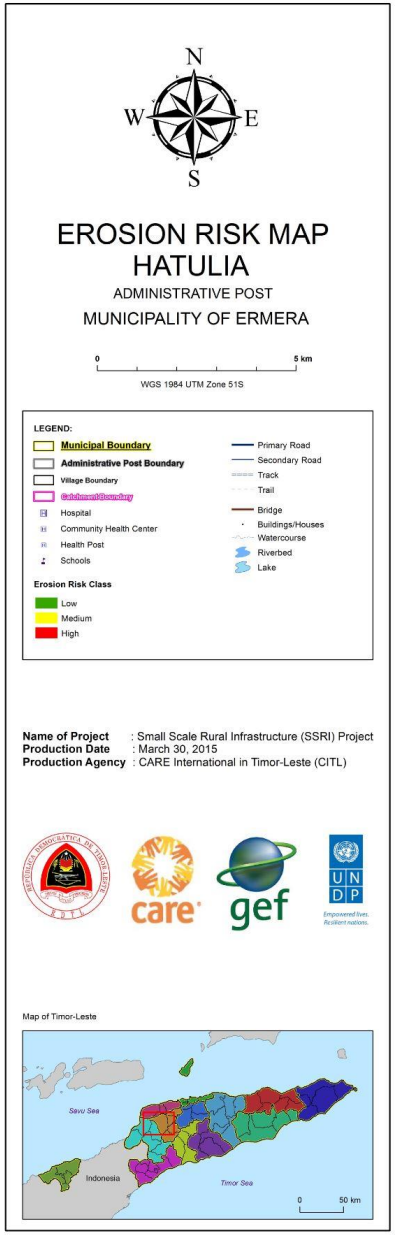


SLOPE RISK MAP OF HATULIA

LAND COVER RISK MAP OF HATULIA

MEAN ANNUAL RAINFALL RISK MAP OF HATULIA

SOIL ERODIBILITY RISK MAP OF HATULIA



Data analysis and cartography by TMap

Produced with Funding from GEF-LDCF and Implemented by UNDP in Partnership with MAE and MCIE

MAP- 20. Erosion Risk Map: Hatulia Administrative Post

Suco - Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Erosion Risk Category						Total Length of Roads	Length of Road in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Km	%	Km	%	Km	%
50522	Ailelo	Lois River Catchment	368	55	14.9%	200	54.3%	113	30.7%	11.2	3.5	31.0%	5.5	48.7%	2.3	20.3%
50622	Aculau	Lois River Catchment	362	215	59.4%	145	40.1%	2	0.6%	21.0	15.4	73.1%	5.1	24.3%	0.5	2.6%
51522	Coilate-Letelo	Lois River Catchment	606	21	3.5%	212	35.0%	373	61.6%	16.2	0.3	1.9%	9.5	58.5%	6.4	39.7%
52022	Fatubolo	Lois River Catchment	599	18	3.0%	293	48.9%	288	48.1%	9.3	0.4	4.1%	4.5	48.8%	4.4	47.0%
52122	Fatubessi	Lois River Catchment	679	29	4.3%	229	33.7%	421	62.0%	28.5	1.4	5.0%	17.1	60.2%	9.9	34.8%
52722	Hatolia Vila	Lois River Catchment	570	84	14.7%	263	46.1%	223	39.1%	12.5	1.2	9.8%	6.8	54.0%	4.5	36.2%
53522	Leimea-Craic	Lois River Catchment	273	39	14.3%	204	74.7%	30	11.0%	1.3	0.2	12.1%	1.2	87.9%	0.0	0.0%
53722	Leimea-Sorinbalo	Lois River Catchment	120	0	0.0%	11	9.2%	109	90.8%	3.8	0.0	0.0%	1.0	25.7%	2.8	74.3%
54222	Lisapat	Lois River Catchment	442	48	10.9%	252	57.0%	142	32.1%	7.7	1.1	14.6%	3.9	50.7%	2.7	34.8%
54922	Manusae	Lois River Catchment	762	204	26.8%	320	42.0%	238	31.2%	26.5	6.0	22.6%	15.4	58.3%	5.1	19.2%
55222	Mau-Ubo	Lois River Catchment	516	53	10.3%	292	56.6%	171	33.1%	9.1	0.6	6.6%	5.6	61.5%	2.9	31.9%
56422	Samara	Lois River Catchment	125	70	56.0%	55	44.0%	0	0.0%	6.2	3.0	48.6%	3.2	51.0%	0.0	0.4%
57322	Urahou	Lois River Catchment	536	77	14.4%	296	55.2%	163	30.4%	11.1	1.9	17.0%	6.9	61.7%	2.4	21.3%
		Totals Hatulia AP	**5,958**	**913**	**15.3%**	**2,772**	**46.5%**	**2,273**	**38.2%**	**164.4**	**34.9**	**21.3%**	**85.6**	**52.0%**	**43.9**	**26.7%**

Table 42. Houses and Road at Risk of Erosion in Hatulia AP

Suco -Catchment Code	*Suco* -Catchment		Total No. of Schools	Schools in Each Erosion Risk Category						Total No. of Health Facilities	Health Facilities in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Number	%	Number	%	Number	%
50522	Ailelo	Lois River Catchment	5	2	40.0%	2	40.0%	1	20.0%	0						
50622	Aculau	Lois River Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
51522	Coilate-Letelo	Lois River Catchment	0							2	0	0.0%	1	50.0%	1	50.0%
52022	Fatubolo	Lois River Catchment	1	0	0.0%	0	0.0%	1	100.0%	1	1	100.0%	0	0.0%	0	0.0%
52122	Fatubessi	Lois River Catchment	4	0	0.0%	2	50.0%	2	50.0%	1	0	0.0%	0	0.0%	1	100.0%
52722	Hatolia Vila	Lois River Catchment	2	0	0.0%	1	50.0%	1	50.0%	1	0	0.0%	1	100.0%	0	0.0%
53522	Leimea-Craic	Lois River Catchment	2	0	0.0%	1	50.0%	1	50.0%	1	0	0.0%	1	100.0%	0	0.0%
53722	Leimea-Sorinbalo	Lois River Catchment	0							0						
54222	Lisapat	Lois River Catchment	3	0	0.0%	1	33.3%	2	66.7%	0						
54922	Manusae	Lois River Catchment	4	0	0.0%	2	50.0%	2	50.0%	1	1	100.0%	0	0.0%	0	0.0%
55222	Mau-Ubo	Lois River Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	0	0.0%	0	0.0%	1	100.0%
56422	Samara	Lois River Catchment	2	0	0.0%	2	100.0%	0	0.0%	0						
57322	Urahou	Lois River Catchment	3	0	0.0%	1	33.3%	2	66.7%	0						
		Totals Hatulia AP	**28**	**2**	**7.1%**	**14**	**50.0%**	**12**	**42.9%**	**9**	**3**	**33.3%**	**3**	**33.3%**	**3**	**33.3%**

Table 43. Schools and Health Facilities at Risk of Erosion in Hatulia AP

2.4.6 Risk Profile – Bazartete Administrative Post

Bazartete is a diverse and complex Administrative Post. Its 10 river catchments and 9 *sucos* intersect to create the 29 *suco*-catchments shown in Table 44 and on Map 21. This complexity stems partially from the varied nature of the terrain and ecosystems in Bazartete, which range from semi-arid, sparsely-vegetated plains along the coast, to intensively farmed and grazed areas in the lower hills, to lush forest and coffee plantation country in the steep, deeply incised uplands. It is also a function of inconsistencies in the data available for this study. In Bazartete and the other 2 APs in Liquiçá Municipality, catchments are defined in much greater detail than they are for other parts of the country, including Baucau and Ermera. What this allows us to do is get a more localized understanding of upstream-downstream linkages, and to compare statistics for smaller catchments which might have significantly different risk exposure than their neighbours. Where generalizations were needed for Ermera and Hatulia AP's 1 catchment, in Liquiçá Municipality, more localized linkages are seen in greater detail, with all or parts of 10 catchments in Bazartete, 5 in Liquiçá and 13 in Maubara.

In Bazartete, different catchments have different characteristics, which in turn have different implications for the three weather-related hazards in this study – floods, landslides and soil erosion. Some, such as Emeta and Caicassa Catchments, are more prone to flooding, whilst others, such as Comluli and Carbutaeloa, will be more susceptible to landslides. The following sections will give a clearer picture of how exposure to risks associated with flooding, landslides and erosion vary from catchment to catchment, and from *suco* to *suco.*

***Suco* -Catchment Code**	***Suco* -Catchment**		**Total Area**
61911	Fahilebo	Comoro River Catchment	1,851
61927	Fahilebo	Moraeloa River Catchment	559
62208	Fatumasi	Caicassa River Catchment	160
62209	Fatumasi	Carbutaeloa River Catchment	248
62227	Fatumasi	Moraeloa River Catchment	269
63308	Lauhata	Caicassa River Catchment	865
63309	Lauhata	Carbutaeloa River Catchment	682
63312	Lauhata	Emeta AggregateCatchment	58
63315	Lauhata	Inur Pilila Aggregate Catchment	329
63327	Lauhata	Moraeloa River Catchment	67
63809	Leorema	Carbutaeloa River Catchment	34
63811	Leorema	Comoro River Catchment	1,243
63822	Leorema	Lois River Catchment	864
63827	Leorema	Moraeloa River Catchment	94
65109	Maumeta	Carbutaeloa River Catchment	237
65112	Maumeta	Emeta AggregateCatchment	221
65113	Maumeta	Gularloa River Catchment	227
65309	Metagou	Carbutaeloa River Catchment	312
65313	Metagou	Gularloa River Catchment	266
65322	Metagou	Lois River Catchment	48
65508	Motaulun	Caicassa River Catchment	79
65510	Motaulun	Comluli Aggregate Catchment	1,084
65527	Motaulun	Moraeloa River Catchment	787
66710	Tibar	Comluli Aggregate Catchment	93
66711	Tibar	Comoro River Catchment	958
66730	Tibar	Riheu River Catchment	3,104
66733	Tibar	Tacitolu Aggregate Catchment	58
67210	Ulmera	Comluli Aggregate Catchment	2,984
67211	Ulmera	Comoro River Catchment	914
		Totals Bazartete AP	**18,693**

Table 44. Suco-Catchments in Bazartete Administrative Post

MAP- 21. Sucos and Catchments of Bazartete Administrative Post

Flood Risk in Bazartete Administrative Post

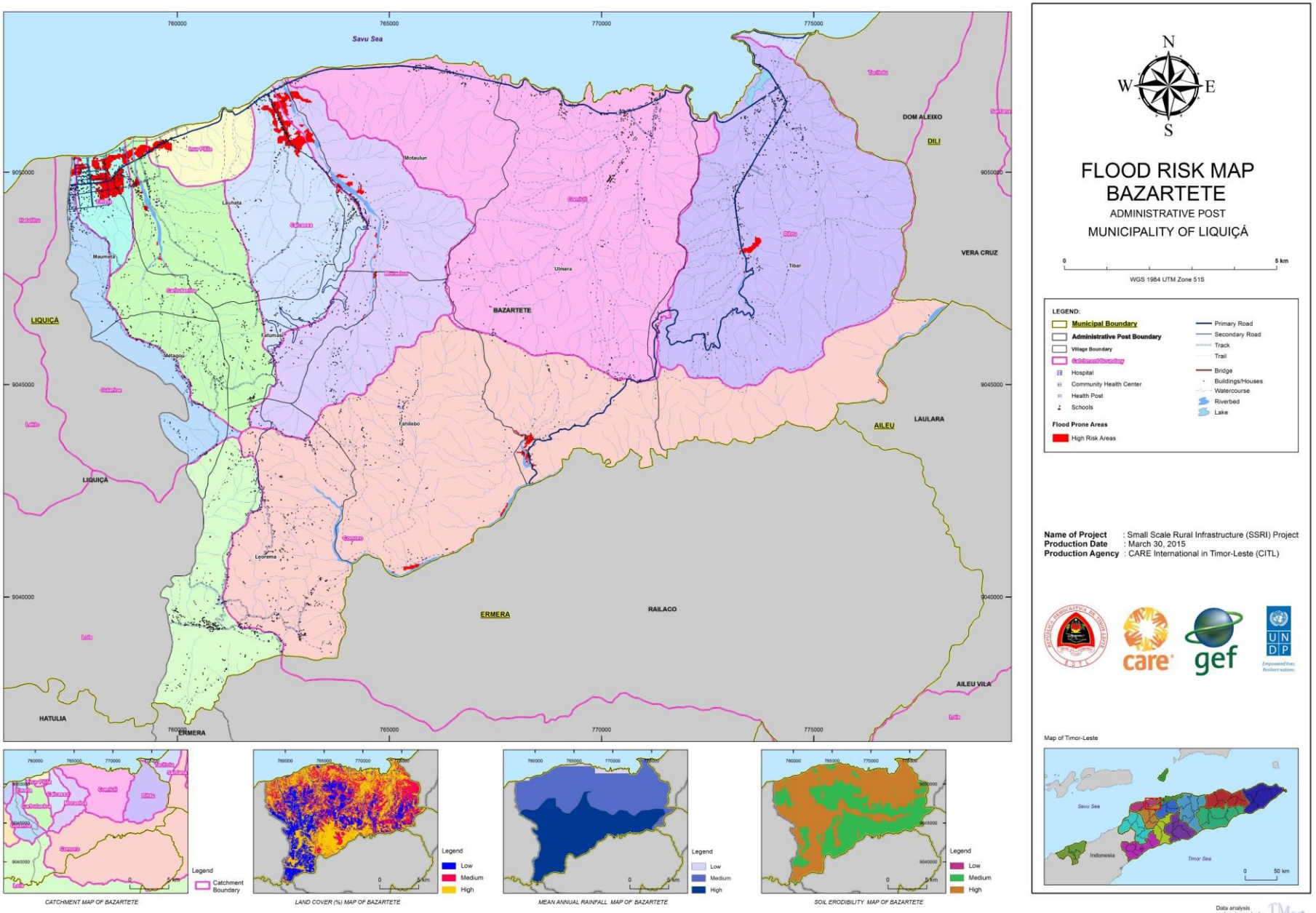
Very little of Bazartete AP is flat, so the risk of flooding doesn't extend to large areas. Map 22 shows that the main risk areas are concentrated in Emeta, Caicassa and Moraeloa Catchments, and in Lauhata, Maumeta and Motaulun *Sucos*. The flood-prone areas are almost entirely in lower catchment areas, close to the mouths of the rivers. Two exceptions are small areas upstream in Tibar-Riheu and Ulmera-Comoro *Suco*-Catchments.

The two largest areas of Bazartete AP that are prone to flooding are in and around the built-up areas of Liquiçá Vila and Lauhata. The processes most responsible for flooding here are large volumes of water coming down very steep slopes after periods of prolonged rain (several hours or even days), or after short, intense downpours. As is often the case, human activity exacerbates the problem –the building of infrastructure in the two towns has not provided adequate drainage to let the water through. The towns themselves act as dams, forcing the water to back up and spill over the banks of the river channels.

The problem is not entirely human induced. The rivers flowing down from the highlands of Bazartete bring large sediment loads with them, and this contributes to the blocking of channels downstream. The rivers in this part of the country are short, steep and flow very quickly after heavy rain. Flooding tends to be quick, intense and destructive. These are flash floods by nature, in contrast to the gentler but also disruptive inundation floods associated with the larger, slower moving Seiçal and Vemasse Rivers in Baucau.

Even though urban development is partially responsible for increasing the incidence of flooding in these naturally flood-prone areas, not a great deal of infrastructure is at risk. This is because this type of flooding does not affect large areas of land, and it is therefore more easily avoided than inundation flooding. Only 238 out of 18,693 houses (6.2%) are considered at-risk for flooding. Of these, 142 are in Lauhata *Suco* and 74 are in Maumeta *Suco.* The only school in a flood zone in Bazartete AP is not on the northern coast, but in the interior, in the upper part of the Comoro River Catchment in Ulmera *Suco.* This is the primary school in the village of Lebuloa. No health facilities are considered at-risk of flooding.

Figure 29 – Engineering works attempt to contain the Moraeloa River. Lauhata Suco, Moraeloa River



Produced with Funding from GEF-LDCF and Implemented by UNDP in Partnership with MAE and MCIE

MAP- 22. Flood Risk Map: Bazartete Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Land Area			Houses			Schools			Health Facilities			Roads		
			Total Area	In Flood Risk Zone		Total Number	In Flood Risk Zone		Total Number	In Flood Risk Zone		Total Number	In Flood Risk Zone		Total Km	In Flood Risk Zone	
				Hectares	%		Number	%		Number	%		Number	%		Km	%
61911	Fahilebo	Comoro River Catchment	1,851	11	0.6%	145	1	0.7%	1	0	0.0%	1	0	0.0%	0.0		
61927	Fahilebo	Moraeloa River Catchment	559	0	0.1%	66	0	0.0%	0			0			0.0		
62208	Fatumasi	Caicassa River Catchment	160	0	0.0%	65	0	0.0%	2	0	0.0%	1	0	0.0%	5.7	0.0	0.0%
62209	Fatumasi	Carbutaeloa River Catchment	248	0	0.0%	102	0	0.0%	1	0	0.0%	0			3.2	0.0	0.0%
62227	Fatumasi	Moraeloa River Catchment	269	1	0.5%	95	0	0.0%	0			0			2.3	0.0	0.0%
63308	Lauhata	Caicassa River Catchment	865	38	4.4%	233	54	23.2%	1	0	0.0%	0			7.2	1.3	17.6%
63309	Lauhata	Carbutaeloa River Catchment	682	20	2.9%	221	15	6.8%	2	0	0.0%	0			8.1	0.8	9.7%
63312	Lauhata	Emeta AggregateCatchment	58	20	35.4%	102	43	42.2%	0			0			2.0	0.6	28.7%
63315	Lauhata	Inur Pilila Aggregate Catchment	329	10	3.0%	53	24	45.3%	0			0			4.9	0.6	11.9%
63327	Lauhata	Moraeloa River Catchment	67	17	25.1%	22	6	27.3%	0			0			0.3	0.0	7.7%
63809	Leorema	Carbutaeloa River Catchment	34	0	0.0%	15	0	0.0%	0			0			0.1	0.0	0.0%
63811	Leorema	Comoro River Catchment	1,243	1	0.1%	401	0	0.0%	1	0	0.0%	0			8.7	0.0	0.0%
63822	Leorema	Lois River Catchment	864	0	0.0%	352	0	0.0%	3	0	0.0%	1	0	0.0%	9.7	0.0	0.0%
63827	Leorema	Moraeloa River Catchment	94	0	0.0%	25	0	0.0%	1	0	0.0%	0			1.2	0.0	0.0%
65109	Maumeta	Carbutaeloa River Catchment	237	0	0.1%	56	0	0.0%	0			0			0.5	0.0	0.0%
65112	Maumeta	Emeta AggregateCatchment	221	36	16.3%	262	74	28.2%	1	0	0.0%	0			10.8	2.8	25.7%
65113	Maumeta	Gularloa River Catchment	227	4	1.9%	165	0	0.0%	0			0			5.3	0.7	13.3%
65309	Metagou	Carbutaeloa River Catchment	312	0	0.0%	157	0	0.0%	0			0			2.4	0.0	0.0%
65313	Metagou	Gularloa River Catchment	266	0	0.0%	115	0	0.0%	1	0	0.0%	1	0	0.0%	4.7	0.0	0.0%
65322	Metagou	Lois River Catchment	48	0	0.0%	13	0	0.0%	0			0			0.0		
65508	Motaulun	Caicassa River Catchment	79	1	0.9%	73	0	0.0%	1	0	0.0%	0			1.9	0.0	0.0%
65510	Motaulun	Comluli Aggregate Catchment	1,084	0	0.0%	96	0	0.0%	1	0	0.0%	0			5.1	0.0	0.0%
65527	Motaulun	Moraeloa River Catchment	787	18	2.3%	109	4	3.7%	1	0	0.0%	1	0	0.0%	1.5	0.2	16.4%
66710	Tibar	Comluli Aggregate Catchment	93	0	0.0%	24	0	0.0%	1	0	0.0%	0			2.4	0.0	0.0%
66711	Tibar	Comoro River Catchment	958	3	0.3%	3	0	0.0%	0			0			0.0		
66730	Tibar	Riheu River Catchment	3,104	8	0.2%	418	0	0.0%	2	0	0.0%	1	0	0.0%	16.0	0.1	0.6%
66733	Tibar	Tacitolu Aggregate Catchment	58	0	0.0%	0			0			0			2.0	0.0	0.0%
67210	Ulmera	Comluli Aggregate Catchment	2,984	0	0.0%	400	0	0.0%	2	0	0.0%	1	0	0.0%	8.8	0.0	0.0%
67211	Ulmera	Comoro River Catchment	914	9	1.0%	81	17	21.0%	3	1	33.3%	0			4.4	0.1	1.9%
		Totals Bazartete AP	**18,693**	**198**	**1.1%**	**3,869**	**238**	**6.2%**	**25**	**1**	**4.0%**	**7**	**0**	**0.0%**	**119**	**7.1**	**6.0%**

Table 45. Risk Statistics for Flooding in Bazartete AP

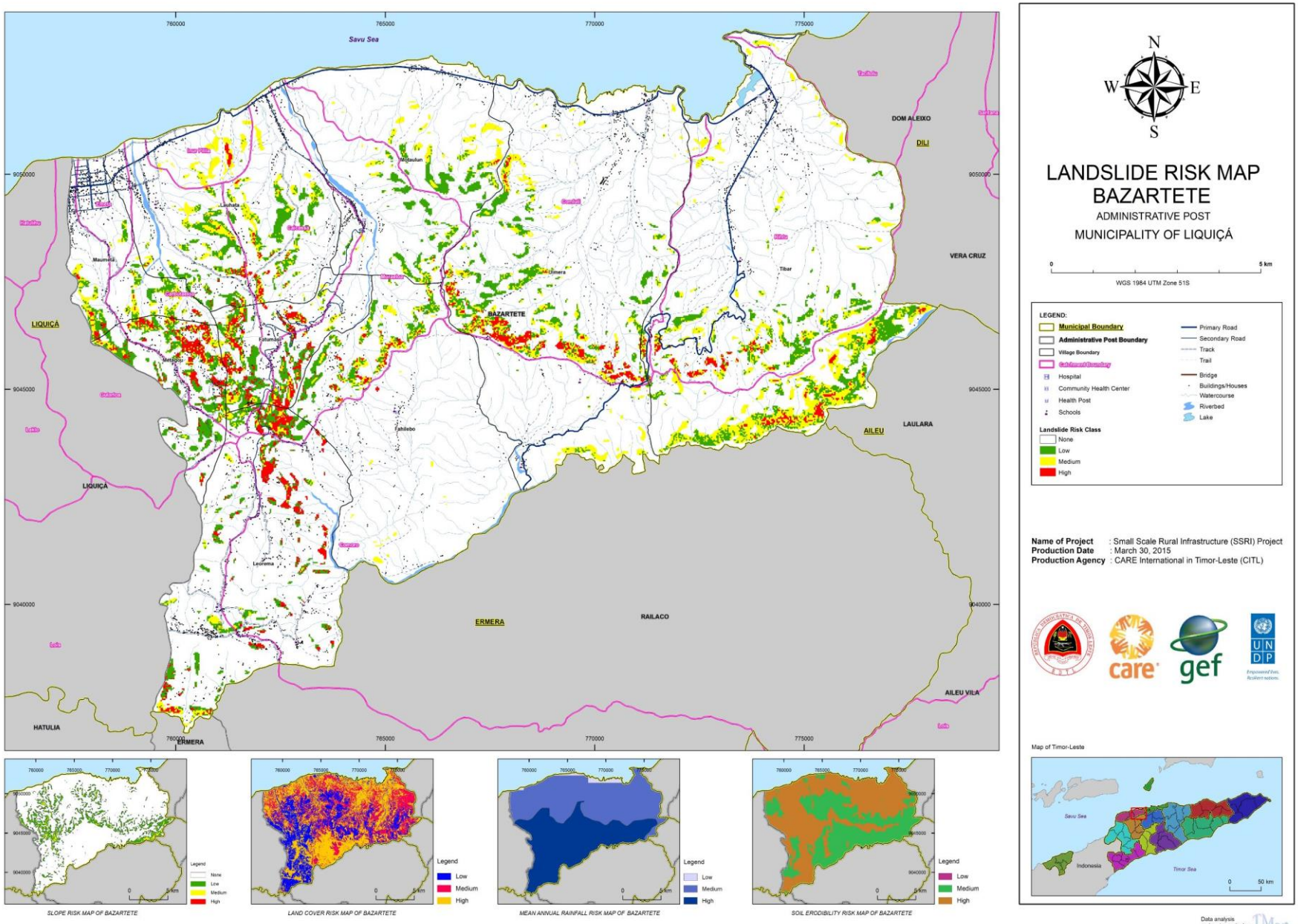
Landslide Risk in Bazartete Administrative Post

The total area considered at risk for landslides in Bazartete AP is 2,490 hectares, representing 13.3% of the total area of the AP. Of this total, 399 hectares (2.1%) are high risk, 935 hectares (5.0%) are medium risk, and 1,156 hectares (6.2%) are low risk. The 'hotspots' are mainly in the Carbutaeloa, Comluli and Comoro River Catchments, as shown on Map 23. An interesting aspect of the risk areas in the Comoro Catchment is that some of them are high risk areas in the extreme upper reaches in Leorema *Suco,* but most of land at medium and low risk for landslides is downstream in Tibar *Suco.* This partially reflects the size of the Comoro Catchment, because the part where the river passes through Tibar is downstream in Bazartete AP, but it is still some considerable distance from the sea when it passes from Bazartete into Vera Cruz AP, and even in Tibar it still bears most of the characteristics of an upper catchment.

In terms of area, Leorema *Suco* has the most land at high risk for landslides with 94 hectares. Most of this is in the Comoro River Catchment. Ulmera *Suco* is next with 68 hectares, mainly in the Comluli Aggregate Catchment. Third is Fatumasi *Suco* with 55 hectares, the largest part of which is in the Carbutaeloa River Catchment. It is interesting to note the distribution of landslide risk in relation to the areas prone to flooding discussed in the previous section. Some of the most at-risk areas for landslides are in the upper catchments of rivers feeding into the flood-prone areas in Maumeta and Lauhata, namely the Carbutaeloa, the Caicassa and the Moraeloa. This is not a coincidence, since it is clear in other parts of the country how landslides and erosion in upper catchments can have impacts that can increase the likelihood, severity and extent of flooding downstream.

Another pattern seen elsewhere is that, by and large, people are good at not building infrastructure in places that are prone to landslides. Only 205 out of a total of 3,869 houses (5.2%) in Bazartete AP are at low, medium or high risk for landslides. Of these, 48 are in Metagou-Carbutaeloa *Suco*-Catchment and 48 are in Fatumasi-Carbutaeloa *Suco*-Catchment. The road network again generally avoids areas where landslides are possible, but still 7.1km out of 119.1km (6.0%) pass through at-risk areas. Fatumasi faces the biggest threat to its network of roads, with 2.4km out of 11.2km (17.9%) considered at some level of risk for landslides. In remote places like Fatumasi, where transportation resources are already extremely limited, a landslide taking out just a single short section of road can isolate communities, prevent crops from reaching markets, keep children away from school and prove life-threatening to people in need of medical support.

Figure 30 –-Stabilization efforts with tree-planting on landslide-prone slope. Ulmera Suco, Comluli Aggregate Catchment



MAP- 23. Landslide Risk Map: Bazartete Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Total Hectares	Area of Land in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%	Hectares	%
61911	Fahilebo	Comoro River Catchment	1,851	1,842	99.5%	0	0.0%	7	0.4%	1	0.1%
61927	Fahilebo	Moraeloa River Catchment	559	420	75.1%	76	13.6%	46	8.2%	17	3.1%
62208	Fatumasi	Caicassa River Catchment	160	136	84.8%	5	3.0%	9	5.4%	11	6.9%
62209	Fatumasi	Carbutaeloa River Catchment	248	127	51.2%	63	25.3%	26	10.4%	32	13.1%
62227	Fatumasi	Moraeloa River Catchment	269	203	75.5%	32	12.0%	11	4.2%	22	8.2%
63308	Lauhata	Caicassa River Catchment	865	720	83.2%	78	9.1%	56	6.5%	11	1.3%
63309	Lauhata	Carbutaeloa River Catchment	682	554	81.2%	75	11.0%	44	6.4%	9	1.4%
63312	Lauhata	Emeta AggregateCatchment	58	58	100.0%	0	0.0%	0	0.0%	0	0.0%
63315	Lauhata	Inur Pilila Aggregate Catchment	329	284	86.3%	1	0.4%	39	12.0%	4	1.3%
63327	Lauhata	Moraeloa River Catchment	67	67	100.0%	0	0.0%	0	0.0%	0	0.0%
63809	Leorema	Carbutaeloa River Catchment	34	17	51.3%	11	33.7%	4	12.9%	1	2.1%
63811	Leorema	Comoro River Catchment	1,243	1,141	91.8%	42	3.4%	7	0.6%	52	4.2%
63822	Leorema	Lois River Catchment	864	771	89.2%	52	6.0%	25	2.9%	17	1.9%
63827	Leorema	Moraeloa River Catchment	94	34	35.7%	29	30.4%	8	8.9%	24	25.0%
65109	Maumeta	Carbutaeloa River Catchment	237	178	75.3%	30	12.8%	25	10.4%	3	1.5%
65112	Maumeta	Emeta AggregateCatchment	221	214	96.7%	4	2.0%	3	1.3%	0	0.0%
65113	Maumeta	Gularloa River Catchment	227	182	80.2%	20	8.7%	20	8.6%	5	2.4%
65309	Metagou	Carbutaeloa River Catchment	312	168	54.0%	60	19.1%	31	9.9%	53	17.1%
65313	Metagou	Gularloa River Catchment	266	192	72.0%	59	22.2%	7	2.5%	9	3.2%
65322	Metagou	Lois River Catchment	48	45	94.6%	1	2.3%	0	0.4%	1	2.8%
65508	Motaulun	Caicassa River Catchment	79	76	96.5%	2	2.7%	1	0.7%	0	0.0%
65510	Motaulun	Comluli Aggregate Catchment	1,084	983	90.6%	52	4.8%	49	4.5%	1	0.1%
65527	Motaulun	Moraeloa River Catchment	787	715	90.8%	53	6.8%	19	2.4%	1	0.1%
66710	Tibar	Comluli Aggregate Catchment	93	78	84.0%	4	3.8%	9	9.4%	3	2.7%
66711	Tibar	Comoro River Catchment	958	579	60.4%	139	14.6%	210	21.9%	30	3.1%
66730	Tibar	Riheu River Catchment	3,104	2,878	92.7%	97	3.1%	107	3.4%	22	0.7%
66733	Tibar	Tacitolu Aggregate Catchment	58	53	91.7%	0	0.8%	4	7.5%	0	0.0%
67210	Ulmera	Comluli Aggregate Catchment	2,984	2,610	87.5%	163	5.5%	142	4.8%	68	2.3%
67211	Ulmera	Comoro River Catchment	914	881	96.4%	5	0.5%	28	3.0%	1	0.1%
		Totals Bazartete AP	**18,693**	**16,203**	**86.7%**	**1,156**	**6.2%**	**935**	**5.0%**	**399**	**2.1%**

Table 46. Land Area at Risk of Landslides in Bazartete AP

Suco -Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%	Number	%
61911	Fahilebo	Comoro River Catchment	145	145	100.0%	0	0.0%	0	0.0%	0	0.0%
61927	Fahilebo	Moraeloa River Catchment	66	57	86.4%	5	7.6%	3	4.5%	1	1.5%
62208	Fatumasi	Caicassa River Catchment	65	60	92.3%	0	0.0%	2	3.1%	3	4.6%
62209	Fatumasi	Carbutaeloa River Catchment	102	54	52.9%	18	17.6%	13	12.7%	17	16.7%
62227	Fatumasi	Moraeloa River Catchment	95	86	90.5%	4	4.2%	1	1.1%	4	4.2%
63308	Lauhata	Caicassa River Catchment	233	229	98.3%	1	0.4%	2	0.9%	1	0.4%
63309	Lauhata	Carbutaeloa River Catchment	221	210	95.0%	6	2.7%	4	1.8%	1	0.5%
63312	Lauhata	Emeta AggregateCatchment	102	102	100.0%	0	0.0%	0	0.0%	0	0.0%
63315	Lauhata	Inur Pilila Aggregate Catchment	53	53	100.0%	0	0.0%	0	0.0%	0	0.0%
63327	Lauhata	Moraeloa River Catchment	22	22	100.0%	0	0.0%	0	0.0%	0	0.0%
63809	Leorema	Carbutaeloa River Catchment	15	11	73.3%	1	6.7%	3	20.0%	0	0.0%
63811	Leorema	Comoro River Catchment	401	387	96.5%	5	1.2%	2	0.5%	7	1.7%
63822	Leorema	Lois River Catchment	352	338	96.0%	3	0.9%	4	1.1%	7	2.0%
63827	Leorema	Moraeloa River Catchment	25	16	64.0%	4	16.0%	0	0.0%	5	20.0%
65109	Maumeta	Carbutaeloa River Catchment	56	51	91.1%	1	1.8%	4	7.1%	0	0.0%
65112	Maumeta	Emeta AggregateCatchment	262	262	100.0%	0	0.0%	0	0.0%	0	0.0%
65113	Maumeta	Gularloa River Catchment	165	162	98.2%	0	0.0%	1	0.6%	2	1.2%
65309	Metagou	Carbutaeloa River Catchment	157	109	69.4%	20	12.7%	5	3.2%	23	14.6%
65313	Metagou	Gularloa River Catchment	115	112	97.4%	2	1.7%	1	0.9%	0	0.0%
65322	Metagou	Lois River Catchment	13	13	100.0%	0	0.0%	0	0.0%	0	0.0%
65508	Motaulun	Caicassa River Catchment	73	73	100.0%	0	0.0%	0	0.0%	0	0.0%
65510	Motaulun	Comluli Aggregate Catchment	96	96	100.0%	0	0.0%	0	0.0%	0	0.0%
65527	Motaulun	Moraeloa River Catchment	109	109	100.0%	0	0.0%	0	0.0%	0	0.0%
66710	Tibar	Comluli Aggregate Catchment	24	24	100.0%	0	0.0%	0	0.0%	0	0.0%
66711	Tibar	Comoro River Catchment	3	3	100.0%	0	0.0%	0	0.0%	0	0.0%
66730	Tibar	Riheu River Catchment	418	415	99.3%	0	0.0%	2	0.5%	1	0.2%
66733	Tibar	Tacitolu Aggregate Catchment	0								
67210	Ulmera	Comluli Aggregate Catchment	400	385	96.3%	1	0.3%	8	2.0%	6	1.5%
67211	Ulmera	Comoro River Catchment	81	80	98.8%	0	0.0%	1	1.2%	0	0.0%
		Totals Bazartete AP	**3,869**	**3,664**	**94.7%**	**71**	**1.8%**	**56**	**1.4%**	**78**	**2.0%**

Table 47. Houses at Risk of Landslides in Bazartete AP

Suco -Catchment Code	*Suco* -Catchment		Total Length of Roads (Km)	Length of Road in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Km	%	Km	%	Km	%	Km	%
61911	Fahilebo	Comoro River Catchment	0.0								
61927	Fahilebo	Moraeloa River Catchment	0.0								
62208	Fatumasi	Caicassa River Catchment	5.7	4.6	80.5%	0.4	6.5%	0.4	7.3%	0.3	5.8%
62209	Fatumasi	Carbutaeloa River Catchment	3.2	2.3	70.4%	0.6	19.3%	0.2	6.0%	0.1	4.4%
62227	Fatumasi	Moraeloa River Catchment	2.3	2.0	83.9%	0.1	4.6%	0.0	0.0%	0.3	11.5%
63308	Lauhata	Caicassa River Catchment	7.2	7.1	98.7%	0.0	0.0%	0.1	1.0%	0.0	0.3%
63309	Lauhata	Carbutaeloa River Catchment	8.1	8.1	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
63312	Lauhata	Emeta AggregateCatchment	2.0	2.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
63315	Lauhata	Inur Pilila Aggregate Catchment	4.9	4.9	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
63327	Lauhata	Moraeloa River Catchment	0.3	0.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
63809	Leorema	Carbutaeloa River Catchment	0.1	0.0	39.8%	0.0	60.2%	0.0	0.0%	0.0	0.0%
63811	Leorema	Comoro River Catchment	8.7	8.4	96.8%	0.2	2.5%	0.0	0.4%	0.0	0.3%
63822	Leorema	Lois River Catchment	9.7	9.1	94.6%	0.2	2.0%	0.3	3.3%	0.0	0.0%
63827	Leorema	Moraeloa River Catchment	1.2	0.3	26.5%	0.4	35.9%	0.1	11.3%	0.3	26.3%
65109	Maumeta	Carbutaeloa River Catchment	0.5	0.5	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
65112	Maumeta	Emeta AggregateCatchment	10.8	10.8	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
65113	Maumeta	Gularloa River Catchment	5.3	5.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
65309	Metagou	Carbutaeloa River Catchment	2.4	1.9	76.4%	0.4	15.6%	0.0	0.0%	0.2	8.0%
65313	Metagou	Gularloa River Catchment	4.7	4.0	85.8%	0.6	13.8%	0.0	0.0%	0.0	0.4%
65322	Metagou	Lois River Catchment	0.0								
65508	Motaulun	Caicassa River Catchment	1.9	1.5	80.3%	0.3	15.5%	0.1	4.2%	0.0	0.0%
65510	Motaulun	Comluli Aggregate Catchment	5.1	5.1	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
65527	Motaulun	Moraeloa River Catchment	1.5	1.5	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
66710	Tibar	Comluli Aggregate Catchment	2.4	2.1	85.5%	0.1	2.7%	0.2	9.3%	0.1	2.5%
66711	Tibar	Comoro River Catchment	0.0								
66730	Tibar	Riheu River Catchment	16.0	15.3	95.4%	0.1	0.7%	0.5	3.4%	0.1	0.5%
66733	Tibar	Tacitolu Aggregate Catchment	2.0	2.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
67210	Ulmera	Comluli Aggregate Catchment	8.8	8.6	98.0%	0.0	0.2%	0.1	0.9%	0.1	0.9%
67211	Ulmera	Comoro River Catchment	4.4	4.4	99.7%	0.0	0.0%	0.0	0.3%	0.0	0.0%
		Totals Bazartete AP	**119.1**	**111.9**	**94.0%**	**3.5**	**2.9%**	**2.1**	**1.8%**	**1.5**	**1.3%**

Table 48. Roads at Risk of Landslides in Bazartete AP

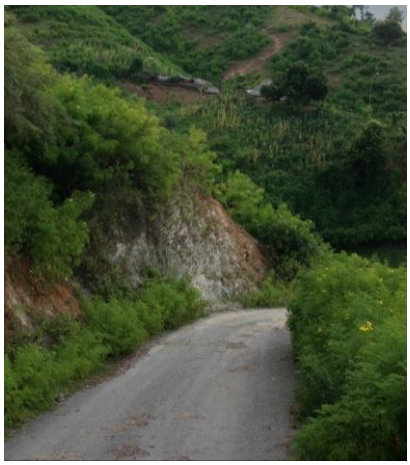


Figure 31. Evidence of high risk for landslides and erosion put road at risk. Fatumasi Suco, Carbutaeloa River Catchment

Figure 32. High risk for landslides and erosion. This is the best vegetation here all year. Ulmera Suco, Comoro River Catchment

Figure 33 – Recently re-opened road after landslide clean-up. Ulmera Suco, Comluli Aggregate

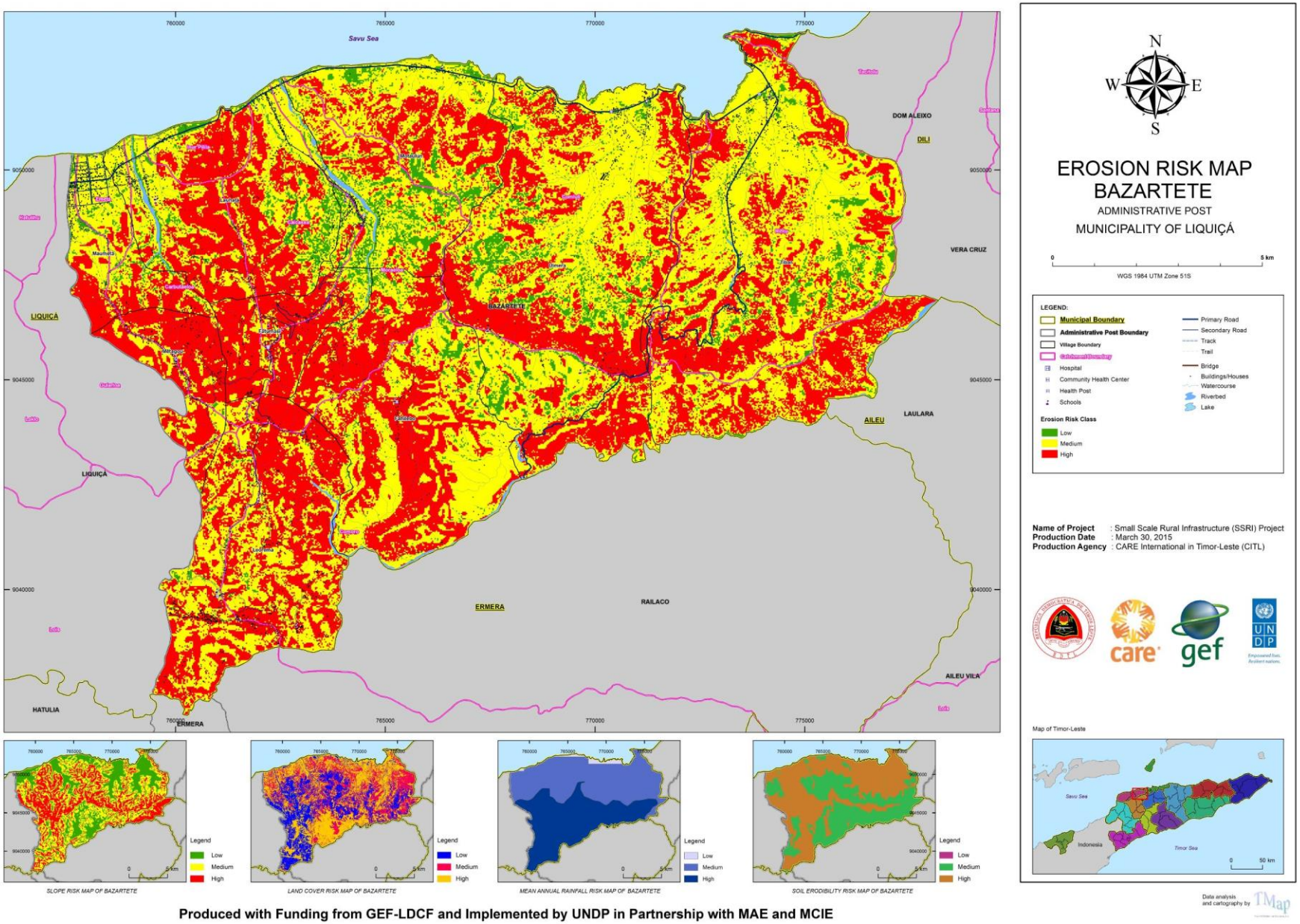
Erosion Risk in Bazartete Administrative Post

Certain factors combine to make parts of Bazartete AP particularly high-risk for erosion. Vegetation is particularly sparse in parts of this AP, especially in dry areas in the rain shadows of high hills, on north-facing slopes, and on nutrient poor soils. Human activities such as intense grazing of animals, removal of trees for firewood and cultivation on steep slopes augment the natural processes, producing conditions that are extremely prone to soil loss. Map 24 shows some of these effects very clearly. The band of red, high-risk land running west to east across the south-eastern part of the AP is comprised of high, north-facing slopes. These slopes are poorly vegetated primarily because they are very dry. This is because they get the full force of the sun for much of the year, and they are exposed to drying winds which prevail from the north. Lower down towards the coast in the north, there are many smaller patches red. High-risk in this case is more because of proximity to more densely populated areas – this land has been cleared for fuel wood and cultivation, exposing the soils to erosion from water and wind.

Almost all the land in Bazartete AP is considered to be medium-to-high risk for erosion, relative to risks in other parts of the country. In this respect it is similar to Ermera, Liquiçá and Maubara. Only 1,375 out of a total of 18,693 hectares (7.4%) are considered low risk for erosion. Motaulun *Suco* in centre-north of the AP, has probably the lowest levels of erosion, but the general trend in all other *sucos* is for small areas of low-risk land in sheltered, densely vegetated valleys and lowland areas, and large areas of medium- to high- risk land in upland areas. The largest areas of high-risk land are in Ulmera-Comluli (1,058 hectares, 35.5%), Tibar-Riheu (952 hectares, 30.7%), Fahilebo-Comoro (805 hectares, 43.5%), and Leorema-Comoro (712 hectares, 57.3%) *Suco*-Catchments.

				Area of Land in Each Erosion Risk Category					
Suco -Catchment Code	*Suco* -Catchment		Total Hectares	Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%
61911	Fahilebo	Comoro River Catchment	1,851	61	3.3%	984	53.2%	805	43.5%
61927	Fahilebo	Moraeloa River Catchment	559	22	4.0%	161	28.9%	375	67.2%
62208	Fatumasi	Caicassa River Catchment	160	3	2.1%	37	23.4%	119	74.5%
62209	Fatumasi	Carbutaeloa River Catchment	248	0	0.0%	50	20.0%	198	80.0%
62227	Fatumasi	Moraeloa River Catchment	269	20	7.5%	77	28.7%	172	63.8%
63308	Lauhata	Caicassa River Catchment	865	103	11.9%	395	45.6%	368	42.5%
63309	Lauhata	Carbutaeloa River Catchment	682	59	8.7%	305	44.8%	317	46.5%
63312	Lauhata	Emeta AggregateCatchment	58	7	12.1%	50	86.7%	1	1.1%
63315	Lauhata	Inur Pilila Aggregate Catchment	329	28	8.5%	110	33.4%	191	58.0%
63327	Lauhata	Moraeloa River Catchment	67	14	20.8%	52	77.5%	1	1.5%
63809	Leorema	Carbutaeloa River Catchment	34	0	0.9%	21	62.2%	13	36.9%
63811	Leorema	Comoro River Catchment	1,243	8	0.7%	523	42.0%	712	57.3%
63822	Leorema	Lois River Catchment	864	13	1.6%	438	50.8%	412	47.7%
63827	Leorema	Moraeloa River Catchment	94	1	0.6%	12	12.5%	82	86.9%
65109	Maumeta	Carbutaeloa River Catchment	237	17	7.3%	94	39.6%	126	53.1%
65112	Maumeta	Emeta AggregateCatchment	221	23	10.4%	174	78.5%	24	10.9%
65113	Maumeta	Gularloa River Catchment	227	19	8.4%	110	48.5%	98	43.0%
65309	Metagou	Carbutaeloa River Catchment	312	2	0.5%	53	17.1%	257	82.4%
65313	Metagou	Gularloa River Catchment	266	0	0.1%	104	39.0%	162	60.9%
65322	Metagou	Lois River Catchment	48	0	0.9%	22	45.0%	26	54.0%
65508	Motaulun	Caicassa River Catchment	79	23	29.8%	43	53.9%	13	16.3%
65510	Motaulun	Comluli Aggregate Catchment	1,084	139	12.9%	590	54.4%	355	32.7%
65527	Motaulun	Moraeloa River Catchment	787	175	22.3%	432	54.9%	179	22.8%
66710	Tibar	Comluli Aggregate Catchment	93	5	5.7%	40	42.5%	48	51.6%
66711	Tibar	Comoro River Catchment	958	27	2.9%	435	45.5%	495	51.7%
66730	Tibar	Riheu River Catchment	3,104	237	7.6%	1,916	61.7%	952	30.7%
66733	Tibar	Tacitolu Aggregate Catchment	58	15	25.9%	18	31.1%	25	43.2%
67210	Ulmera	Comluli Aggregate Catchment	2,984	269	9.0%	1,657	55.5%	1,058	35.5%
67211	Ulmera	Comoro River Catchment	914	81	8.9%	486	53.2%	346	37.9%
		Totals Bazartete AP	**18,693**	**1,375**	**7.4%**	**9,389**	**50.2%**	**7,929**	**42.4%**

Table 49. Land Area at Risk of Erosion in Bazartete AP



MAP- 24. Erosion Risk Map: Bazartete Administrative Post

Suco - Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Erosion Risk Category						Total Length of Roads	Length of Road in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Km	%	Km	%	Km	%
61911	Fahilebo	Comoro River Catchment	145	2	1.4%	65	44.8%	78	53.8%	0.0						
61927	Fahilebo	Moraeloa River Catchment	66	1	1.5%	19	28.8%	46	69.7%	0.0						
62208	Fatumasi	Caicassa River Catchment	65	0	0.0%	18	27.7%	47	72.3%	5.7	0.0	0.0%	1.2	20.4%	4.5	79.6%
62209	Fatumasi	Carbutaeloa River Catchment	102	0	0.0%	28	27.5%	74	72.5%	3.2	0.0	0.0%	1.0	32.3%	2.2	67.7%
62227	Fatumasi	Moraeloa River Catchment	95	2	2.1%	27	28.4%	66	69.5%	2.3	0.0	0.0%	0.3	11.0%	2.1	89.0%
63308	Lauhata	Caicassa River Catchment	233	32	13.7%	166	71.2%	35	15.0%	7.2	1.5	21.4%	4.4	61.1%	1.3	17.5%
63309	Lauhata	Carbutaeloa River Catchment	221	16	7.2%	160	72.4%	45	20.4%	8.1	1.3	15.7%	5.4	67.2%	1.4	17.0%
63312	Lauhata	Emeta AggregateCatchment	102	11	10.8%	91	89.2%	0	0.0%	2.0	0.3	16.2%	1.7	83.8%	0.0	0.0%
63315	Lauhata	Inur Pilila Aggregate Catchment	53	6	11.3%	47	88.7%	0	0.0%	4.9	1.9	38.6%	2.7	54.3%	0.3	7.1%
63327	Lauhata	Moraeloa River Catchment	22	2	9.1%	20	90.9%	0	0.0%	0.3	0.1	26.8%	0.2	73.2%	0.0	0.0%
63809	Leorema	Carbutaeloa River Catchment	15	0	0.0%	6	40.0%	9	60.0%	0.1	0.0	0.0%	0.0	0.0%	0.1	100.0%
63811	Leorema	Comoro River Catchment	401	1	0.2%	127	31.7%	273	68.1%	8.7	0.1	0.9%	4.2	48.6%	4.4	50.5%
63822	Leorema	Lois River Catchment	352	5	1.4%	128	36.4%	219	62.2%	9.7	0.4	3.7%	6.2	63.7%	3.1	32.6%
63827	Leorema	Moraeloa River Catchment	25	1	4.0%	7	28.0%	17	68.0%	1.2	0.0	0.0%	0.1	8.6%	1.1	91.4%
65109	Maumeta	Carbutaeloa River Catchment	56	4	7.1%	26	46.4%	26	46.4%	0.5	0.0	0.0%	0.3	61.0%	0.2	39.0%
65112	Maumeta	Emeta AggregateCatchment	262	23	8.8%	238	90.8%	1	0.4%	10.8	1.5	13.8%	9.3	86.2%	0.0	0.0%
65113	Maumeta	Gularloa River Catchment	165	22	13.3%	128	77.6%	15	9.1%	5.3	1.3	24.6%	3.6	69.1%	0.3	6.4%
65309	Metagou	Carbutaeloa River Catchment	157	0	0.0%	29	18.5%	128	81.5%	2.4	0.0	0.0%	1.1	43.4%	1.4	56.6%
65313	Metagou	Gularloa River Catchment	115	0	0.0%	70	60.9%	45	39.1%	4.7	0.0	0.0%	2.7	57.2%	2.0	42.8%
65322	Metagou	Lois River Catchment	13	0	0.0%	5	38.5%	8	61.5%	0.0						
65508	Motaulun	Caicassa River Catchment	73	31	42.5%	42	57.5%	0	0.0%	1.9	0.5	25.9%	0.8	42.9%	0.6	31.2%
65510	Motaulun	Comluli Aggregate Catchment	96	13	13.5%	83	86.5%	0	0.0%	5.1	1.0	19.6%	4.1	80.4%	0.0	0.0%
65527	Motaulun	Moraeloa River Catchment	109	43	39.4%	61	56.0%	5	4.6%	1.5	0.3	23.6%	1.1	73.9%	0.0	2.6%
66710	Tibar	Comluli Aggregate Catchment	24	2	8.3%	12	50.0%	10	41.7%	2.4	0.5	22.3%	0.8	31.8%	1.1	45.9%
66711	Tibar	Comoro River Catchment	3	0	0.0%	3	100.0%	0	0.0%	0.0						
66730	Tibar	Riheu River Catchment	418	48	11.5%	348	83.3%	22	5.3%	16.0	2.6	16.2%	10.6	65.8%	2.9	17.9%
66733	Tibar	Tacitolu Aggregate Catchment	0							2.0	1.5	74.1%	0.5	25.9%	0.0	0.0%
67210	Ulmera	Comluli Aggregate Catchment	400	36	9.0%	307	76.8%	57	14.3%	8.8	1.1	12.1%	6.5	74.4%	1.2	13.5%
67211	Ulmera	Comoro River Catchment	81	4	4.9%	29	35.8%	48	59.3%	4.4	0.3	5.9%	2.1	47.9%	2.0	46.3%
		Totals Bazartete AP	**3,869**	**305**	**7.9%**	**2,290**	**59.2%**	**1,274**	**32.9%**	**119.1**	**16.1**	**13.5%**	**70.7**	**59.4%**	**32.2**	**27.1%**

Table 50. Houses and Roads at Risk of Erosion in Bazartete AP

Figure 34. Road itself eroding away. Ulmera Suco, Comoro River Catchment

Figure 35 – Extremely steep, cleared forest cover, cultivated fields in high-risk area for erosion. Metagou Suco, Carbutaeloa River Catchment

Figure 36 – Sparse vegetation on highly erodible soils. Near Lebulua, Ulmera Suco, Comoro

Suco -Catchment Code	*Suco* -Catchment		Total No. of Schools	Schools in Each Erosion Risk Category						Total No. of Health Facilities	Health Facilities in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Number	%	Number	%	Number	%
61911	Fahilebo	Comoro River Catchment	1	0	0.0%	0	0.0%	1	100.0%	1	0	0.0%	0	0.0%	1	100.0%
61927	Fahilebo	Moraeloa River Catchment	0							0						
62208	Fatumasi	Caicassa River Catchment	2	0	0.0%	0	0.0%	2	100.0%	1	0	0.0%	0	0.0%	1	100.0%
62209	Fatumasi	Carbutaeloa River Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
62227	Fatumasi	Moraeloa River Catchment	0							0						
63308	Lauhata	Caicassa River Catchment	1	0	0.0%	1	100.0%	0	0.0%	0						
63309	Lauhata	Carbutaeloa River Catchment	2	0	0.0%	2	100.0%	0	0.0%	0						
63312	Lauhata	Emeta AggregateCatchment	0							0						
63315	Lauhata	Inur Pilila Aggregate Catchment	0							0						
63327	Lauhata	Moraeloa River Catchment	0							0						
63809	Leorema	Carbutaeloa River Catchment	0							0						
63811	Leorema	Comoro River Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
63822	Leorema	Lois River Catchment	3	0	0.0%	3	100.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
63827	Leorema	Moraeloa River Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
65109	Maumeta	Carbutaeloa River Catchment	0							0						
65112	Maumeta	Emeta AggregateCatchment	1	0	0.0%	1	100.0%	0	0.0%	0						
65113	Maumeta	Gularloa River Catchment	0							0						
65309	Metagou	Carbutaeloa River Catchment	0							0						
65313	Metagou	Gularloa River Catchment	1	0	0.0%	0	0.0%	1	100.0%	1	0	0.0%	1	100.0%	0	0.0%
65322	Metagou	Lois River Catchment	0							0						
65508	Motaulun	Caicassa River Catchment	1	1	100.0%	0	0.0%	0	0.0%	0						
65510	Motaulun	Comluli Aggregate Catchment	1	1	100.0%	0	0.0%	0	0.0%	0						
65527	Motaulun	Moraeloa River Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
66710	Tibar	Comluli Aggregate Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
66711	Tibar	Comoro River Catchment	0							0						
66730	Tibar	Riheu River Catchment	2	2	100.0%	0	0.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
66733	Tibar	Tacitolu Aggregate Catchment	0							0						
67210	Ulmera	Comluli Aggregate Catchment	2	0	0.0%	2	100.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
67211	Ulmera	Comoro River Catchment	3	0	0.0%	2	66.7%	1	33.3%	0						
		Totals Bazartete AP	**25**	**4**	**16.0%**	**12**	**48.0%**	**9**	**36.0%**	**7**	**1**	**14.3%**	**4**	**57.1%**	**2**	**28.6%**

Table 51. Schools and Health Facilities at Risk of Erosion in Bazartete AP

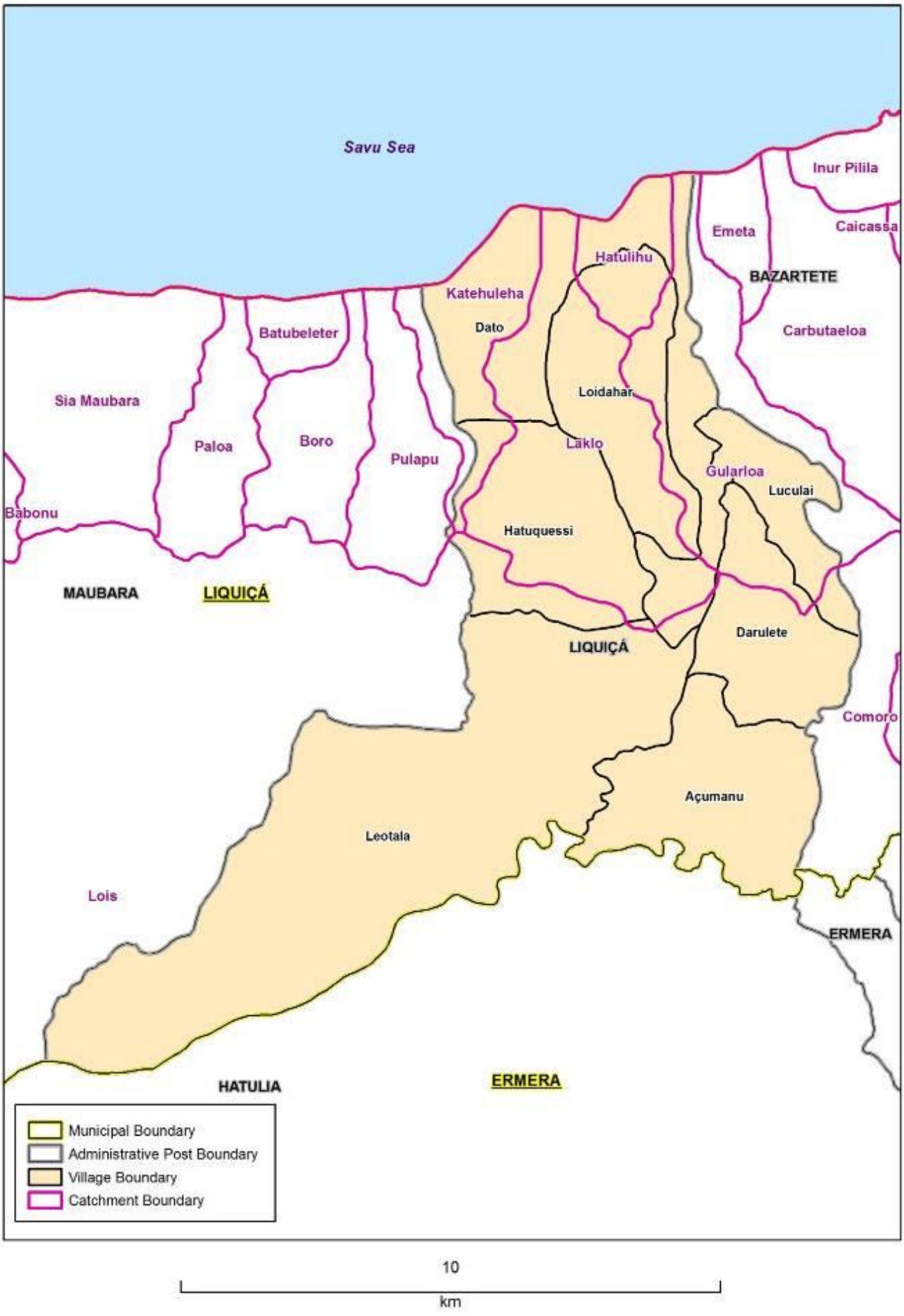
4.7 Risk Profile – Liquiçá Administrative Post

Liquiçá is a small administrative post with a total area of only 9,822 hectares, only slightly larger than Ermera AP. It has three distinct regions with different bio-physical characteristics contributing to potential for floods, landslides and erosion. The northern part of the AP is a narrow neck of land along the coast. This is a low-lying, gently rolling area, and as home to the capital city of the municipality, it is densely settled and relatively well-developed with infrastructure. South of the coastal zone, the land rises steeply into an area of high hills. Here population density is moderate, and land cover is a patchwork of forest, grassland and cultivated land. The hills continue all the way south to the Gleno River, which defines the border between Liquiçá AP and Hatulia AP. Towards the southwest is a very remote, sparsely populated region, where the terrain is less steep and the vegetation cover less disturbed. In the northern coastal area and this southwest corner of Liquiçá AP, flooding is the major weather-related threat; in the central highland region, landslides and erosion are the main problems.

Liquiçá AP has 7 *sucos* and is part of just 5 river catchments. The combination of the two produces the 17 *suco*-catchments shown in Table 52 and on Map 25. Half of the AP drains to the north, down the Laklo and Gularloa Rivers, and the other half drains to the west down the Lois River.

***Suco*-Catchment Code**	***Suco*-Catchment**		**Total Area**
70122	Açumanu	Lois River Catchment	1,091
71613	Darulete	Gularloa River Catchment	180
71622	Darulete	Lois River Catchment	592
71713	Dato	Gularloa River Catchment	372
71714	Dato	Hatulihu Aggregate Catchment	196
71718	Dato	Katehuleha Aggregate Catchment	482
71719	Dato	Laklo River Catchment	449
71722	Dato	Lois River Catchment	41
72818	Hatuquessi	Katehuleha Aggregate Catchment	88
72819	Hatuquessi	Laklo River Catchment	767
72822	Hatuquessi	Lois River Catchment	217
73922	Leotala	Lois River Catchment	3,916
74413	Loidahar	Gularloa River Catchment	214
74414	Loidahar	Hatulihu Aggregate Catchment	182
74419	Loidahar	Laklo River Catchment	586
74613	Luculai	Gularloa River Catchment	389
74622	Luculai	Lois River Catchment	60
		Totals Liquiçá AP	**9,822**

Table 52. Suco-Catchments in Liquiçá Administrative Post



MAP- 25. Sucos and Catchments of Liquiçá Administrative Post

Flood Risk in Liquiçá Administrative Post

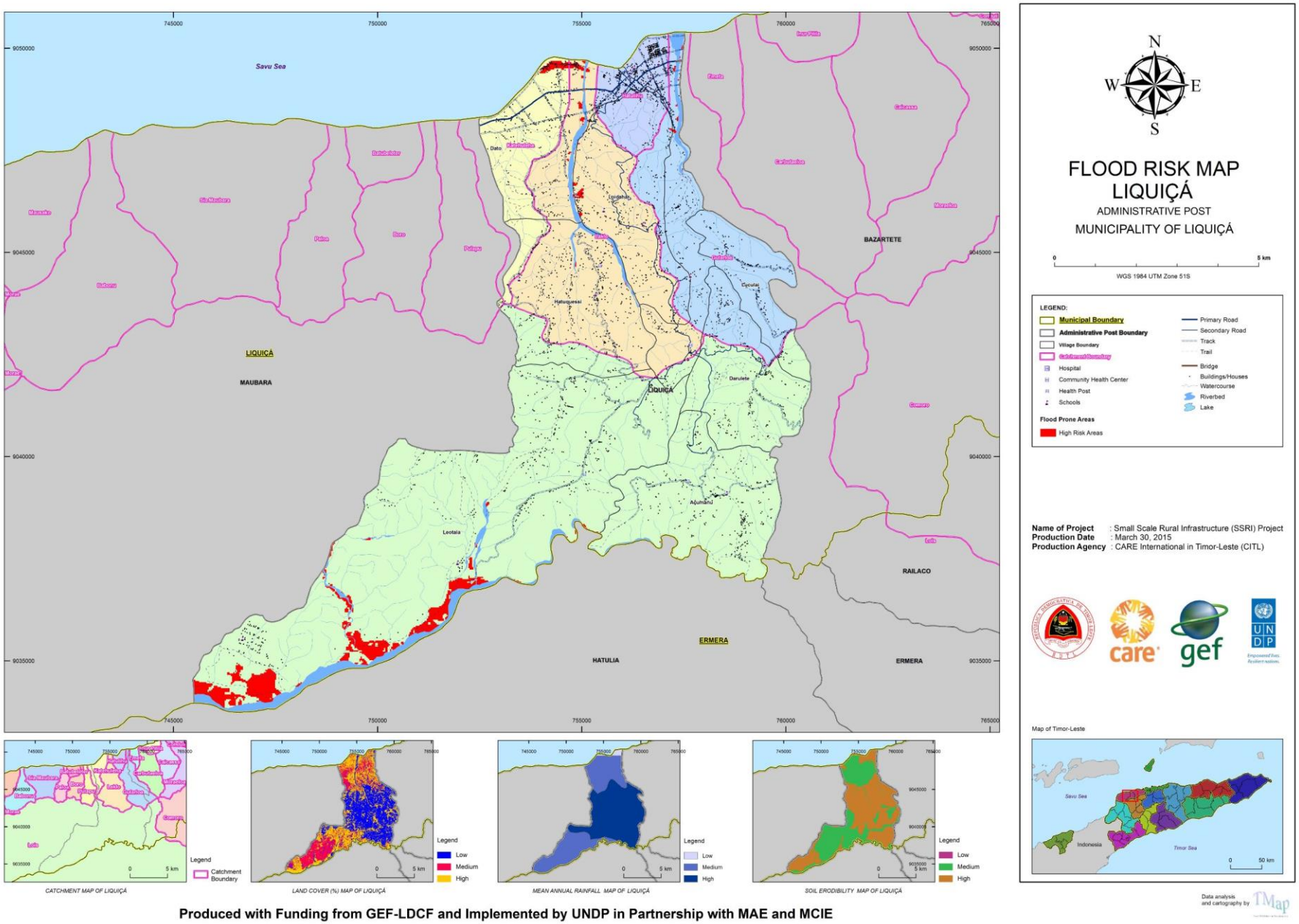
Most of the flooding in Liquiçá AP is likely to happen in the southwest, along the banks of the Lauveli River (Map 26). This is in the lower portions of the Leotala-Lois River *Suco*-Catchment. More than 300 hectares are prone to flooding here, which is 87% of the total flood-prone area for the entire AP. The nature of the threat is similar to that along the lower reaches of the Seiçal and Vemasse Rivers in Baucau Municipality, and the Lois River in Maubara and Hatulia APs. This is the broad, low-lying, flat flood plain of a large river with a large catchment area. Huge volumes of water flow down the Lauveli and Lois Rivers during peak flow, and naturally the water sometimes overflows its banks. Indeed, in some places farmers deliberately divert water onto the land, because they grow rice here, and rice thrives in flood conditions.

Leotala *Suco* is sparsely populated and does not have a lot of infrastructure. Only 1 house is considered to be located in the flood-prone area, and only 800 meters out of a total of more than 14 km of road are at risk.

The other area in which flooding is a significant threat is in the north, near the mouth of the Laklo River. This is a small area – only 27 hectares – but it is in a built-up, densely settled area, so the threats to infrastructure and communities are higher than in the southwest. Here the problem is similar to that farther east along the coast in Bazartete. Drainage to the sea is impeded by sediment deposits, by infrastructure and, occasionally, by extremely high tides. During and after major rain events, the Laklo River overflows its banks and spreads across adjacent farmland and settlements.

The impact of the flooding on infrastructure here is much more than it is in the area to the southwest. Fifty-five houses in Dato *Suco* are at-risk of being flooded. This *represents* almost 12% of the total number of houses in Dato-Katehuleha and Dato-Laklo *Suco*-Catchments. In these same 2 *suco*-catchments, and in neighbouring Dato-Gularloa *Suco*-Catchment, 1.6km out of 22.0km (7.3%) of road is threatened with either being inundated or washed away.

The 1 school in Liquiçá that is considered to be in the flood-risk zone is Laclolema Primary School in the Loidahar-Laklo River *Suco*-Catchment. This school is located upstream from the area near the mouth of the river described above. It is located on the east bank of the Laklo River, less than 70 metres from the river channel itself.



Produced with Funding from GEF-LDCF and Implemented by UNDP in Partnership with MAE and MCIE

MAP- 26. Flood Risk Map: Liquiçá Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Land Area			Houses			Schools			Health Facilities			Roads		
			Total Area	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total Km	In Flood Risk Zone	
				Hectares	%	Number	Number	%	Number	Number	%	Number	Number	%		Km	%
70122	Açumanu	Lois River Catchment	1,091	1	0.1%	330	0	0.0%	1	0	0.0%	1	0	0.0%	8.7	0.0	0.0%
71613	Darulete	Gularloa River Catchment	180	0	0.0%	88	0	0.0%	0			0			0.4	0.0	0.0%
71622	Darulete	Lois River Catchment	592	0	0.0%	174	0	0.0%	1	0	0.0%	1	0	0.0%	7.3	0.0	0.0%
71713	Dato	Gularloa River Catchment	372	10	2.7%	141	0	0.0%	1	0	0.0%	0			2.5	0.4	15.3%
71714	Dato	Hatulihu Aggregate Catchment	196	0	0.0%	631	0	0.0%	5	0	0.0%	0			12.4	0.0	0.0%
71718	Dato	Katehuleha Aggregate Catchment	482	12	2.5%	256	34	13.3%	0			0			13.5	0.8	5.9%
71719	Dato	Laklo River Catchment	449	15	3.3%	204	21	10.3%	1	0	0.0%	1	0	0.0%	6.0	0.4	6.0%
71722	Dato	Lois River Catchment	41	0	0.0%	27	0	0.0%	0			0			1.0	0.0	0.0%
72818	Hatuquessi	Katehuleha Aggregate Catchment	88	0	0.0%	25	0	0.0%	0			0			2.2	0.0	0.0%
72819	Hatuquessi	Laklo River Catchment	767	1	0.2%	411	0	0.0%	2	0	0.0%	1	0	0.0%	7.5	0.0	0.0%
72822	Hatuquessi	Lois River Catchment	217	0	0.0%	81	0	0.0%	0			0			2.0	0.0	0.0%
73922	Leotala	Lois River Catchment	3,916	302	7.7%	568	1	0.2%	3	0	0.0%	1	0	0.0%	14.3	0.1	0.8%
74413	Loidahar	Gularloa River Catchment	214	0	0.2%	117	0	0.0%	0			1	0	0.0%	0.7	0.0	0.0%
74414	Loidahar	Hatulihu Aggregate Catchment	182	0	0.0%	105	0	0.0%	1	0	0.0%	1	0	0.0%	2.0	0.0	0.0%
74419	Loidahar	Laklo River Catchment	586	5	0.9%	298	9	3.0%	3	1	33.3%	0			8.2	0.0	0.0%
74613	Luculai	Gularloa River Catchment	389	0	0.0%	148	0	0.0%	0			0			4.3	0.0	0.0%
74622	Luculai	Lois River Catchment	60	0	0.0%	23	0	0.0%	0			0			0.2	0.0	0.0%
		Totals Liquiçá AP	**9,822**	**347**	**3.5%**	**3,627**	**65**	**1.8%**	**18**	**1**	**5.6%**	**7**	**0**	**0.0%**	**93**	**1.6**	**1.8%**

Table 53. Risk Statistics for Flooding in Liquiçá AP

Landslide Risk in Liquiçá Administrative Post

The threat of landslides in Liquiçá AP is very much confined to the middle zone – the steep, remote region high above the flood-prone areas of the north coast and the Lauveli River floodplain in the southwest (Map 27). Though the conditions are not as extreme as they are in Quelicai or parts of Ermera APs, landslide risk is still widespread here. The risk tends to be less severe, with larger areas of low risk and smaller areas of high risk. Out of a total area of 9,822 hectares, 851 hectares (8.7%) are considered low-risk, 471 hectares (4.8%) are considered medium risk, and 291 hectares (3.0%) are considered high-risk for landslides.

				Area of Land in Each Landslide Risk Category							
Suco -Catchment Code	*Suco* -Catchment		Total Hectares	No Risk		Low Risk		Medium Risk		High Risk	
				Hectares	%	Hectares	%	Hectares	%	Hectares	%
70122	Açumanu	Lois River Catchment	1,091	741	67.9%	203	18.6%	71	6.5%	76	7.0%
71613	Darulete	Gularloa River Catchment	180	125	69.2%	35	19.4%	8	4.3%	13	7.1%
71622	Darulete	Lois River Catchment	592	525	88.7%	54	9.1%	5	0.9%	8	1.3%
71713	Dato	Gularloa River Catchment	372	254	68.2%	32	8.6%	63	17.0%	23	6.2%
71714	Dato	Hatulihu Aggregate Catchment	196	196	100.0%	0	0.0%	0	0.0%	0	0.0%
71718	Dato	Katehuleha Aggregate Catchment	482	470	97.5%	9	1.8%	3	0.7%	0	0.0%
71719	Dato	Laklo River Catchment	449	381	84.9%	28	6.3%	23	5.1%	17	3.7%
71722	Dato	Lois River Catchment	41	35	85.2%	5	13.3%	0	0.2%	1	1.3%
72818	Hatuquessi	Katehuleha Aggregate Catchment	88	62	70.9%	5	5.5%	19	21.7%	2	2.0%
72819	Hatuquessi	Laklo River Catchment	767	575	75.0%	115	15.0%	38	4.9%	39	5.1%
72822	Hatuquessi	Lois River Catchment	217	186	85.8%	25	11.4%	4	1.7%	3	1.2%
73922	Leotala	Lois River Catchment	3,916	3,513	89.7%	171	4.4%	176	4.5%	56	1.4%
74413	Loidahar	Gularloa River Catchment	214	212	99.1%	1	0.4%	1	0.5%	0	0.0%
74414	Loidahar	Hatulihu Aggregate Catchment	182	179	98.3%	1	0.3%	3	1.4%	0	0.0%
74419	Loidahar	Laklo River Catchment	586	469	80.1%	65	11.2%	35	5.9%	17	2.9%
74613	Luculai	Gularloa River Catchment	389	236	60.7%	99	25.5%	23	5.8%	31	8.1%
74622	Luculai	Lois River Catchment	60	50	83.3%	3	5.6%	0	0.5%	6	10.7%
		Totals Liquiçá AP	**9,822**	**8,209**	**83.6%**	**851**	**8.7%**	**471**	**4.8%**	**291**	**3.0%**

Table 54. Land Area at Risk of Landslides in Liquiçá AP

Açumanu and Leotala are the *sucos* where you are most likely to encounter landslides. These are the two *sucos* in the southern part of the AP, and both of them are entirely within the Lois River Catchment. Leotala *Suco* has the largest total at-risk area, with 403 hectares, representing more than 10% of its total area. In Açumanu, a smaller area of 350 hectares is considered to be at some level of risk for landslides, but this represents 32% of the total area of the *suco*, making Açumanu one of the most landslide-prone *sucos* included in this study. In terms of percentage of total area of *sucos* at-risk for landslides, Açumanu is comparable with Fatumasi in Bazartete AP (31%), Laisorolai de Cima in Quelicai AP (28%), Ponilala in Ermera AP (25%), and Mau-Ubo in Hatulia AP (23%).

				Houses in Each Landslide Risk Category							
Suco -Catchment Code	*Suco* -Catchment		Total No. of Houses	No Risk		Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%	Number	%
70122	Açumanu	Lois River Catchment	330	280	84.8%	30	9.1%	7	2.1%	13	3.9%
71613	Darulete	Gularloa River Catchment	88	78	88.6%	8	9.1%	0	0.0%	2	2.3%
71622	Darulete	Lois River Catchment	174	170	97.7%	3	1.7%	0	0.0%	1	0.6%
71713	Dato	Gularloa River Catchment	141	109	77.3%	6	4.3%	16	11.3%	10	7.1%
71714	Dato	Hatulihu Aggregate Catchment	631	631	100.0%	0	0.0%	0	0.0%	0	0.0%
71718	Dato	Katehuleha Aggregate Catchment	256	256	100.0%	0	0.0%	0	0.0%	0	0.0%
71719	Dato	Laklo River Catchment	204	189	92.6%	7	3.4%	5	2.5%	3	1.5%
71722	Dato	Lois River Catchment	27	26	96.3%	1	3.7%	0	0.0%	0	0.0%
72818	Hatuquessi	Katehuleha Aggregate Catchment	25	23	92.0%	1	4.0%	1	4.0%	0	0.0%
72819	Hatuquessi	Laklo River Catchment	411	333	81.0%	46	11.2%	10	2.4%	22	5.4%
72822	Hatuquessi	Lois River Catchment	81	74	91.4%	6	7.4%	0	0.0%	1	1.2%
73922	Leotala	Lois River Catchment	568	533	93.8%	14	2.5%	13	2.3%	8	1.4%
74413	Loidahar	Gularloa River Catchment	117	117	100.0%	0	0.0%	0	0.0%	0	0.0%
74414	Loidahar	Hatulihu Aggregate Catchment	105	105	100.0%	0	0.0%	0	0.0%	0	0.0%
74419	Loidahar	Laklo River Catchment	298	260	87.2%	28	9.4%	5	1.7%	5	1.7%
74613	Luculai	Gularloa River Catchment	148	133	89.9%	8	5.4%	3	2.0%	4	2.7%
74622	Luculai	Lois River Catchment	23	23	100.0%	0	0.0%	0	0.0%	0	0.0%
		Totals Liquiçá AP	**3,627**	**3,340**	**92.1%**	**158**	**4.4%**	**60**	**1.7%**	**69**	**1.9%**

Table 55. Houses at Risk of Landslides in Liquiçá AP

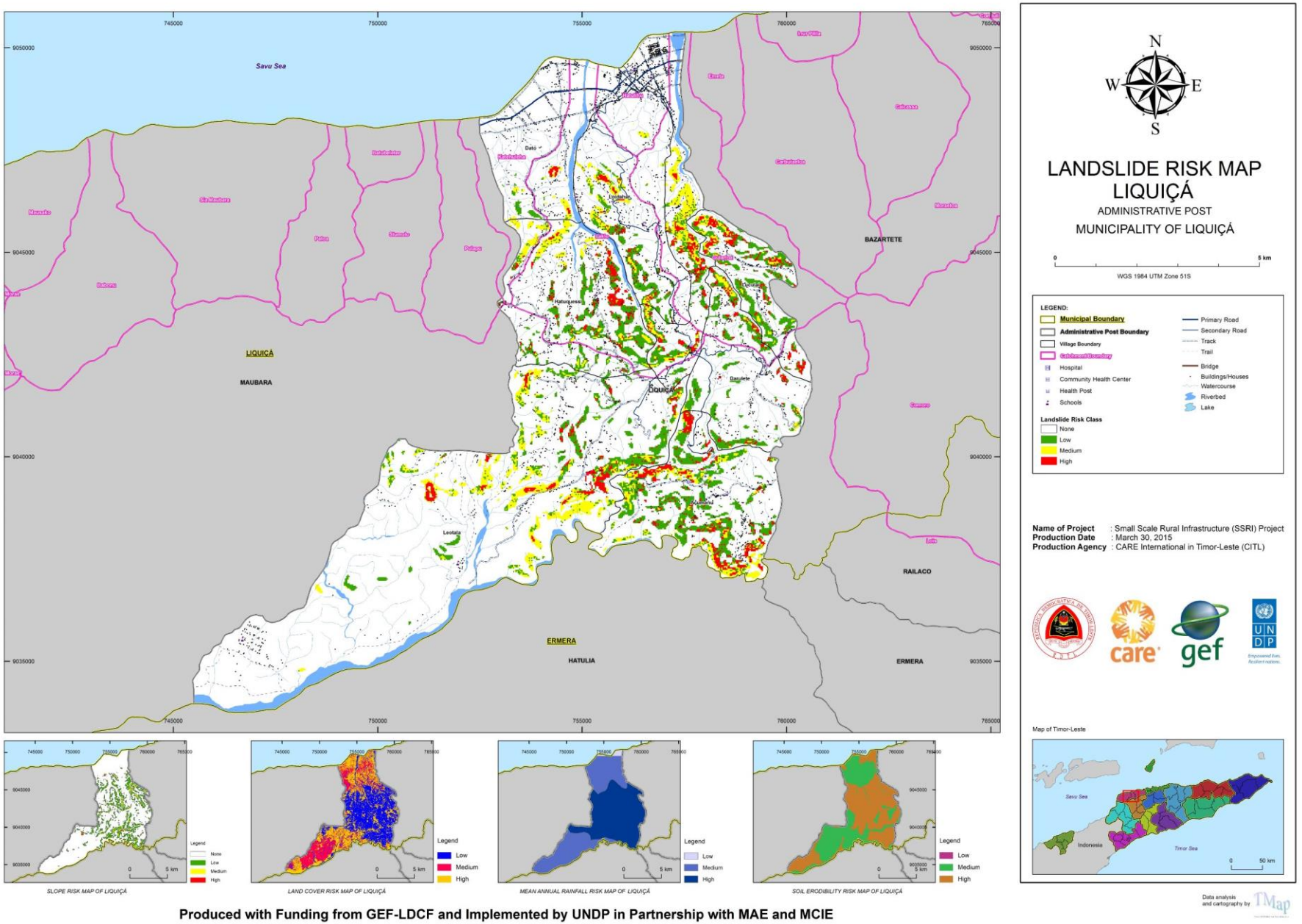
In terms of infrastructure, landslides pose a bigger threat in Liquiçá AP than in any of the other 7 APs covered in this study. Of the Liquiçá AP's total stock of 3,627 houses, 287 (7.9%) of them are in low-, medium- or high-risk areas for landslides. This is both the highest number of houses and the highest percentage for any of the 8 APs. Bazartete AP has the second highest number of houses at-risk of landslides with 205 (5.3%), Maubara AP is next with 173 (4.3%), then Hatulia AP with 176 (3.0%) and Quelicai with 144 (3.0%).

The *sucos* with the most at-risk houses are Hatuquessi with 87, Açumanu (50), Dato (48) and Loidahar (38.). Of these, Hatuquessi has the highest number in the medium and high risk categories, with 32.

Whereas 7.9% of the houses in Liquiçá AP are considered under threat from landslides, the proportion for roads is slightly lower, at 6.9%. This figure represents 6.5km of at-roads at-risk, out of a total length of 93.1km. Most of the sections of vulnerable road are not considered to be at high-risk from landslides, with 3.4km in the low-risk category, 2.1km in the medium risk category, and only 1.0km in the high-risk category. Açumanu is again the *suco* with the biggest potential problem. Of its 8.7km of road, 1.8km (21%) is considered at risk, most of this in the low-risk category. Hatuquessi *Suco* also has 1.8km (15%) of its roads under threat from landslides, and Loidahar and Leotala *Sucos* have 0.9km each at-risk.

			Total	Length of Road in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
Suco -Catchment Code	*Suco* -Catchment		Length of Roads (Km)	Km	%	Km	%	Km	%	Km	%
70122	Açumanu	Lois River Catchment	8.7	7.0	80.3%	1.2	13.6%	0.3	3.0%	0.3	3.1%
71613	Darulete	Gularloa River Catchment	0.4	0.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
71622	Darulete	Lois River Catchment	7.3	6.7	91.8%	0.3	4.2%	0.3	4.0%	0.0	0.0%
71713	Dato	Gularloa River Catchment	2.5	2.5	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
71714	Dato	Hatulihu Aggregate Catchment	12.4	12.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
71718	Dato	Katehuleha Aggregate Catchment	13.5	13.5	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
71719	Dato	Laklo River Catchment	6.0	5.6	93.1%	0.1	2.2%	0.1	2.1%	0.2	2.6%
71722	Dato	Lois River Catchment	1.0	1.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
72818	Hatuquessi	Katehuleha Aggregate Catchment	2.2	1.7	74.4%	0.1	4.0%	0.5	20.4%	0.0	1.2%
72819	Hatuquessi	Laklo River Catchment	7.5	6.9	92.3%	0.3	3.6%	0.1	1.3%	0.2	2.9%
72822	Hatuquessi	Lois River Catchment	2.0	1.5	75.2%	0.3	16.0%	0.1	4.9%	0.1	3.9%
73922	Leotala	Lois River Catchment	14.3	13.4	94.0%	0.5	3.5%	0.3	2.1%	0.1	0.4%
74413	Loidahar	Gularloa River Catchment	0.7	0.7	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
74414	Loidahar	Hatulihu Aggregate Catchment	2.0	2.0	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
74419	Loidahar	Laklo River Catchment	8.2	7.4	89.6%	0.3	3.6%	0.4	4.8%	0.2	2.1%
74613	Luculai	Gularloa River Catchment	4.3	3.9	91.2%	0.3	6.4%	0.1	1.4%	0.0	1.0%
74622	Luculai	Lois River Catchment	0.2	0.2	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
		Totals Liquiçá AP	**93.1**	**86.7**	**93.1%**	**3.4**	**3.6%**	**2.1**	**2.2%**	**1.0**	**1.1%**

Table 56. Roads at Risk of Landslides in Liquiçá AP



MAP- 27. Landslide Risk Map: Liquiçá Administrative Post

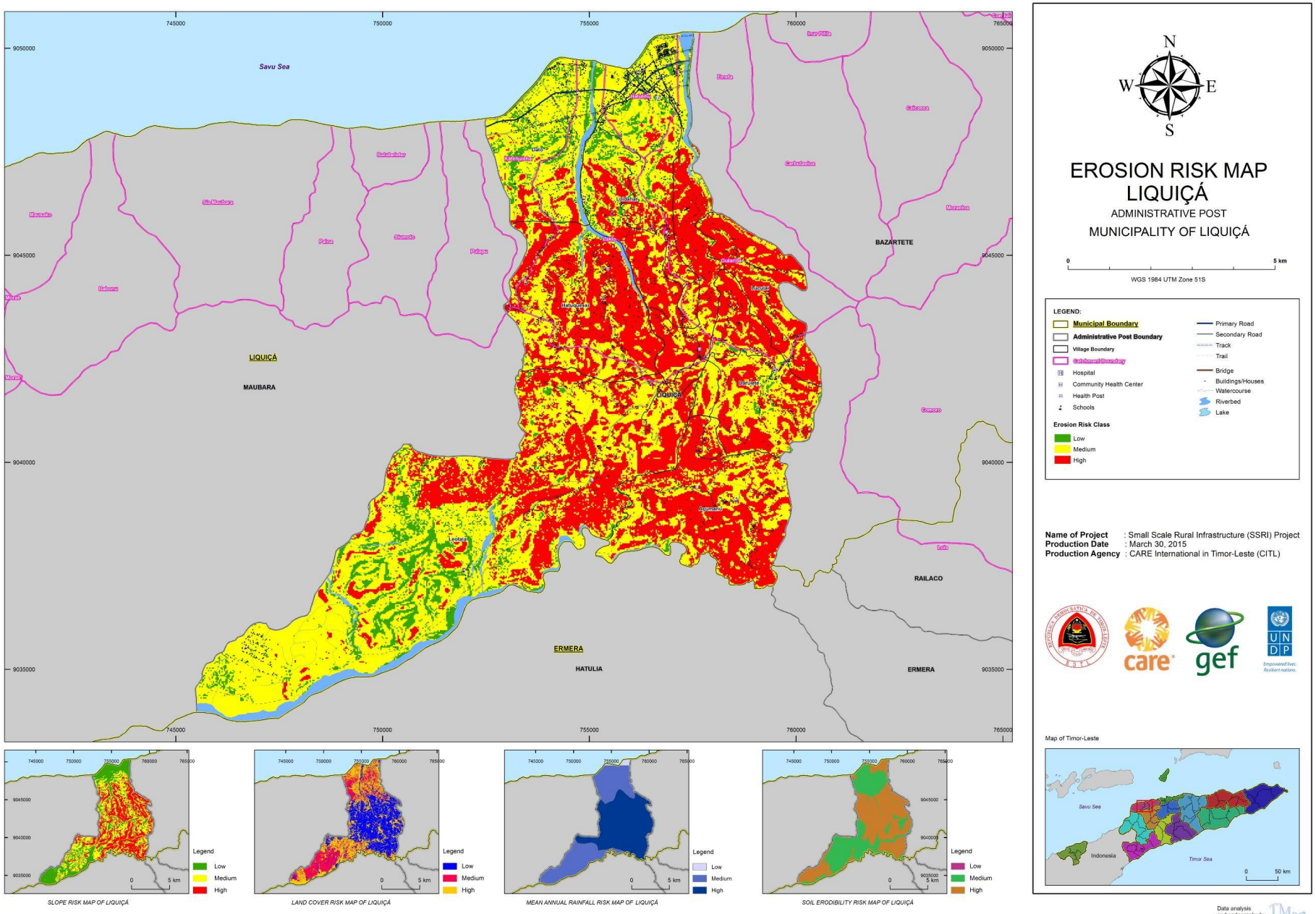
Erosion Risk in Liquiçá Administrative Post

The distribution of erosion risk in Liquiçá AP closely matches that of landslide risk – relatively high in the middle, upland zone, and relatively low on the gentler slopes in the north and southwest. As in other APs in this part of the country, most of Liquiçá is considered very prone to erosion, with only 9.2% of the land area in the low-risk category, 51.8% in the medium risk category, and 39% in high risk category (Map 28). The familiar upstream-downstream relationship appears again – high potential for erosion and landslides in upper catchments, closely linked with high potential for flooding downstream in the same catchments. In this particular AP, the catchments with most severe erosion problems are the Lois, Laklo and Gularloa River Catchments. Note that much of the soil and rock eroded from the upper sections of the Lois River Catchment in Liquiçá AP is 'exported' to other administrative areas in the lower catchment, namely Hatulia, Atabae and Maubara APs. It is important to take the implications of these trans-boundary linkages into account when planning and implementing development programs, including the building and maintenance of infrastructure.

The *sucos* most vulnerable to landslides also have the highest relative potential for erosion. By far the largest area of erosion risk is in Leotala *Suco* in the Lois River Catchment. Here, 3,437 out of a total of 3,916 hectares (87.8%) are considered to be medium- or high-risk for erosion. Smaller areas of land are involved in Açumanu and Hatuquessi *Sucos*, but the proportions at risk are even higher than Leotala's 87.8%. In Hatuquessi, 1,053 out of 1,072 hectares (98.3%) are at medium- to high-risk, and in Açumanu, the number is 1,079 out of 1,091 hectares (98.9%).

				Area of Land in Each Erosion Risk Category					
Suco -Catchment			Total	Low Risk		Medium Risk		High Risk	
Code	*Suco* -Catchment		Hectares	Hectares	%	Hectares	%	Hectares	%
70122	Açumanu	Lois River Catchment	1,091	13	1.1%	416	38.1%	663	60.7%
71613	Darulete	Gularloa River Catchment	180	2	1.0%	55	30.3%	124	68.7%
71622	Darulete	Lois River Catchment	592	19	3.3%	320	54.1%	253	42.7%
71713	Dato	Gularloa River Catchment	372	43	11.7%	122	32.7%	207	55.6%
71714	Dato	Hatulihu Aggregate Catchment	196	28	14.4%	168	85.7%	0	0.0%
71718	Dato	Katehuleha Aggregate Catchment	482	107	22.1%	342	71.0%	33	6.9%
71719	Dato	Laklo River Catchment	449	80	17.8%	242	53.9%	127	28.3%
71722	Dato	Lois River Catchment	41	0	0.1%	19	46.7%	22	53.2%
72818	Hatuquessi	Katehuleha Aggregate Catchment	88	1	1.3%	31	35.5%	55	63.1%
72819	Hatuquessi	Laklo River Catchment	767	16	2.1%	252	32.9%	499	65.0%
72822	Hatuquessi	Lois River Catchment	217	1	0.6%	132	60.8%	84	38.6%
73922	Leotala	Lois River Catchment	3,916	479	12.2%	2,352	60.1%	1,085	27.7%
74413	Loidahar	Gularloa River Catchment	214	14	6.7%	124	57.9%	76	35.4%
74414	Loidahar	Hatulihu Aggregate Catchment	182	36	20.0%	131	71.9%	15	8.1%
74419	Loidahar	Laklo River Catchment	586	57	9.6%	262	44.7%	268	45.7%
74613	Luculai	Gularloa River Catchment	389	3	0.8%	107	27.5%	279	71.8%
74622	Luculai	Lois River Catchment	60	1	1.9%	17	27.9%	42	70.2%
		Totals Liquiçá AP	**9,822**	**901**	**9.2%**	**5,090**	**51.8%**	**3,831**	**39.0%**

Table 57. Land Area at Risk of Erosion in Liquiçá AP



Produced with Funding from GEF-LDCF and Implemented by UNDP in Partnership with MAE and MCIE

MAP- 28. Erosion Risk Map: Liquiçá Administrative Post

Suco - Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Erosion Risk Category						Total Length of Roads	Length of Road in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Km	%	Km	%	Km	%
70122	Açumanu	Lois River Catchment	330	1	0.3%	132	40.0%	197	59.7%	8.7	0.1	1.4%	4.3	49.5%	4.3	49.1%
71613	Darulete	Gularloa River Catchment	88	0	0.0%	36	40.9%	52	59.1%	0.4	0.1	34.3%	0.2	51.0%	0.1	14.7%
71622	Darulete	Lois River Catchment	174	10	5.7%	94	54.0%	70	40.2%	7.3	0.4	5.5%	4.7	65.2%	2.1	29.4%
71713	Dato	Gularloa River Catchment	141	12	8.5%	60	42.6%	69	48.9%	2.5	1.0	39.0%	1.5	61.0%	0.0	0.0%
71714	Dato	Hatulihu Aggregate Catchment	631	103	16.3%	528	83.7%	0	0.0%	12.4	2.4	19.6%	9.9	80.4%	0.0	0.0%
71718	Dato	Katehuleha Aggregate Catchment	256	62	24.2%	194	75.8%	0	0.0%	13.5	3.2	23.6%	10.2	75.8%	0.1	0.6%
71719	Dato	Laklo River Catchment	204	17	8.3%	149	73.0%	38	18.6%	6.0	1.2	19.4%	3.7	61.4%	1.2	19.2%
71722	Dato	Lois River Catchment	27	0	0.0%	14	51.9%	13	48.1%	1.0	0.0	0.0%	0.6	59.0%	0.4	41.0%
72818	Hatuquessi	Katehuleha Aggregate Catchment	25	0	0.0%	9	36.0%	16	64.0%	2.2	0.0	0.0%	0.7	30.0%	1.6	70.0%
72819	Hatuquessi	Laklo River Catchment	411	7	1.7%	137	33.3%	267	65.0%	7.5	0.0	0.7%	3.8	51.1%	3.6	48.2%
72822	Hatuquessi	Lois River Catchment	81	0	0.0%	51	63.0%	30	37.0%	2.0	0.0	0.0%	0.8	41.2%	1.2	58.8%
73922	Leotala	Lois River Catchment	568	32	5.6%	343	60.4%	193	34.0%	14.3	0.3	2.1%	10.1	70.5%	3.9	27.4%
74413	Loidahar	Gularloa River Catchment	117	8	6.8%	79	67.5%	30	25.6%	0.7	0.0	2.4%	0.5	65.8%	0.2	31.9%
74414	Loidahar	Hatulihu Aggregate Catchment	105	21	20.0%	84	80.0%	0	0.0%	2.0	0.1	7.3%	1.8	92.7%	0.0	0.0%
74419	Loidahar	Laklo River Catchment	298	35	11.7%	128	43.0%	135	45.3%	8.2	1.0	12.7%	4.0	48.5%	3.2	38.8%
74613	Luculai	Gularloa River Catchment	148	0	0.0%	69	46.6%	79	53.4%	4.3	0.1	1.4%	2.1	48.2%	2.2	50.3%
74622	Luculai	Lois River Catchment	23	7	30.4%	11	47.8%	5	21.7%	0.2	0.1	59.5%	0.0	14.3%	0.1	26.2%
		Totals Liquiçá AP	**3,627**	**315**	**8.7%**	**2,118**	**58.4%**	**1,194**	**32.9%**	**93.1**	**10.1**	**10.9%**	**59.0**	**63.3%**	**24.0**	**25.8%**

Table 58. Houses and Roads at Risk of Erosion in Liquiçá AP

Suco -Catchment Code	*Suco* -Catchment		Total No. of Schools	Schools in Each Erosion Risk Category						Total No. of Health Facilities	Health Facilities in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Number	%	Number	%	Number	%
70122	Açumanu	Lois River Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	0	0.0%	0	0.0%	1	100.0%
71613	Darulete	Gularloa River Catchment	0							0						
71622	Darulete	Lois River Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
71713	Dato	Gularloa River Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
71714	Dato	Hatulihu Aggregate Catchment	5	2	40.0%	3	60.0%	0	0.0%	0	0		0		0	
71718	Dato	Katehuleha Aggregate Catchment	0							0						
71719	Dato	Laklo River Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	0	0.0%	0	0.0%	1	100.0%
71722	Dato	Lois River Catchment	0							0						
72818	Hatuquessi	Katehuleha Aggregate Catchment	0							0	0					
72819	Hatuquessi	Laklo River Catchment	2	0	0.0%	1	50.0%	1	50.0%	1	0	0.0%	0	0.0%	1	100.0%
72822	Hatuquessi	Lois River Catchment	0							0						
73922	Leotala	Lois River Catchment	3	0	0.0%	2	66.7%	1	33.3%	1	0	0.0%	0	0.0%	1	100.0%
74413	Loidahar	Gularloa River Catchment	0							1	0	0.0%	0	0.0%	1	100.0%
74414	Loidahar	Hatulihu Aggregate Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
74419	Loidahar	Laklo River Catchment	3	0	0.0%	1	33.3%	2	66.7%	0						
74613	Luculai	Gularloa River Catchment	0							0						
74622	Luculai	Lois River Catchment	0							0						
		Totals Liquiçá AP	**18**	**2**	**11.1%**	**11**	**61.1%**	**5**	**27.8%**	**7**	**1**	**14.3%**	**1**	**14.3%**	**5**	**71.4%**

Table 59. Schools and Health Facilities at Risk of Erosion in Liquiçá AP

2.4.8 Risk Profile – Maubara Administrative Post

Maubara is a large and diverse administrative post, and because of these attributes it probably has the most varied risk profile of any of the 8 APs included in this study. All three types of risk manifest themselves in Maubara, with extensive areas prone to flooding in the south, significant risks of landslides in the steep central and western uplands, and varying degrees of erosion risk across the entire territory. This diversity is in part reflected in the administrative structure and the drainage patterns in Maubara AP. Seven *sucos* and 13 river catchments combine to produce a total of 24 *suco*-catchments. These are listed in Table 60 and shown on Map 29.

The northern part of Maubara is divided up among 11 *suco*-catchments of varying size and with varying characteristics. Some of them, such as the Bautu, Morae, Babono, Boro, Paloa and Pulapu River Catchments, are associated with individual rivers; others, such as the Kaikasa, Batubeleter, Katehuleha, Mausako and Sia Maubara Aggregate Catchments are not. As the word 'aggregate' in the name implies, these are generalized, medium-sized amalgamations of smaller catchments, usually in areas where there isn't a single, major river channel. Aggregate catchments are often found in generally flat areas near the coast, where small streams and drainage channels meander about and flow into the sea in numerous places. It is not uncommon for the mouths of these channels to move up and down the coast.

In Maubara, the Lois River Catchment occupies almost the entire southern half of the AP. Six of Maubara's 7 *sucos* occupy parts of the Lois Catchment – only Vaviquinia in the north is entirely outside it. As the following sections will explain, almost all of the flood-prone land in Maubara AP is in the Lois River Catchment, but the most serious threats from landslides and erosion are in other catchments that drain to the north and west.

***Suco* -Catchment Code**	***Suco* -Catchment**		**Total Area**
82401	Gugleur	Babono River Catchment	11
82404	Gugleur	Bautu River Catchment	545
82417	Gugleur	Kaikasa Aggregate Catchment	295
82422	Gugleur	Lois River Catchment	2,273
82426	Gugleur	Morae River Catchment	1,132
82522	Guiço	Lois River Catchment	3,317
84122	Lissadila	Lois River Catchment	5,495
85001	Maubaralissa	Babono River Catchment	765
85022	Maubaralissa	Lois River Catchment	487
87404	Vatuboro	Bautu River Catchment	336
87422	Vatuboro	Lois River Catchment	2,350
87431	Vatuboro	Sanakiana Aggregate Catchment	2,133
87501	Vatuvou	Babono River Catchment	79
87502	Vatuvou	Batubeleter Aggregate Catchment	238
87506	Vatuvou	Boro River Catchment	651
87518	Vatuvou	Katehuleha Aggregate Catchment	158
87522	Vatuvou	Lois River Catchment	1,491
87524	Vatuvou	Sia Maubara Aggregate Catchment	1,374
87528	Vatuvou	Paloa River Catchment	621
87529	Vatuvou	Pulapu River Catchment	696
87601	Vaviquinia	Babono River Catchment	439
87624	Vaviquinia	Sia Maubara Aggregate Catchment	313
87625	Vaviquinia	Mausako Aggregate Catchment	771
87626	Vaviquinia	Morae River Catchment	423
		Totals Maubara AP	**26,394**

Table 60. Suco-Catchments in Maubara Administrative Post

MAP- 29. Sucos and Catchments of Maubara Administrative Post

Flood Risk in Maubara Administrative Post

Two-thousand one hundred and fifty-three hectares in Maubara AP is susceptible to flooding. This represents 8.2% of the total area of the AP, which is 26,394 hectares. Apart from two small patches of flood-prone land on the north coast near the towns of Maubara and Liquiçá, which together occupy only 84 hectares of land, the flood risk is all found along the banks of the Lois River and some of its larger tributaries. As Map 30 shows, the Lois is a large river draining a large catchment area, and its flooding potential is quite extensive.

The *sucos* most at risk of flooding within the Lois River Catchment include Vatuboro, where 665 hectares (28.3%) are in the flood-risk zone, Guiço, with 572 hectares (17.3%), Lissadila with 529 hectares (9.6%) and Gugleur with 279 hectares (12.3%).

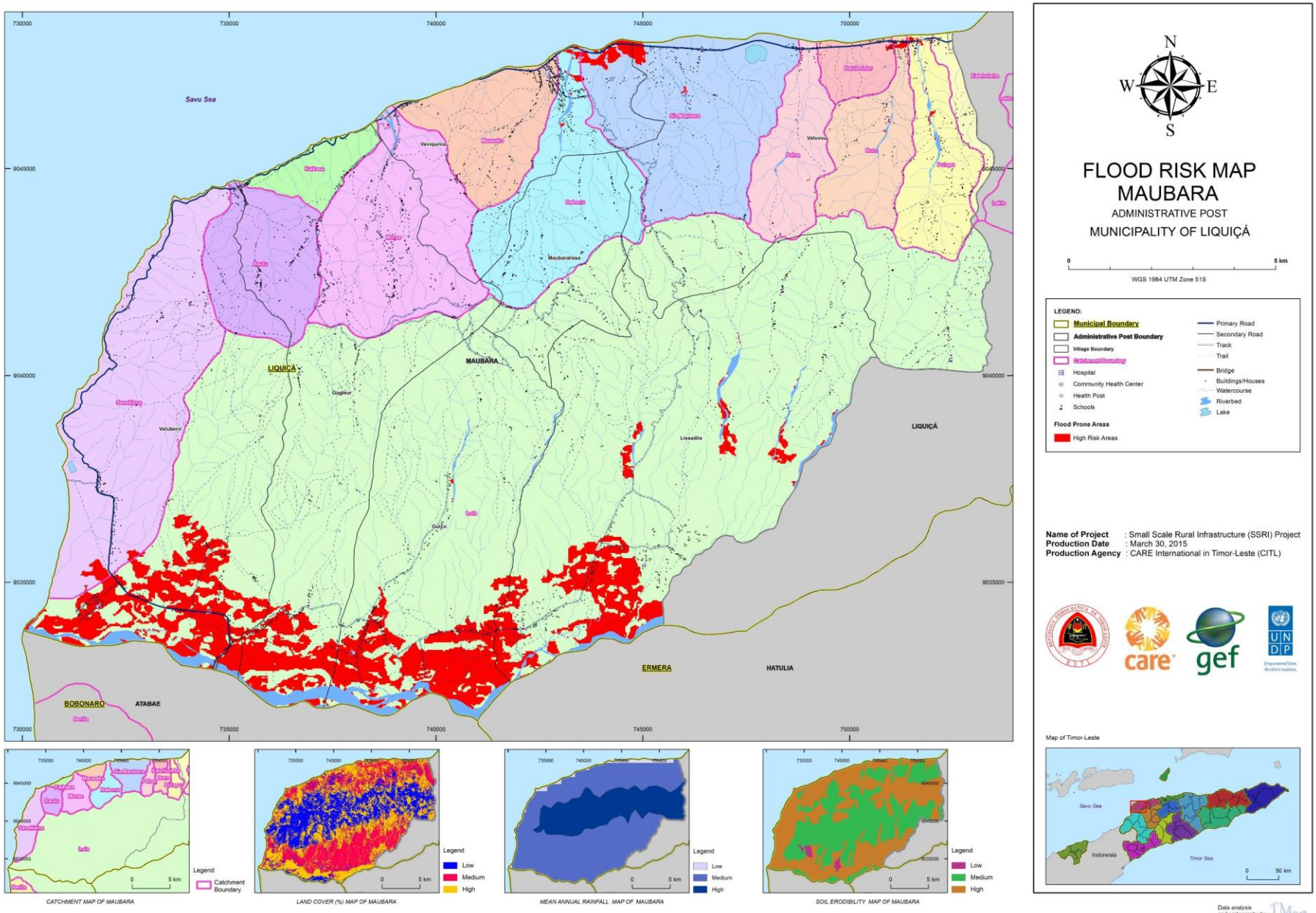
There are quite a lot of structures built on flood-prone land – 412 houses (8% of the total), 3 schools (15%), 2 health facilities (29%) and 16.1km of road (13.9%), but given the large size of the at-risk area, it is perhaps a bit surprising that the proportions of infrastructure aren't higher. This is largely because communities in Maubara manage their flooding quite well; they have been farming rice here for many years, and most people consider flooding to be a resource, not a threat (Figure 36). Whilst a relatively small number of families are prepared to adapt to their environment and risk living on land that gets inundated from time to time, most families are aware of which areas flood and which don't (Figure 37), and they build their houses on dry ground. Similarly with schools and health facilities – a few are located in the flood zone, but most are built on higher ground a bit farther from the river. The type of infrastructure that really suffers from flooding in Maubara is roads.

Figure 37 – Road in flood zone. Suco Guiço

Figure 38 – Rice growing in a high-risk area for flooding. Lissadila Suco

Figure 39 – Government warning in Lissadila Suco

As mentioned above, 16.1km of road runs through the flood zone in Maubara AP, representing 13.9% of the total network of 116km. Most of the flood-prone roads are un-paved, or if they were once paved, the asphalt has been destroyed and the roads have reverted to dirt and gravel tracks. Figure 35 shows an example. All four of the *sucos* that extend down to the Lauveli and Lois Rivers have sections of flood-prone road. Vatuboro is worst-affected with 7.0km (74% of the total length of road in the *suco)*. Next is Guiço with 4.6km (33%), followed by Lissadila with 2.3km (13%) and finally Gugleur with 0.7km (8%).



MAP- 30. Flood Risk Map: Maubara Administrative Post

Suco -Catchment Code	*Suco* -Catchment		Land Area			Houses			Schools			Health Facilities			Roads		
			Total Area	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total	In Flood Risk Zone		Total Km	In Flood Risk Zone	
				Hectares	%	Number	Number	%	Number	Number	%	Number	Number	%		Km	%
82401	Gugleur	Babono River Catchment	11	0	0.0%	0			0			0			0.0		
82404	Gugleur	Bautu River Catchment	545	0	0.0%	146	0	0.0%	3	0	0.0%	0			1.2	0.0	0.0%
82417	Gugleur	Kaikasa Aggregate Catchment	295	0	0.0%	50	0	0.0%	0			0			6.2	0.0	0.0%
82422	Gugleur	Lois River Catchment	2,273	279	12.3%	207	50	24.2%	1	0	0.0%	0			8.2	0.7	8.2%
82426	Gugleur	Morae River Catchment	1,132	0	0.0%	324	0	0.0%	2	0	0.0%	1	0	0.0%	8.1	0.0	0.0%
82522	Guiço	Lois River Catchment	3,317	572	17.3%	298	118	39.6%	1	1	100.0%	1	1	100.0%	14.1	4.6	32.6%
84122	Lissadila	Lois River Catchment	5,495	529	9.6%	759	70	9.2%	2	0	0.0%	1	0	0.0%	16.9	2.3	13.4%
85001	Maubaralissa	Babono River Catchment	765	0	0.0%	154	0	0.0%	0			0			1.5	0.0	0.0%
85022	Maubaralissa	Lois River Catchment	487	0	0.0%	121	0	0.0%	1	0	0.0%	1	0	0.0%	4.9	0.0	0.0%
87404	Vatuboro	Bautu River Catchment	336	0	0.0%	59	0	0.0%	0			0			0.3	0.0	0.0%
87422	Vatuboro	Lois River Catchment	2,350	665	28.3%	250	145	58.0%	2	2	100.0%	1	1	100.0%	9.4	7.0	74.5%
87431	Vatuboro	Sanakiana Aggregate Catchment	2,133	24	1.1%	191	1	0.5%	1	0	0.0%	0			13.7	0.0	0.0%
87501	Vatuvou	Babono River Catchment	79	0	0.0%	8	0	0.0%	0			0			1.5	0.0	0.0%
87502	Vatuvou	Batubeleter Aggregate Catchment	238	2	0.8%	42	7	16.7%	0			0			1.8	0.0	0.0%
87506	Vatuvou	Boro River Catchment	651	6	0.9%	81	6	7.4%	0			0			0.4	0.1	35.0%
87518	Vatuvou	Katehuleha Aggregate Catchment	158	0	0.0%	54	0	0.0%	0			0			1.1	0.0	0.0%
87522	Vatuvou	Lois River Catchment	1,491	0	0.0%	179	0	0.0%	1	0	0.0%	0			4.5	0.0	0.0%
87524	Vatuvou	Sia Maubara Aggregate Catchment	1,374	17	1.2%	254	1	0.4%	2	0	0.0%	0			6.3	0.3	4.5%
87528	Vatuvou	Paloa River Catchment	621	0	0.0%	47	0	0.0%	0			0			0.4	0.0	0.0%
87529	Vatuvou	Pulapu River Catchment	696	7	1.0%	152	4	2.6%	1	0	0.0%	1	0	0.0%	1.6	0.3	17.5%
87601	Vaviquinia	Babono River Catchment	439	11	2.6%	195	1	0.5%	2	0	0.0%	0			2.6	0.2	6.2%
87624	Vaviquinia	Sia Maubara Aggregate Catchment	313	40	12.6%	55	9	16.4%	0			0			3.2	0.6	20.1%
87625	Vaviquinia	Mausako Aggregate Catchment	771	0	0.0%	324	0	0.0%	1	0	0.0%	1	0	0.0%	5.4	0.0	0.0%
87626	Vaviquinia	Morae River Catchment	423	1	0.3%	53	0	0.0%	0			0			2.2	0.0	1.4%
		Totals Maubara AP	**26,394**	**2,153**	**8.2%**	**4,003**	**412**	**10.3%**	**20**	**3**	**15.0%**	**7**	**2**	**28.6%**	**116**	**16.1**	**13.9%**

Table 61. Risk Statistics for Flooding in Maubara AP

Landslide Risk in Maubara Administrative Post

Of the 8 APs included in this study, Maubara AP has the most land considered to be at some level of risk from landslides, with 3,681 hectares. Map 31 shows that the *sucos* in Maubara AP with the most land at-risk include Gugleur (980 hectares), Vatuvou (831 hectares) and Vatuboro (702 hectares). One of the reasons these *sucos* have the largest total area at-risk for landslides is because they are the largest *sucos*. Other areas with potential for landslides, though not as extensive, are found in other *sucos* throughout the AP.

Though the Lois River Catchment has a large number of at-risk sites covering a large area, most of the risk here is considered low- to-medium. High-risk areas are concentrated in the upper sections of the smaller catchments draining to the north and west, including Babono, Morae, Paloa, Pulapu, Sanakiana and Sia Maubara. This is partly because the north-facing slopes are generally steeper, and partly because vegetative cover on them tends to be less dense because of their orientation. Slopes facing north are usually drier than south-facing slopes - they are more exposed to the direct sun and to prevailing winds – and this means natural vegetative cover tends to be less vigorous. Population pressure is also higher on the north-facing slopes, especially those closest to the towns of Maubara and Liquiçá, where the taking of wood for fuel, the clearing of vegetation for agriculture, and the grazing of livestock all contribute to the degradation of natural protective vegetation cover.

				Area of Land in Each Landslide Risk Category							
Suco -Catchment Code	*Suco* -Catchment		Total Hectares	No Risk Hectares	No Risk %	Low Risk Hectares	Low Risk %	Medium Risk Hectares	Medium Risk %	High Risk Hectares	High Risk %
82401	Gugleur	Babono River Catchment	11	9	80.4%	1	4.5%	1	9.4%	1	5.7%
82404	Gugleur	Bautu River Catchment	545	384	70.6%	70	12.8%	79	14.4%	12	2.3%
82417	Gugleur	Kaikasa Aggregate Catchment	295	245	83.1%	13	4.5%	34	11.5%	3	1.0%
82422	Gugleur	Lois River Catchment	2,273	1,927	84.8%	179	7.9%	130	5.7%	37	1.6%
82426	Gugleur	Morae River Catchment	1,132	710	62.8%	235	20.8%	152	13.4%	34	3.0%
82522	Guiço	Lois River Catchment	3,317	3,047	91.9%	133	4.0%	118	3.6%	19	0.6%
84122	Lissadila	Lois River Catchment	5,495	5,286	96.2%	90	1.6%	92	1.7%	26	0.5%
85001	Maubaralissa	Babono River Catchment	765	510	66.6%	76	9.9%	143	18.7%	36	4.7%
85022	Maubaralissa	Lois River Catchment	487	426	87.5%	34	7.1%	25	5.2%	1	0.2%
87404	Vatuboro	Bautu River Catchment	336	209	62.2%	64	19.1%	53	15.8%	10	2.9%
87422	Vatuboro	Lois River Catchment	2,350	2,209	94.0%	93	4.0%	44	1.9%	3	0.1%
87431	Vatuboro	Sanakiana Aggregate Catchment	2,133	1,698	79.6%	160	7.5%	221	10.3%	54	2.5%
87501	Vatuvou	Babono River Catchment	79	63	79.6%	4	4.9%	11	14.0%	1	1.6%
87502	Vatuvou	Batubeleter Aggregate Catchment	238	236	99.0%	2	0.8%	0	0.2%	0	0.0%
87506	Vatuvou	Boro River Catchment	651	554	85.1%	60	9.3%	26	4.0%	11	1.6%
87518	Vatuvou	Katehuleha Aggregate Catchment	158	145	91.5%	2	1.6%	11	6.8%	0	0.2%
87522	Vatuvou	Lois River Catchment	1,491	1,268	85.1%	95	6.4%	72	4.8%	56	3.7%
87524	Vatuvou	Sia Maubara Aggregate Catchment	1,374	1,196	87.0%	73	5.3%	77	5.6%	28	2.0%
87528	Vatuvou	Paloa River Catchment	621	488	78.6%	48	7.8%	59	9.5%	26	4.1%
87529	Vatuvou	Pulapu River Catchment	696	527	75.7%	54	7.8%	71	10.2%	44	6.3%
87601	Vaviquinia	Babono River Catchment	439	346	78.8%	29	6.7%	51	11.6%	13	2.9%
87624	Vaviquinia	Sia Maubara Aggregate Catchment	313	308	98.5%	3	1.0%	2	0.5%	0	0.0%
87625	Vaviquinia	Mausako Aggregate Catchment	771	670	86.8%	12	1.6%	75	9.7%	15	1.9%
87626	Vaviquinia	Morae River Catchment	423	249	58.9%	66	15.7%	67	16.0%	40	9.5%
		Totals Maubara AP	**26,394**	**22,713**	**86.1%**	**1,598**	**6.1%**	**1,614**	**6.1%**	**469**	**1.8%**

Table 62. Land Area at Risk of Landslides in Maubara AP

In terms of the exposure of its infrastructure to landslide risk, Maubara AP ranks as one of the highest of the 8 APs studied. Of its total stock of 4,003 houses, 173 (4.3%) are on landslide-prone sites. Only Liquiçá (7.9%) and Bazartete (5.3%) have higher proportions of at-risk houses. None of Maubara's 20 schools or 7 health facilities are considered to be threatened by landslides, but a substantial part of its roads network is. In fact, Maubara has the longest length of at-risk roads (9.4km) representing the largest proportion of its total road network (8.1%) of any of the 8 SSRI APs.

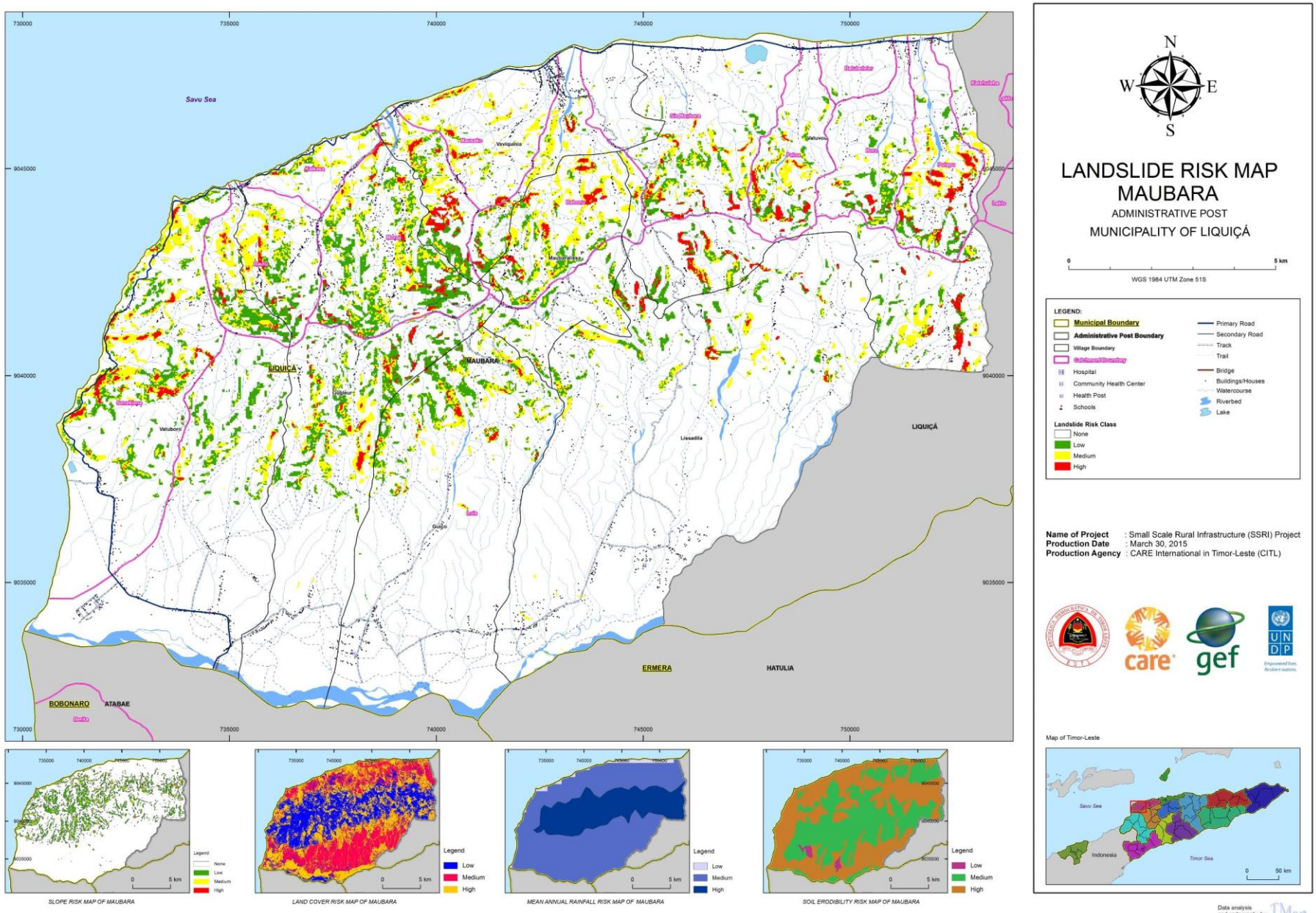
The largest numbers of houses at-risk from landslides are in Gugleur *Suco*, where there are 39 of them. Second is Maubaralissa *Suco*, with 34, followed by Vatuvou *Suco* with 33 and Vaviquinia *Suco* with 24. Vatuvou *Suco* with 14 and Vaviquinia *Suco* with 13 have the most houses in the high-risk category for landslides.

The Sanakiana Aggregate Catchment lies entirely within Vatuboro *Suco,* and it is here that the potential for landslides damaging or destroying roads is greatest. Of Maubara AP's 9.4km of at-risk road, 4.1km (44%) are in the Vatuboro-Sanakiana *Suco*-Catchment. Most of this 4.1km is considered to be at medium or high risk, and most of it is part of the main road linking Dili to Kupang in Indonesia, and to the exclave of Oecusse Municipality.

Figure 40 – Three images showing the challenges faced by road-builders on the main Dili – Batugade Road. Vatuboro Suco, Sanakiana Aggregate Catchment

				Houses in Each Landslide Risk Category							
Suco -Catchment Code	*Suco* -Catchment		Total No. of Houses	No Risk		Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%	Number	%
82401	Gugleur	Babono River Catchment	0	0		0		0		0	
82404	Gugleur	Bautu River Catchment	146	140	95.9%	3	2.1%	3	2.1%	0	0.0%
82417	Gugleur	Kaikasa Aggregate Catchment	50	50	100.0%	0	0.0%	0	0.0%	0	0.0%
82422	Gugleur	Lois River Catchment	207	203	98.1%	0	0.0%	3	1.4%	1	0.5%
82426	Gugleur	Morae River Catchment	324	295	91.0%	12	3.7%	14	4.3%	3	0.9%
82522	Guiço	Lois River Catchment	298	292	98.0%	0	0.0%	3	1.0%	3	1.0%
84122	Lissadila	Lois River Catchment	759	746	98.3%	0	0.0%	5	0.7%	8	1.1%
85001	Maubaralissa	Babono River Catchment	154	124	80.5%	10	6.5%	13	8.4%	7	4.5%
85022	Maubaralissa	Lois River Catchment	121	117	96.7%	2	1.7%	2	1.7%	0	0.0%
87404	Vatuboro	Bautu River Catchment	59	52	88.1%	3	5.1%	4	6.8%	0	0.0%
87422	Vatuboro	Lois River Catchment	250	249	99.6%	1	0.4%	0	0.0%	0	0.0%
87431	Vatuboro	Sanakiana Aggregate Catchment	191	180	94.2%	2	1.0%	9	4.7%	0	0.0%
87501	Vatuvou	Babono River Catchment	8	8	100.0%	0	0.0%	0	0.0%	0	0.0%
87502	Vatuvou	Batubeleter Aggregate Catchment	42	42	100.0%	0	0.0%	0	0.0%	0	0.0%
87506	Vatuvou	Boro River Catchment	81	78	96.3%	2	2.5%	0	0.0%	1	1.2%
87518	Vatuvou	Katehuleha Aggregate Catchment	54	49	90.7%	1	1.9%	4	7.4%	0	0.0%
87522	Vatuvou	Lois River Catchment	179	173	96.6%	5	2.8%	0	0.0%	1	0.6%
87524	Vatuvou	Sia Maubara Aggregate Catchment	254	251	98.8%	0	0.0%	2	0.8%	1	0.4%
87528	Vatuvou	Paloa River Catchment	47	46	97.9%	0	0.0%	0	0.0%	1	2.1%
87529	Vatuvou	Pulapu River Catchment	152	132	86.8%	4	2.6%	6	3.9%	10	6.6%
87601	Vaviquinia	Babono River Catchment	195	175	89.7%	4	2.1%	3	1.5%	13	6.7%
87624	Vaviquinia	Sia Maubara Aggregate Catchment	55	55	100.0%	0	0.0%	0	0.0%	0	0.0%
87625	Vaviquinia	Mausako Aggregate Catchment	324	324	100.0%	0	0.0%	0	0.0%	0	0.0%
87626	Vaviquinia	Morae River Catchment	53	49	92.5%	2	3.8%	2	3.8%	0	0.0%
		Totals Maubara AP	**4,003**	**3,830**	**95.7%**	**51**	**1.3%**	**73**	**1.8%**	**49**	**1.2%**

Table 63. Houses at Risk of Landslides in Maubara AP



Produced with Funding from GEF-LDCF and Implemented by UNDP in Partnership with MAE and MCIE

MAP- 31. Landslide Risk Map: Maubara Administrative Post

Figure 41 – Large landslide in high-risk area. Guiço Suco, Lois River Catchment

Figure 39 – Terracing to strengthen and reduce steepness of slope and thus lessen threat to road from landslides and erosion. Gualeur Suco, Kaikasa

Suco -Catchment Code	*Suco* -Catchment		Total Length of Roads (Km)	Length of Road in Each Landslide Risk Category							
				No Risk		Low Risk		Medium Risk		High Risk	
				Km	%	Km	%	Km	%	Km	%
82401	Gugleur	Babono River Catchment	0.0								
82404	Gugleur	Bautu River Catchment	1.2	1.2	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
82417	Gugleur	Kaikasa Aggregate Catchment	6.2	5.8	93.9%	0.0	0.0%	0.2	3.8%	0.1	2.2%
82422	Gugleur	Lois River Catchment	8.2	7.7	94.6%	0.2	2.5%	0.2	2.5%	0.0	0.4%
82426	Gugleur	Morae River Catchment	8.1	6.6	82.1%	1.0	12.0%	0.3	3.5%	0.2	2.5%
82522	Guiço	Lois River Catchment	14.1	13.8	97.2%	0.0	0.1%	0.4	2.7%	0.0	0.0%
84122	Lissadila	Lois River Catchment	16.9	16.5	97.6%	0.2	1.2%	0.1	0.6%	0.1	0.7%
85001	Maubaralissa	Babono River Catchment	1.5	1.4	92.5%	0.1	4.1%	0.1	3.4%	0.0	0.0%
85022	Maubaralissa	Lois River Catchment	4.9	4.3	87.4%	0.3	6.1%	0.3	5.7%	0.0	0.8%
87404	Vatuboro	Bautu River Catchment	0.3	0.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
87422	Vatuboro	Lois River Catchment	9.4	9.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
87431	Vatuboro	Sanakiana Aggregate Catchment	13.7	9.6	69.9%	0.6	4.3%	2.6	19.4%	0.9	6.4%
87501	Vatuvou	Babono River Catchment	1.5	1.3	87.1%	0.0	0.5%	0.2	12.4%	0.0	0.0%
87502	Vatuvou	Batubeleter Aggregate Catchment	1.8	1.8	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
87506	Vatuvou	Boro River Catchment	0.4	0.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
87518	Vatuvou	Katehuleha Aggregate Catchment	1.1	1.1	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
87522	Vatuvou	Lois River Catchment	4.5	4.4	98.9%	0.0	0.7%	0.0	0.0%	0.0	0.5%
87524	Vatuvou	Sia Maubara Aggregate Catchment	6.3	6.1	96.0%	0.0	0.2%	0.2	3.8%	0.0	0.0%
87528	Vatuvou	Paloa River Catchment	0.4	0.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
87529	Vatuvou	Pulapu River Catchment	1.6	1.1	67.5%	0.4	22.4%	0.0	0.0%	0.2	10.0%
87601	Vaviquinia	Babono River Catchment	2.6	2.5	96.0%	0.0	1.2%	0.1	2.8%	0.0	0.0%
87624	Vaviquinia	Sia Maubara Aggregate Catchment	3.2	3.1	98.3%	0.0	0.0%	0.1	1.7%	0.0	0.0%
87625	Vaviquinia	Mausako Aggregate Catchment	5.4	5.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
87626	Vaviquinia	Morae River Catchment	2.2	2.0	90.3%	0.1	5.4%	0.1	4.3%	0.0	0.0%
		Totals Maubara AP	**115.6**	**106.2**	**91.9%**	**2.9**	**2.5%**	**4.8**	**4.2%**	**1.6**	**1.4%**

Table 64. Roads at Risk of Landslides in Maubara AP

Erosion Risk in Maubara Administrative Post

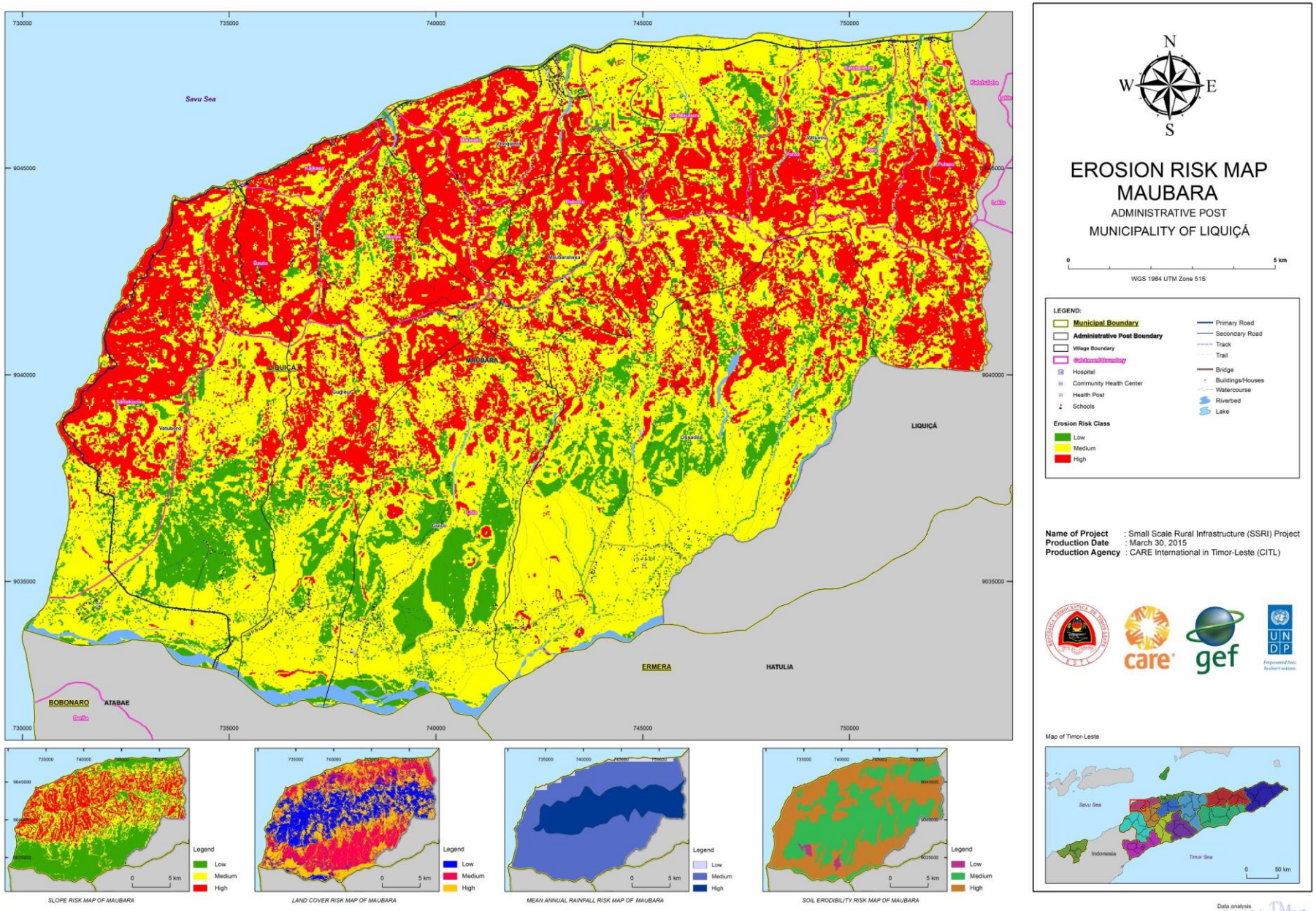
In common with the other 2 APs in Liquiçá Municipality, most of Maubara AP is considered to have medium to high risk for soil erosion. The distribution pattern for erosion risk closely mirrors that for landslide risk discussed in the previous section. The highest potential for erosion is on steep, north-facing slopes in the north and west of the AP. Erosion is also a potential problem in the south, but generally the threat is lower than in other areas. Of the total land area of 26,394 hectares, 3,686 hectares (14.0%) is considered low-risk for erosion, 14,640 hectares (55.5%) is considered medium risk, and 8,068 hectares (30.5%) is considered high risk.

Figure 40 – Heavy sediment load in the Lois River, evidence of substantial erosion in upper catchment. Vatuboro Suco, Lois River Catchment

As Map 32 shows, the areas with the highest risk are concentrated on north-facing slopes in the relatively small catchments in the north and west. In Pulapu, Boro, Paloa and Sia Maubara Catchments, a clear distinction can be made between the very steep, sparsely vegetated slopes of the upper catchments, where erosion potential is highest, and the gentler slopes lower down in the catchments, where the threat is lower. Farther west, however, erosion is a more serious threat in all parts of catchments, 5 of them having more than 50% of their area in high risk zone. These include Bautu with 566 hectares (64%), Kaikasa 183 hectares (62%), Pulapu 390 hectares (56%), Morae 884 hectares (54%), and Mausako 410 hectares (53%). Though the Lois River Catchment has the largest area at high risk for erosion with 2,907 hectares, this represents only 19% of the area of the part of this catchment that lies within Maubara AP.

				Area of Land in Each Erosion Risk Category					
Suco -Catchment			Total	Low Risk		Medium Risk		High Risk	
Code	*Suco* -Catchment		Hectares	Hectares	%	Hectares	%	Hectares	%
82401	Gugleur	Babono River Catchment	11	0	1.2%	7	58.0%	5	40.8%
82404	Gugleur	Bautu River Catchment	545	12	2.2%	163	29.8%	370	68.0%
82417	Gugleur	Kaikasa Aggregate Catchment	295	2	0.7%	110	37.4%	183	62.0%
82422	Gugleur	Lois River Catchment	2,273	375	16.5%	1,325	58.3%	574	25.2%
82426	Gugleur	Morae River Catchment	1,132	83	7.4%	503	44.5%	545	48.2%
82522	Guiço	Lois River Catchment	3,317	934	28.2%	1,918	57.8%	465	14.0%
84122	Lissadila	Lois River Catchment	5,495	793	14.4%	3,854	70.1%	848	15.4%
85001	Maubaralissa	Babono River Catchment	765	36	4.6%	296	38.7%	433	56.6%
85022	Maubaralissa	Lois River Catchment	487	30	6.1%	292	59.9%	166	34.1%
87404	Vatuboro	Bautu River Catchment	336	14	4.2%	125	37.4%	196	58.4%
87422	Vatuboro	Lois River Catchment	2,350	731	31.1%	1,440	61.3%	179	7.6%
87431	Vatuboro	Sanakiana Aggregate Catchment	2,133	181	8.5%	918	43.0%	1,034	48.5%
87501	Vatuvou	Babono River Catchment	79	4	4.5%	40	50.7%	36	44.8%
87502	Vatuvou	Batubeleter Aggregate Catchment	238	51	21.5%	169	71.0%	18	7.4%
87506	Vatuvou	Boro River Catchment	651	70	10.8%	343	52.7%	238	36.6%
87518	Vatuvou	Katehuleha Aggregate Catchment	158	13	8.5%	98	61.7%	47	29.7%
87522	Vatuvou	Lois River Catchment	1,491	49	3.3%	766	51.4%	675	45.3%
87524	Vatuvou	Sia Maubara Aggregate Catchment	1,374	132	9.6%	815	59.3%	427	31.0%
87528	Vatuvou	Paloa River Catchment	621	36	5.9%	285	45.9%	300	48.2%
87529	Vatuvou	Pulapu River Catchment	696	34	4.9%	273	39.2%	390	56.0%
87601	Vaviquinia	Babono River Catchment	439	40	9.2%	202	45.9%	197	44.8%
87624	Vaviquinia	Sia Maubara Aggregate Catchment	313	30	9.6%	249	79.7%	34	11.0%
87625	Vaviquinia	Mausako Aggregate Catchment	771	23	2.9%	338	43.8%	410	53.2%
87626	Vaviquinia	Morae River Catchment	423	13	3.0%	111	26.3%	299	70.8%
		Totals Maubara AP	**26,394**	**3,686**	**14.0%**	**14,640**	**55.5%**	**8,068**	**30.6%**

Table 65. Land Area at Risk of Erosion in Maubara AP



MAP- 32. Erosion Risk Map: Maubara Administrative Post

One of the most notable characteristics of the distribution of infrastructure in Maubara AP is that very little infrastructure is found in low-risk areas for erosion. Almost 93% of the houses, 86% of the roads and 85% of the schools and health facilities are built on land that is considered to have medium or high potential for erosion. Not only does this pose threats to the stability of the structures themselves, but it also influences the quality of domestic water supply, the ability of drainage channels to carry water from the land to the sea, and the proper functioning of canals, off-takes, sluice gates, weirs and other water control structures that form parts of irrigation and drainage systems. Systems such as these are particularly important in the rice-growing area along the north bank of the Lois and Luaveli Rivers.

Figure 42 – Flash floods cause erosion and deposit sediment, damaging roads and other infrastructure. Guiço Suco, Lois River Catchment

Figure 43 – Severe erosion on steep slope with thin, friable soils and no vegetative cover. Vatuboro Suco, Sanakiana Aggregate Catchment

Figure 44 – Gabions protect farmland, irrigation systems, houses, schools and health clinics from river erosion. Vatuboro Suco, Lois River Catchment

Suco - Catchment Code	*Suco* -Catchment		Total No. of Houses	Houses in Each Erosion Risk Category						Total Length of Roads	Length of Road in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Km	%	Km	%	Km	%
82401	Gugleur	Babono River Catchment	0							0.0						
82404	Gugleur	Bautu River Catchment	146	2	1.4%	81	55.5%	63	43.2%	1.2	0.1	12.4%	0.9	76.8%	0.1	10.8%
82417	Gugleur	Kaikasa Aggregate Catchment	50	1	2.0%	35	70.0%	14	28.0%	6.2	0.0	0.4%	2.7	43.3%	3.5	56.4%
82422	Gugleur	Lois River Catchment	207	25	12.1%	125	60.4%	57	27.5%	8.2	1.0	12.1%	5.5	67.8%	1.6	20.1%
82426	Gugleur	Morae River Catchment	324	47	14.5%	151	46.6%	126	38.9%	8.1	0.8	10.4%	3.3	41.1%	3.9	48.5%
82522	Guiço	Lois River Catchment	298	52	17.4%	223	74.8%	23	7.7%	14.1	3.3	23.4%	9.6	67.7%	1.3	9.0%
84122	Lissadila	Lois River Catchment	759	54	7.1%	500	65.9%	205	27.0%	16.9	2.7	16.0%	11.6	68.5%	2.6	15.6%
85001	Maubaralissa	Babono River Catchment	154	9	5.8%	77	50.0%	68	44.2%	1.5	0.2	16.0%	0.9	60.1%	0.4	24.0%
85022	Maubaralissa	Lois River Catchment	121	20	16.5%	60	49.6%	41	33.9%	4.9	0.6	13.1%	2.7	54.6%	1.6	32.4%
87404	Vatuboro	Bautu River Catchment	59	2	3.4%	36	61.0%	21	35.6%	0.3	0.0	10.9%	0.3	86.0%	0.0	3.1%
87422	Vatuboro	Lois River Catchment	250	55	22.0%	192	76.8%	3	1.2%	9.4	2.1	22.8%	7.3	77.2%	0.0	0.0%
87431	Vatuboro	Sanakiana Aggregate Catchment	191	17	8.9%	97	50.8%	77	40.3%	13.7	0.5	3.3%	4.6	33.6%	8.6	63.1%
87501	Vatuvou	Babono River Catchment	8	1	12.5%	3	37.5%	4	50.0%	1.5	0.2	10.1%	0.9	60.9%	0.4	29.0%
87502	Vatuvou	Batubeleter Aggregate Catchment	42	6	14.3%	36	85.7%	0	0.0%	1.8	0.1	5.4%	1.7	92.9%	0.0	1.7%
87506	Vatuvou	Boro River Catchment	81	6	7.4%	69	85.2%	6	7.4%	0.4	0.0	0.0%	0.4	100.0%	0.0	0.0%
87518	Vatuvou	Katehuleha Aggregate Catchment	54	2	3.7%	36	66.7%	16	29.6%	1.1	0.3	26.9%	0.8	73.1%	0.0	0.0%
87522	Vatuvou	Lois River Catchment	179	9	5.0%	73	40.8%	97	54.2%	4.5	0.1	2.9%	2.6	59.0%	1.7	38.1%
87524	Vatuvou	Sia Maubara Aggregate Catchment	254	6	2.4%	225	88.6%	23	9.1%	6.3	0.6	8.9%	5.3	83.8%	0.5	7.3%
87528	Vatuvou	Paloa River Catchment	47	2	4.3%	35	74.5%	10	21.3%	0.4	0.1	12.2%	0.4	87.8%	0.0	0.0%
87529	Vatuvou	Pulapu River Catchment	152	6	3.9%	60	39.5%	86	56.6%	1.6	0.1	6.2%	0.8	45.9%	0.8	47.9%
87601	Vaviquinia	Babono River Catchment	195	15	7.7%	140	71.8%	40	20.5%	2.6	0.5	19.0%	1.9	72.6%	0.2	8.3%
87624	Vaviquinia	Sia Maubara Aggregate Catchment	55	2	3.6%	51	92.7%	2	3.6%	3.2	0.2	6.1%	2.9	91.3%	0.1	2.6%
87625	Vaviquinia	Mausako Aggregate Catchment	324	15	4.6%	254	78.4%	55	17.0%	5.4	0.5	9.8%	4.2	77.4%	0.7	12.8%
87626	Vaviquinia	Morae River Catchment	53	0	0.0%	36	67.9%	17	32.1%	2.2	0.1	5.0%	1.1	51.5%	1.0	43.5%
		Totals Maubara AP	**4,003**	**354**	**8.8%**	**2,595**	**64.8%**	**1,054**	**26.3%**	**115.6**	**14.2**	**12.3%**	**72.3**	**62.6%**	**29.0**	**25.1%**

Table 66. Houses and Roads at Risk of Erosion in Maubara AP

Suco -Catchment Code	*Suco* -Catchment		Total No. of Schools	Schools in Each Erosion Risk Category						Total No. of Health Facilities	Health Facilities in Each Erosion Risk Category					
				Low Risk		Medium Risk		High Risk			Low Risk		Medium Risk		High Risk	
				Number	%	Number	%	Number	%		Number	%	Number	%	Number	%
82401	Gugleur	Babono River Catchment	0							0						
82404	Gugleur	Bautu River Catchment	3	0	0.0%	2	66.7%	1	33.3%	0						
82417	Gugleur	Kaikasa Aggregate Catchment	0							0						
82422	Gugleur	Lois River Catchment	1	0	0.0%	1	100.0%	0	0.0%	0						
82426	Gugleur	Morae River Catchment	2	2	100.0%	0	0.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
82522	Guiço	Lois River Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
84122	Lissadila	Lois River Catchment	2	0	0.0%	1	50.0%	1	50.0%	1	0	0.0%	1	100.0%	0	0.0%
85001	Maubaralissa	Babono River Catchment	0							0						
85022	Maubaralissa	Lois River Catchment	1	1	100.0%	0	0.0%	0	0.0%	1	0	0.0%	0	0.0%	1	100.0%
87404	Vatuboro	Bautu River Catchment	0							0						
87422	Vatuboro	Lois River Catchment	2	0	0.0%	2	100.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
87431	Vatuboro	Sanakiana Aggregate Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
87501	Vatuvou	Babono River Catchment	0							0						
87502	Vatuvou	Batubeleter Aggregate Catchment	0							0						
87506	Vatuvou	Boro River Catchment	0							0						
87518	Vatuvou	Katehuleha Aggregate Catchment	0							0						
87522	Vatuvou	Lois River Catchment	1	0	0.0%	0	0.0%	1	100.0%	0						
87524	Vatuvou	Sia Maubara Aggregate Catchment	2	0	0.0%	2	100.0%	0	0.0%	0						
87528	Vatuvou	Paloa River Catchment	0							0						
87529	Vatuvou	Pulapu River Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%
87601	Vaviquinia	Babono River Catchment	2	0	0.0%	1	50.0%	1	50.0%	0						
87624	Vaviquinia	Sia Maubara Aggregate Catchment	0							0						
87625	Vaviquinia	Mausako Aggregate Catchment	1	0	0.0%	1	100.0%	0	0.0%	1	0	0.0%	1	100.0%	0	0.0%
87626	Vaviquinia	Morae River Catchment	0							0						
		Totals Maubara AP	**20**	**3**	**15.0%**	**12**	**60.0%**	**5**	**25.0%**	**7**	**1**	**14.3%**	**5**	**71.4%**	**1**	**14.3%**

Table 67. Schools and Health Facilities at Risk of Erosion in Maubara AP

3.0 Climate Vulnerability and Capacity Analysis (CVCA)

3.1 Objectives

The end-goal of this project is to have a comprehensive overview of which communities are most at risk of suffering from climate change induced natural disasters: flooding; landslide, and erosion. By cross examining GIS data and the community CVCA, we will have an all-inclusive picture of what is occurring in each suco, and will be able to suggest appropriate responses. The CVCA is a key tool for assessing climate change, and also involving and building capacity and ownership of the community; CARE's approach to climate change adaptation is grounded in the knowledge that people must be empowered to transform and secure their rights and livelihoods.

The main objectives of the CVCAs are to:

Analyse vulnerability to climate change and adaptive capacity at the community level: gathering, organizing and analyzing information on the vulnerability and adaptive capacity of communities, households and individuals. The CVCA model provides guidance and tools for community based participatory research, analysis and learning.

Combine community knowledge and scientific data to yield greater understanding about local impacts of climate change: One of the challenges of working at the local level on climate change adaptation is the lack of micro-level information on impacts. This is coupled with inadequate data and information on weather and climate predictions. The process of gathering and analyzing information with communities serves to build local knowledge on climate issues and appropriate strategies to adapt. The participatory exercises and associated discussions provide opportunities to link community knowledge to available scientific information on climate change. This will help local stakeholders to understand the implications of climate change for their livelihoods, so that they are better able to analyse risks and plan for adaptation..

Figure 45: CVCA conducted in Lauhata village, Liquiça Municipality

3.2 Methodology

The Climate Vulnerability and Capacity Analysis (CVCA) methodology helps us to understand the implications of climate change for the lives and livelihoods of the people we serve. This approach works with communities to understand their susceptibility to climate risks, as well as understanding their priorities and exposure to those risks. By combining local knowledge and experience with scientific data gathered in the parallel GIS analysis, this results in a clearer overall picture of vulnerability. The process also builds people's understanding about climate risks and adaptation strategies. It provides a framework for dialogue within communities, as well as between communities and other stakeholders. The results provide a solid foundation for the identification of practical strategies to facilitate community-based adaptation to climate change. This provides the ideal background analysis in order to take the next step and develop aldeia (or community) resilient action plans to facilitate the community to consider potential coping and prevention mechanisms and plan how they will mitigate these risks and build their resilience as a whole both through seeking external support but also through their own initiatives.

The CVCA methodology has been adapted to gather and analyse information to design climate change adaptation initiatives, as well as to integrate climate change adaptation issues into livelihood activities and the maintenance and improvement of infrastructure, prioritizing these as a starting point during the different phases of the CVCA. Infrastructure in the sucos was the main topic analysed in all participatory sessions.

Data at the village level was collected through CVCA workshops that included both participatory workshop activities and Focus Group Discussions (FGD). All data was disaggregated by gender and implemented by trained field facilitators, in consultation with the chief of the village and EVAS team, through FGDs and participatory workshop activities as described below. This methodology enabled village leaders and community planners to better understand the process and therefore be able to meet the needs of the vulnerable population in changing environments. The results from the workshop were then presented to the community to verify the data. It is important to note that people's perceptions of risk will likely be subjective due to time and location bias, for example, if a flood occurred in the community recently it is likely the community will highlight it as a major risk, even if this was the first time flooding had ever occurred in that area. As the GIS mapping activity was taking place simultaneously, this data was not presented to the community, however conducting the process in this way had the advantage of not influencing community response giving a more accurate picture of the communities own perceptions and priorities. Each community's response to climate change risks is slightly skewed based on the type of disaster that has most impacted them, however, we also asked the community to tell us about the disasters that happen most frequently, and to note on the community map what infrastructure is most at risk from said natural disaster.

Men and women, throughout the world, have different priorities – this is why the data was disaggregated by gender, and we also requested both men and women to produce different community maps. This allowed the facilitators to see where there was a parallel between the men and women's perceptions of threats, and allowed each gender to voice concerns particular to their own priorities. It is also ensured women were able to voice their opinions, which is important given typical gender norms in Timor Leste where women are not expected to speak up in such meetings

The GIS maps considered the risk of climate change induced natural disasters based on the likelihood of them occurring, according to the topography of the land. The community viewed the risk with the natural bias of historical events, the severity of the impact and what infrastructure was affected. For example, if landslides occur each year but in an area of land with no vital infrastructure, the community is less likely to see this is a great risk. If a flood happened last year and devastated their crops and roads, they are likely to see floods as a major risk to their community, despite it being a one-off occurrence. The facilitators of the

CVCAs did not give full technical definitions of the different types of “risk” or “hazard” as this level of technical knowledge is too complex for a one day workshop and would be likely to dissuade the community members from becoming involved.

One of the key ways this CVCA process differed from previous workshops was that it was conducted at Suco level, rather than the Aldeia, which meant covering a significantly larger geographical area within each workshop. CARE International had also planned sub-district workshops to support identification and prioritisation, but upon consultation with the authorities was told that they were unnecessary as they already had the required information.

The CVCA process is not linear; the GIS mapping occurred in parallel with the CVCA workshops and the workshops themselves had to evolve organically. It was a key priority of the facilitators to allow the community to inform us of their own priorities and perceptions of risk; this had to allow time for discussion, and relied upon the facilitator to act as a guide, rather than a prompt. Four participatory rural assessment tools (PRA) were used in the workshops alongside FGDs to collect information relating to past and current situation of livelihoods, seasons and natural resources:

- Hazard mapping
- Seasonal calendar
- Historical Timeline
- Vulnerability matrix

For descriptions of the use of these tools please see Annex 2.

3.2.2 Selection criteria for CVCA locations

A participatory meeting was organized with UNDP SSRI staff members to determine selection criteria, which included rural area, population size, infrastructure, level of climate risk, level and scale of location, presence of development partners and presence or absence of Community Based Natural Risk Management (CBNRM) group initiatives. The selection also considered facilitators’ recommendations based on their experiences running development programs in these areas.

The locations sites were selected based on seven main qualitative and quantitative criteria details, as displayed in table 68.

Selection Criteria	Details	Guide
Rural area	The focus of the CVCA work will be on rural locations, and will not include more urban sites near to municipality centers	Selected areas will be rural
Population size	Population will be a factor in the selection process with larger populations being favoured; this will positively correlate with both infrastructure needs and environmental degradation levels (with higher populations being linked to higher infrastructure need and higher degradation levels)	Selected areas will have higher populations

Selection Criteria	Details	Guide
Infrastructures	Selection will take account of existing infrastructure, especially small scale rural infrastructure (SSRI); this will also include where there are fewer infrastructures but a high need; where possible selection will also factor in plans for increased infrastructure in the future; the CVCA process will seek to determine levels of engagement with development stakeholders and investment levels in the area	Selected areas will have either high SSRI presence or low current SSRI presence, but with high need, and plans for significant new infrastructures in the near future
Level of climate risk	This will look at key risks including landslides, flooding, and erosion; this will be identified by GIS mapping and validated by cross-checking with key informants/ community members; again this factor is expected to positively correlate with ecosystem degradation	Selected areas will include locations which encompass areas of high climate risk. Considered locations where level of climate risk showed above 50%.
Level and scale of location	The level of engagement for the CVCA process will take account of the geographic and demographic focus and potential for participation; for example where there are dispersed communities the CVCA process will focus on the aldeia, where there are densely situated communities the CVCA process will focus on the village level; the CVCA process will seek to determine levels of activity around CBNRM and other groups/ activities	Selected areas will maximize the potential for community engagement in the CVCA process
Presence of development partners	Presence of different players in community development programs such infrastructure development, environmental management initiatives etc.	Initially collect information from chief of village and later on analyse during CVCA workshop
Presence or absence of CBNRM	Presence or absence of CBNRM initiatives, such as tree planting and agro forestry	Initially collect information from chief of village and later on analyse during CVCA workshop

Table 68: Selection criteria

3.2.3 Final list of locations

In preparation for the CVCA implementation, the team initially shortlisted 30 locations to participate in the CVCA process in Liquiçá, Ermera and Baucau Municipalities. The selection process was completed in two phases. The first phase covered the first ten sites; these sites were chosen by the UNDP-SSRI project as they already had existing working relationships with them. These sites focused more on climate change related issues such as areas with projects affected by long drought, landslide, water, small irrigation and small rural roads.

In the second phase, 20 villages were shortlisted initially. However, due to the need to prioritise remote areas, the most at risk and due to resource constraints 16 were finally selected. Those selected were based on consideration of the seven quantitative and qualitative criteria presented in table 68 above in order to decide the most vulnerable risk locations associated with small infrastructure. In the end, CVCA workshops were conducted in 23 of the 26 selected locations. CVCA workshops were not conducted in 3 selected areas due to security issues in Baucau municipality.

No	Municipality	Administrative Post	Village	Notes
1	Liquica	Maubara	Maubaralisa	First phase
2	Liquica	Maubara	Lisadila	First phase
3	Baucau	Baucau vila	Gariwai	First phase
4	Baucau	Baucau vila	Bahu	First phase
5	Baucau	Vemasse	Ossoala	First phase
6	Baucau	Quelicai	Lacoliu	First phase
7	Ermera	Ermera	Ailelo	First phase
8	Ermera	Ermera	Talimoro	First phase
9	Ermera	Ermera	Leguimia	First phase
10	Ermera	Hatolia	Leimia-Craic	First phase
11	Baucau	Quelicai	Laisorolai de Cima	Not completed (security)
12	Baucau	Quelicai	Maluro	Not completed (security)
13	Baucau	Quelicai	Laisorolai de Baixo	Not completed (security)
14	Ermera	Ermera	Ponilala	Second Phase
15	Ermera	Ermera	Mirtutu	Second Phase
16	Ermera	Ermera	Lauala	Second Phase
17	Ermera	Ermera	Estado	Second Phase
18	Ermera	Ermera	Raimerhei	Second Phase
19	Ermera	Hatolia	Coliate-Leotelo	Second Phase
20	Ermera	Hatolia	Lemia Sorimbalu	Second Phase
21	Liquiça	Bazartete	Fatumasi	Second Phase
22	Liquiça	Bazartete	Metagou	Second Phase
23	Liquiça	Bazartete	Leorema	Second Phase
24	Liquiça	Bazartete	Fahilebo	Second Phase
25	Liquiça	Bazartete	Lauhata	Second Phase
26	Liquiça	Maubara	Vaviquinia	Second Phase
27	Liquica	Liquica	Luculai	Not selected
28	Liquica	Liquica	Acumano	Not selected
29	Liquica	Liquica	Hatuquessi	Not selected
30	Liquica	Liquica	Darulete	Not selected

Table 69. List of locations for CVCA workshops

4.0 Cross analysis of the findings of the CVCA and the GIS maps

Qualitative information collected during the CVCAs has been analysed and combined with the findings obtained from the technical risk mapping study. The CVCAs conducted in the project target areas highlight the major environmental hazards, risks, impact and coping mechanisms experienced and implemented by men and women on their major livelihood resources.

The following analysis has considered the three hazards – flooding, erosion and landslide – and their impact on infrastructures where relevant information was available, combining the findings of the risk of exposure analysis generated from the GIS maps and the major findings from the results of the workshops, including coping mechanisms. Throughout this section we have used three tables in order to effectively display our results. The first one gives an oversight of whether landslide, erosion and flooding are an issue in the whole suco; the GIS result is displayed in percentages and the community response is rated between 0 – 3, 0 being no risk and 3 being extremely high risk. The second table looks in more depth at where the risks are; focusing specifically on: roads, housing, schools and health centres. We have also included an *Other* column as we found that communities often had views on the risk facing bridges and their water system – whilst these were not the focus of our report, we felt it prudent to acknowledge them. As with the first table, the GIS results are displayed in percentages, and the CVCA result is between 0-3, dependent on the findings. The third and final table within the CVCA section shows whether the CVCA data and GIS data correlate and correspond, or whether the answers differ. If the results were in agreement, we found it useful to write the level of risk, low, medium or high, within the box. The results gathered by the GIS mapping and CVCAs will be triangulated within a Meta Analysis at the end of this report and will inform on how to best proceed.

The purpose of this analysis is to see if there is a direct correlation between community perceptions of risks related to climate change, and what the GIS maps report as being risk areas. It is interesting to see both sets of data alongside one another as it gives an insight into the community life, and not only reveals their perceptions of risk, but also what they perceive is vital infrastructure. The GIS maps looked at: flooding; landslide, and erosion, and the potential impact all three could have on: roads; housing; schools, and health facilities - the CVCA results show that some communities did not always perceive the school or health centre to be a vital piece of infrastructure. Due to the differing perceptions of risk and priority, the CVCA results differ vastly from suco to suco – this should not be seen as a failure, the community information is subjective and must be viewed as part of a bigger picture. It is interesting when the GIS and CVCA results strongly agree with one another – there should be substantive evidence to reinforce the CVCA perception and enables an informed decision to be made on how to proceed. An area where there is strong discord between the GIS and CVCA results usually indicates that the area would benefit from further investigation.

It is important to note that many communities did not ever experience *floods*. Typical floods, due to rising water from a local watershed, are referred to as *flooding* in the GIS maps and CVCA FGD – whilst many communities reported this as not being an issue, *flash floods* regularly came up and seemed to be a major concern for many communities. Concerns about flash floods will therefore appear in the text below each table.

The suco analysis of CVCA and GIS map findings are as follows.

Suco Ponilala, Administrative post Ermera, Ermera Municipality

Suco Ponilala, Administrative post Ermera, Ermera Municipality

Comparison of GIS Data and Community Perception according to Hazard by Risk Level

	Landslide	Soil Erosion	Flood
GIS	No Risk (75%)* Low (6.4%) Med (6.2%) High (12.4%)	No Risk (0%) Low (0.4%) Med (33.1%) High (66.5%)	No Risk
CVCA (m)	Med (1.35)**	Low (0.65)	No Risk
CVCA (f)	Med (1.13)	Med (1.13)	No Risk

*as % of total in suco= 847 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Ponilala Suco, in the northwest corner of Ermera AP, is steep and densely populated and covers a total land area of 847 hectares. The possibility of potential damage and dangerous catastrophic events is very high. The **vertical slopes leading down** to the Gleno River **are not suitable for building any kind of infrastructure.** The community highlighted that in the rainy season landslides occur regularly with reference to landslides almost every year since 2000. In 2014 a landslide occurred which **damaged four hectares and** as a result affected a coffee plantation, 1.5 km of rural roads, paddy fields, a cemetery, a school building, and water supply systems in **Aldeias Hatoposi, Sacoco and Nunupu**. The women's group additionally mentioned that **erosion** occurred almost every year and mostly affected farmland, especially in **Aldeias Sacoco and Nunupo.**

According to GIS data, Ponilala Suco is not considered to be at risk of flooding, which is validated by the perception of the community. However, the community stated that the suco is at a low risk of flash flooding. The male group mentioned that there was a **flash flood in 2007 in Aldeias Sacoco, Nunupu, Hatuposi and Eroho**, which resulted in the destruction of paddy fields, rural roads, small bridges, public schools and government community houses.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=8.8km)		Houses (Total=479)		Schools (Total=2)		Health Facilities (Total=0)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (98.2%) Low (1.8%)	High (3.0)/ High (3.0)	No Risk (97.9%) Low (1.5%) Med (0.2%) High (0.4%)	Med (2.0)/ Low (1.0)	No risk (100%)	Med (2.0)/ None (0.0)	n/a	n/a	Water system, Bridges/ Water system
Soil Erosion	Med (28.8%) High (71.2%)	Low (1.0)/ High (3.0)	Low (0.6%) Med (31.5%) High (67.8%)	Med (2.0)/ Med (2.0)	Med (50%) High (50%)	No Risk (0.0)/ No Risk (0.0)	n/a	n/a	Water system, Bridges/ Water system
Flood	Not considered at risk =>								

Community members highlighted in **2014 roughly 1.5km of road was completely disconnected** and inaccessible by public transport in **Aldeia Hatuposi and Nunupu**. The same event **affected Aldeia Sacoco**, where roughly 100m of rural road was significantly damaged, as were gabion boxes. Road repair and construction of small scale infrastructure is still required in this area. The community members usually use locally available materials and voluntary labour to make minor repairs to damaged roads and small bridges. They also plant local trees to protect the soil from landslides, using their own resources and the chief of Suco normally communicates with the district authority for major repairs. As a coping mechanism to mitigate affects on houses affected people evacuate their house to a safe location and later try to repair with the help of other community members. Similarly for schools, the community usually helps to repair minor damage, however if the damage is severe, then district authorities are requested for assistance.

Community members believe that there is a risk of soil erosion in this suco because they are losing soil fertility in farmland and sedimentation in drainage ditches and riverbeds (common consequences of soil erosion). As a coping mechanism the community, especially those living near affected areas, ensures that damaged parts of the road can be used again by removing all the soil material that blocked the road. The community **suggested implementing a bio-engineering initiative** on the road side **areas in Aldeias Sacoco and Hatuposi**.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=8.8km)	Houses (Total=479)	Schools (Total=2)	Health Facilities (Total=0)
Landslides	Disagree	Agree – low/no risk	Agree – low/no risk	n/a
Soil Erosion	Disagree	Agree – medium risk	Disagree	n/a
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	n/a

<u>Recommendations:</u> The priority aldeais in the suco that could benefit from significantly from resilient action planning due to the risk and perceived risks based on historical experience include **Aldeias Hatuposi, Nunupu and Sacoco**. There is also a discrepancy in the community perceptions of the risk of soil erosion and the potential risks faced as indicated by the GIS mapping. Specific attention to the dangers of soil erosion and mitigation strategies during the resilient action planning is recommended. It is important to note the vertical slopes leading down to the Gleno River are not suitable for building any kind of infrastructure, and this needs to be considered during the implementation of any initiatives.

Suco Mertutu, Administrative post Ermera, Ermera Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (94.5%)* Low (2.3%) Med (1.3%) High (1.9%)	Low (1.9%) Med (34.5%) High (63.6%)	No risk (99.8%) High (0.2%)
CVCA (m)	High (3.0)**	Med (2.0)	Med (2.0)
CVCA (f)	High (3.0)	High (3.0)	Med (2.0)

*as % of total in suco= 674 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Mertutu Suco is steep, densely settled and intensively farmed. The most serious risk is **soil erosion, but two key structures – a school and a health facility – are under high risk from erosion and flooding.** The total land area of Mertutu Suco is 714 hectares, all of which is in the Lois River Catchment.

	Roads (Total=10.3km)		Houses (Total=644)		Schools (Total=3)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (88.9%) Low (4.9%) Med (3.1%) High (3.1%)	Med (2.0)/ Low (0.0)	No Risk (96.9%) Low (0.5%) Med (0.3%) High (2.0%)	High (3.0)/ High (3.0)		None (0.0)/ None (0.0)	No risk 100%	No risk 100%	Water system/ n/a
Soil Erosion	Low (0.6%) Med (24.3%) High (75.1%)	High (2.0)/ High (2.0)	Low (5.1%) Med (36.5%) High (58.4%)	High (3.0)/ High (3.0)		No Risk (0.0)/ No Risk (0.0)	High 100%	No risk 100%	Water system / n/a
Flood	No risk 100%	No risk 100%	No risk 100%	No risk 100%		Med (2.0) Med (2.0)	High (100%)	High (3.0) High (3.0)	

Mertutu proves to be an interesting anomaly as only 40 hectares of land out of a total area of 714 hectares is considered at risk of landslide. The **47 community members (27 men and 20 women)** that attended the CVCA workshop stated that Mertutu Suco is at **high risk of landslide**. They made this comment based on the landslides that occurred in 2013-14 in **Aldeias Hohtino, Apido, Railorin and Tatabauria**, which resulted in the destruction of plantation areas, farmland, community houses, and 500m of rural roads, including road side drainage systems.

An unusually high proportion of roads passes through landslide risk areas in comparison to other sucos and is evidence of Ermera's notoriously challenging terrain. According to the men in the community, the roads are under a medium level of risk of landslide, considering the **landslides that occurred in 2013-14**. They also mentioned that the surface of the roads are mostly soil and gravel and do not have concrete road side drainage systems and no retaining walls are in place. The **community normally removes the soil material and plant residues** that block the road and drainage system with their own initiatives to make the road passable. The impact of landslide does not have a significant effect on the majority of houses. Contradicting this finding, the community members stated that the houses are under **a high landslide risk** considering the landslides that occurred in 2013-14. As a coping mechanism, affected people evacuate their house to a safe location and **later try to repair their house with the help of other community members**.

Mertutu Suco is **highly susceptible to soil erosion**. During the CVCA the women described the community at high risk of erosion where men group described it at medium risk. The women group also commented that erosion occurred nearly every year and mostly affects houses, plantation, farmland and road side drainage in

all aldeias. In the rainy season, the water system in **Aldeia Hotino** becomes in danger due to the occurrence of erosion, which specifically affects springs, water well, and pipelines of water supply.

The reason for the risk of erosion is due to losing soil fertility at farmland and sedimentation at drainage ditch and riverbed. As a coping mechanism the community, especially those living near the affected areas, ensures that damaged parts of the road can be used again by removing all the soil material that blocked the road. The **community suggested implementing a bio-engineering initiative** on the road side areas. According to the community perception the houses are at high risk in regards to erosion. The community members **do not have any coping mechanisms** in place, but rather depend on external support from government and NGOs.

Both GIS mapping and the community agree that there is significant flood risk to key infrastructures, such as the clinic. The community make significant efforts to divert the river from its destructive course every year, but long term prevention is beyond their capacity and eventually the river bank will erode away and affect the school building.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=10.3km)	Houses (Total=644)	Schools (Total=3)	Health Facilities (Total=1)
Landslides	Agree – low/no risk	Disagree	Agree – low/no risk	Agree – no risk
Soil Erosion	Agree – high risk	Agree – high risk	Disagree	Disagree
Flood	Agree – low/no risk	Agree – low/no risk	Agree – medium risk	Agree – high risk

Recommendations: Considering the vulnerability risk of Mertutu Suco where around 100m of road are under risk of landslide and around 10kms are at risk of erosion, there is room for undertaking road rehabilitation and maintenance initiatives which could include small scale infrastructure for protection, specifically concrete surfacing, road side drain and retaining wall, as well as bio-engineering interventions. To ensure proper water supply, there is room for rehabilitation of the existing water supply system as well as construction of a new water supply system, as required upon discussion with the community. The water supply aspects would need to be further evaluated as poses a specific issue. It is highly recommended that the community is engaged in action planning to better understand the specific risks that are posed and be able to respond to and mitigate future challenges. This can include attention to the school and health facility at high risk and inclusion of response to the over 90% of the total houses classified as high and medium risk to erosion.

Suco Lauala, Administrative post Ermera, Ermera Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (96.6%)* Low (0.3%) Med (3.1%) High (0%)	Low (4.0%) Med (44.1%) High (51.9%)	No risk (93.3%) Low (6.7%)
CVCA (m)	Med (1.35)**	No risk	Not identified
CVCA (f)	Med (1.92)	Med (1.92)	Not identified

*as % of total in suco= 1,454 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

In Lauala Suco the main problem is soil erosion and more than half the land area, houses and roads are classified as high risk. The total land area of Lauala Suco is 1,454 hectares, all of which is in the Lois River Catchment. It is associated with one of the Lois's major tributaries, the Gleno River.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=4.0km)		Houses (Total=522)		Schools (Total=1)		Health Facilities (Total=0)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	Not at risk 100%	High (3.0)/ High (3.0)	No Risk (99.8%) Med (0.2%)	High (3.0) High (3.0)	No risk (100%)	None (0.0)	n/a	n/a	Small bridges/water system
Soil Erosion	Low (2.6%) Med (41.2%) High (56.2%)	No risk/ High (3.0)	Low (2.7%) Med (32.2%) High (65.1%)	No risk/ No risk	High (100%)	No Risk (0.0) Low (1.0)	n/a	n/a	Small bridges/ Water system
Flood	No risk (81.3%) At risk (18.7%)	Not identified	No Risk(92.3%) At risk (7.7%)	Not identified	No risk (100%)	Not identified	n/a	n/a	

The **community members commented that landslides have occurred almost every year since 2001** until now in Aldeia Sari, which have resulted in the destruction of 10 hectares of the community farmed land and coffee plantation, traditional water system made with bamboo, community houses and 12m of rural roads including a small bridge.

The GIS maps and community opinion are at odds: the maps show no threat to the roads whereas the community believes there is a high risk of landslide on them. The community usually repairs the minor damage to the bridge using trunks and local trees are planted to prevent landslide. According to the community perceptions the houses are under high landslide risk because houses in **Aldeia Sari** have been destroyed due to landslides which have occurred **almost every year since 2001**. As a coping mechanism, affected people evacuate their house to a safe location and then try to repair the house with the help of other community members.

Luala Suco is highly susceptible to soil erosion but during the CVCA, only the women described it at medium risk for erosion because erosion has occurred almost every year since 2005 in **Aldeias Hohana, Hatuhei and Uluehan** while men did not identify erosion as a risk at all. By the women, it was stated Erosion mostly affects coffee plantation, farmland, road side drainage and small bridges. Road blockage due to high sedimentation is also very common. As a coping mechanism the community, especially those living near the affected areas, take initiatives to ensure that damaged parts of the road can be used such as removing all of the soil material that blocks the road and by planting local trees. Despite the school appearing to be in a high risk area, the women identify it as low risk, and the men do not perceive it to be at risk at all. The community helps to repair minor damages, however, depending on the volume of damage, the school authority communicates with the relevant department to fix the damaged area. There is no **health facility** in Lauala suco.

Whilst flooding is not a problem in this community, flash flooding was reported as being an issue and a danger to several roads, bridges and houses. The community normally make minor repairs to the small bridges using trunks in order to facilitate transportation, they also plant local trees to prevent landslide. As a coping mechanism, people whose houses are affected by flash flooding drain out the water and clean the mud and other sediment from the houses. There is no **health facility** in Lauala Suco.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=4.0km)	Houses (Total=522)	Schools (Total=1)	Health Facilities (Total=0)
Landslides	Disagree	Disagree	Agree – low/no risk	n/a
Soil Erosion	Agree – med/high	Disagree	Disagree	n/a
Flood	Disagree	Disagree	Agree – no risk	n/a

Recommendations: Lauala Suco' greatest risk is the effect of erosion on its roads. This can be potentially be mitigated through undertaking a bio-engineering intervention to protect the road, while all other road protective infrastructures can be assessed. There is clear discrepancy over perceived risks and actual risks. This community would benefit from further engagement on sharing specific mapping results and forming and implementing an action plan to mitigate high risks such affects of erosion to housing and its school.

Suco Estado, Administrative post Ermera, Ermera Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (91.0%)* Low (0.8%) Med (6.3%) High (1.0%)	Low (2.3%) Med (49.3%) High (48.4%)	No Risk (99.5%) At risk (0.5%)
CVCA (m)	Low (1.0)**	Low (0.69)	Not identified
CVCA (f)	Med (1.07)	Med (1.36)	Not identified

*as % of total in suco= 1,264 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Estado Suco is in a remote upland area, where the main agricultural crop is coffee. The main problem is soil erosion which is mostly medium to high risk level. Landslides have little infrastructure at risk. The total land area of Estado Suco is 1,264 hectares, all of which is in the Lois River Catchment.

	Roads (Total=10.7km)		Houses (Total=500)		Schools (Total=2)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (97.3%) Med (2.7%)	High (2.0)/ High (1.0)	No Risk (99.4%) Med (0.6%)	Med (2.0)/ Low (1.0)	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	n/a/ Small brides, Water system
Soil Erosion	Low (1.6%) Med (66.2%) High (32.2%)	Med (2.0)/ High (3.0)	Low (0.8%) Med (58.2%) High (41.0%)	Low (1.0)/ Low (1.0)	Med (50%) High (50%)	Not identified	Med (100%)	Not identified	n/a/Small bridges, water system
Flood	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	No Risk (50%) At Risk (50%)	No Risk (0.0)/ No Risk (0.0)	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	

The community generally avoids living on or building roads on steep inaccessible terrain, and only three houses and 300m of road are found in such settings in Estado Suco. The 43 community members (28 men and 15 women) who attended the CVCA workshop stated that Estado Suco is at a medium risk of landslide. They also commented that landslides occurred **in 2006-07 and 2012-15**, resulting in the destruction of rural roads, small bridges, community houses, plantations and water springs in **Aldeias Tasakina, Saramata, Coracao de Jesus, and Sinai**. The affect of the landslides was more significant on water springs due to logging in the forest.

According to the male group, the level of the roads under landslide risk is medium, noting that landslides occurred in **2006-07 and 2012-15**. The community members usually use locally available materials and voluntary labour to make minor repairs to damaged roads and small bridges. They also plant local trees to protect the soil from landslides, using their own initiative. Estado Suco is a medium risk area for landslide; however, the impact of landslide does not significantly affect the **houses**. As a coping mechanism, affected people evacuate their house to a safe location and then try to repair the house with the support received from the MSS.

Estado Suco is highly susceptible to soil erosion. The women commented that **erosion occurred almost every year** which mostly affects farmland, plantation and road side drainage specifically in **Aldeias Huitasu, Erbure, Rematu, and Hamrik Metin**. The risk of erosion on roads has been identified as due to sedimentation in drainage ditches at road side. As a coping mechanism the community makes **temporary** repairs to minor damage and plants trees to hold the soil. The GIS mps and CVCA results disagree about risk levels to housing; according to the community's perception, both men and women consider the houses to be under a low risk due to erosion whereas the GIS maps suggest it is medium/high. As a coping mechanism the affected families evacuate to the safe place and rebuild/repair the houses receiving support from MSS.

Although flooding was not perceived to be a risk, flash flooding occurs every year in **Aldeias Huitaco, Hamrik Metin**, and **Coracao de Jesus**, resulting in the damage of rural roads, small bridges, community houses, food crops, and plantations.

	Roads (Total=10.7km)	Houses (Total=500)	Schools (Total=2)	Health Facilities (Total=1)
Landslides	Disagree	Disagree	Agree – no risk	Agree – no risk
Soil Erosion	Agree – medium/high	Disagree	Disagree	Disagree
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	Agree – no risk

Recommendations: Considering the vulnerability risk of Suco Estado, 0.3 km of rural road is under risk of landslide and 10.7 km of road is under erosion risk. There is room for undertaking road rehabilitation and maintenance initiatives which could include small scale infrastructure and also bio-engineering interventions. Clear discrepancies also exist between community perception and actual risk, specifically to erosion risk to housing, schools and its facility and additionally flood risk towards one of its schools. A follow-up action plan to is recommended to be developed with the community, this could be used to help the community better understand the risks and develop strategies to mitigate those risks.

Suco Raimerhei, Administrative post Ermera, Ermera Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (94.2%)* Low (0.6%) Med (5.1%) High (0.1%)	Low (1.6%) Med (42.3%) High (56.1%)	
CVCA (m)	Med (2.0)**	Low (0.91)	
CVCA (f)	High (2.7)	Med (2.70)	

*as % of total in suco= 761 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Raimerhei Suco is densely settled and intensively farmed. The land is degraded and natural vegetation cover is sparse. These factors make it particularly vulnerable to erosion. The total land area of Raimerhei Suco is 808 hectares, all of which is in the Lois River Catchment.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=3.2km)		Houses (Total=396)		Schools (Total=1)		Health Facilities (Total=0)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (100%)	High (3.0)/ High (3.0)	No Risk (99.7%) Med (0.3%)	High (3.0)/ Med (2.0)	No risk (100%)	No Risk (0.0)/ No Risk (0.0)	n/a	n/a	Small bridges/ Water system, Small bridges
Soil Erosion	Med (34.4%) High (65.6%)	No Risk (0)/ High (3.0)	Low (0.6%) Med (31.5%) High (67.8%)	Med (2.0)/ Med (2.0)	Med (100%)	Not identified	n/a	n/a	n/a/ Small bridges, Water system
Flood	Not considered at risk =>						n/a	n/a	

The surface of the roads is gravel and soil while there are no concrete roads. Landslides were experienced in **2003 in Aldeia Karimbala, 2005 in Aldeia Moris Foun** and **almost every year in Aldeias Loumou, Nazare, Timlete, Raimaran and Mate Restu**, resulting in damage of roads, road side drains, small bridges and plantations. The roads affected by landslide are not protected by retaining walls or gabion boxes therefore exposed to the impact of landslide. The community in the affected areas remove the soil and mud that block the road and ensure water flow through the ditch is clear after the landslide. **They do this every week during the rainy season, specifically in Karimbala site (Tarmauhahi).** The community also fix the broken bridges with the locally available wood to make the road passable. The men in the community stated that the risk for landslide is high for the houses and the women said the risk is medium. As a coping mechanism, affected people evacuate their houses to a safe location and then try to repair the house with support from the community, they also change the weak/old wood and use zinc foil to protect from damage. It was stated in the CVCA that erosion affected farmland causing low productivity and also affected plantation, water springs and rural roads. According to community **erosion occurs almost every year**. The community perception of the risk of erosion to housing agrees with the GIS maps, rating it at medium/high.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=3.2km)	Houses (Total=396)	Schools (Total=1)	Health Facilities (Total=0)
Landslides	Disagree	Disagree	Agree – low/no risk	n/a
Soil Erosion	Disagree	Agree – medium/high risk	Disagree	n/a
Flood	n/a	n/a	n/a	n/a

Recommendations:

The construction of retaining walls and the placement of gabion boxes is recommended for road protection. Soil erosion poses a risk to a substantial number of houses and the community could benefit from further assessment and planning to mitigate risks in this area.

Suco Ailelo, Administrative post Ermera, municipality Ermera

	Landslide	Soil Erosion	Flood
GIS	No Risk (95.2%)* Low (1.0%) Med (1.3%) High (2.5%)	Low (35.2%) Med (47.1%) High (17.7%)	No Risk (89.7%) At Risk (10.3%
CVCA (m)	Not identified**	Med (1.35)	Not identified
CVCA (f)	Med (1.83)	Not identified	Not identified

*as % of total in suco= 2,629 hectares
** as average rating of risk perception through vulnerability matrix with maximum rating 3

Ailelo Suco includes low, flat, riverside land prone to flooding which is sparsely populated, rising to steep, more densely populated areas prone to landslides and erosion. The total land area of Ailelo Suco is 2,629 hectares, all (100%) of which is in the Lois River Catchment. One hundred and three community members (46 men and 57 women) attended in CVCA workshop.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=11.2km)		Houses (Total=368)		Schools (Total=5)		Health Facilities (Total=0)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (100%)	Not identified/ Med (2.0)	No Risk (99.8%) High (0.3%)	Med (2.0)/ Low (1.0)	No risk (100%)	Low (1.0)/ None (0.0)	n/a	n/a	n/a/ Electricity post
Soil Erosion	Low (31%) Med (48.7%) High (20.3%)	Med (2.0)/ Not identified	Low (14.9%) Med (54.4%) High (30.7%)	Low (1.0)/ Not identified	Low (40%) Med (40%) High (20%)	Low (1.0)/ Not identified	n/a	n/a	Small Bridges, Water system/ Electricyty posts
Flood	No Risk (94.6%) At Risk (5.4%)	Not identified/ Not identified	No Risk (98.6%) At Risk (1.4%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	n/a	n/a	

While the GIS maps claim there is no landslide risk in Ailelo, the female group commented that **landslide occurs every year,** destroying coffee plantations, food crops, rural roads and electricity posts in **Aldeia Leirema**.

The CVCA group commented that erosion occurred in **most years from 2007**, resulting in destroyed coffee plantations, maize fields, rural roads, farmlands and water springs in **Aldeias Nalmeik and Boebaka**

While there is no risk of tidal flooding, the women referred to flash flooding in **Aldeia Leirema in 2000, 2012 and 2015** which resulted in the destruction of plantations, farmland, and the death of livestock. The male group said that small bridges, rural roads, coffee plantations were destroyed every year in **Aldeias Nakrobo, Turema, Hohuú Bestarn, Aitos, Erleta**, as a result of flash flooding.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=11.2km)	Houses (Total=368)	Schools (Total=5)	Health Facilities (Total=0)
Landslides	Agree - Mediium	Disagree	Agree – low/no risk	n/a
Soil Erosion	Agree – medium risk	Disagree	Disagree	n/a
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	n/a

Recommendations:

The most significant risk posed to this community is to its roads, a third of its houses and a school a result of soil erosion. Furthermore, even though not considered a significant issue by the community, floods have negatively affected aldeias in most years and one of its schools is at high risk. It is recommended that further assessment be conducted to construct protective measures for its roads and houses and school at risk while mitigation strategies are discussed through action planning.

Suco Talimoro, Administrative post Ermera, municipality Ermera

	Landslide	Soil Erosion	Flood
GIS	No Risk (86.8%)* Low (11.0%) Med (1.9%) High (0.3%)	Low (10.7%) Med (64.4%) High (24.9%)	No Risk (100%)
CVCA (m)	Med (1.9)**	Not identified	Not identified

*as % of total in suco= 450 hectares
** as average rating of risk perception through vulnerability matrix with maximum rating 3

Talimoro Suco is in the middle hills near Gleno, which are not as steep as some nearby areas. There is less high risk for landslides and erosion but still significant threats in the low to medium categories. The total land area of Talimoro Suco is 450 hectares, all (100%) of which is in the Lois River Catchment. A total of 76 community members (27 men and 49 women) attended in CVCA workshop.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=6.5km)		Houses (Total=292)		Schools (Total=2)		Health Facilities (Total=0)		Other
	GIS	CVCA *	GIS	CVCA	GIS	CVCA	GIS	CVCA	CVCA
Landslides	No Risk (95.4%) Low (2.7%) High (1.9%)	High (3.0)	No Risk (93.8%) Low (4.1%) Med (1.4%) High (0.7%)	Med (2.0)	No risk (100%)	Med (1.5)	n/a	n/a	Small bridges
Soil Erosion	Low (10.1%) Med (57.8%) High (32.1%)	Not identified	Low (12.7%) Med (62.0%) High (25.3%)	Not identified	Med (100%)	identified	n/a	n/a	Small bridges
Flood	No Risk (100%)	Not identified	No Risk (100%)	Not identified	No Risk (100%)	Not identified	n/a	n/a	

*Facilitator did not identify which data belonged to the male and female groups

The women commented that landslides occurred in **2015**, resulting in the destruction of paddy fields, community houses and plantation areas in **Aldeias Lebuai and Mankabia**. The men commented that landslides occurred also in **1999, 2007-2009 and 2014**, resulting in the destruction of rural roads, paddy fields and community houses in **Aldeias Diru Anwei, Lissa Luli, Mau-Bara Kai-pu, Nunu-lau, Manleki and Degenu-siku, Ulo-Ana**.

None of Talimoro Suco is considered to be at risk of flooding through the GIS mapping. The community members shared there is no flood risk in T**alimoro Suco**, but they experienced flash flooding at a high level. The women in the community referred to flash flooding every year in **Aldeias Lebuai** and **Mankabia** which resulted in destroyed food crops, plantation areas, school buildings, rural roads, water capitation tanks and drinking water pipelines. The men commented on flooding in **2007-2009 and 2014-2015 in Daru Watu Lau, E´e Solo so, Gou Mau Lau, Nunu-Lau, Manleki, Degenu-siku**, which resulted in destroyed community houses, maize fields, paddy fields, drinking water pipelines, coffee plantations, and death of livestock.

	Roads (Total=6.5km)	Houses (Total=292)	Schools (Total=2)	Health Facilities (Total=0)
Landslides	Disagree	Disagree	Agree – low/no risk	n/a
Soil Erosion	Disagree	Disagree	Disagree	n/a
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	n/a

Recommendations:

There is a clear discrepancy between the GIS information and community perception in this community where soil erosion is not a perceived risk while both a significant portion of roads and houses are at high risk. Also while the GIS information indicates the Suco to not be at risk, which is corroborated by the community,

the community experience indicates there has been significant negative affects due to flooding. It is recommended that the mapping information is discussed with the community and action planning is conducted to investigate the root causes of the damage to flooding and create mitigation strategies.

Suco Leguimea, Administrative post Ermera, municipality Ermera

	Landslide	Soil Erosion	Flood
GIS	No Risk (98.1%)* Low (0.2%) Med (1.0%) High (0.7%)	Low (0.9%) Med (36.6%) High (62.5%)	n/a
CVCA (m)	Med (1.93)**	Not identified	n/a
CVCA (f)	Med (1.67)	Not identified	n/a

*as % of total in suco= 850 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Leguimea Suco is located in a very remote area of the municipality. Its most serious problem is the risk of erosion, with more than 99% of its total land area in high-risk areas. The total land area of Leguimea Suco is 850 hectares, all (100%) of which is in the Lois River Catchment.A total of 80 community members (25 men and 55 women) attended the CVCA workshop.

	Roads (Total=8.7km)		Houses (Total=295)		Schools (Total=2)		Health Facilities (Total=0)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (100%)	High (3.0)/ Med (2.0)	No Risk (97.6%) Med (1.7%) High (0.7%)	Not identified/ Med (2.0)	No risk (100%)	Not identified as infrastructure at risk	n/a	n/a	Small bridges/Small bridges
Soil Erosion	Med (28.8%) High (71.2%)	Not identified/ Not identified	Low (0.6%) Med (31.5%) High (67.8%)	Not identified/ Not identified	Med (50%) High (50%)	Not identified as infrastructure at risk	n/a	n/a	Not identified/ Not identified
Flood	Not considered at risk =>						n/a	n/a	

According to the women who attended the CVCA, landslides occur every year, resulting in the destruction of small bridges, houses, rural roads and farmlands in **Aldeia Villa Maria**. The men commented that landslides occur every year resulting in the destruction of coffee plantations, food crops, rural roads, water systems, public facilities (chapel and electricity post) in **Aldeias Vila Rei, Rai Masin, Fatmaunalo, Bisokmou and Pohuia**. The men also commented that during the rainy season, small bridges, drainage systems as well as rural roads are part of the infrastructure that suffers the most due to landslides and flash floods.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=19.6km)	Houses (Total=793)	Schools (Total=5)	Health Facilities (Total=1)
Landslides	Disagree	Disagree	Agree – low/no risk	Agree – no risk
Soil Erosion	Agree – medium/ high	Agree – medium risk	Disagree	Disagree
Flood	Agree-no risk	Agree – low/no risk	Agree – low/no risk	Agree – no risk

<u>Recommendations:</u>

Landslides clearly pose a significant risk to the community with historical experience indicating yearly damages and 99% of its land at risk. Roads in the communities face the highest risk of damage due to landslides. Furthermore, soil erosion poses a significant risk to close to 2/3 of the houses in the community but was not deemed a threat by the community. Action planning with clear mitigation strategies with specific attention to the roads and houses is recommended.

Suco Leimea-Craic, Administrative post Hatolia, Municipality Ermera

	Landslide	Soil Erosion	Flood
GIS	No Risk (94.9%)* Low (0.8%) Med (1.2%) High (3.1%)	Low (19.6%) Med (56.2%) High (24.2%)	No Risk (93.3%) At Risk (6.7%)
CVCA (m)	Not identified**	Low (0.79)	Not identified
CVCA (f)	Med (1.5)	Not identified	Not identified

*as % of total in suco= 2,875 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Leimea-Craic suco is sparsely populated and its people are concentrated in two main settlements on the lower riverside land. The main risk is erosion. The total land area of Leimea-Craic suco is 2,875 hectares, all of which is in the Lois River Catchment.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=1.3km)		Houses (Total=273)		Schools (Total=2)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (100%)	Not identified/ High (3.0)	No Risk (100%)	Not identified/ No Risk (0.0)	No Risk (100%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	Not identified/ Not identified
Soil Erosion	Low (11.4%) Med (88.6%)	No Risk (0.0)/ Not identified	Low (14.3%) Med (74.7%) High (11.0%)	No Risk (0.0)/ Not identified	Med (50%) High (50%)	Not identified/ Not identified	Med (100%)	Not identified/ Not identified	Not identified/ Not identified
Flood	No Risk (80.8%) At Risk (19.2%)	Not identified/ Not identified	No Risk (93.4%) At Risk (6.6%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	

You can see from the table above that the GIS maps and community opinion of what infrastructure is at risk from landslide differs wildly.

Erosion appears to be the biggest threat to the community infrastructure, but the community members have not acknowledged it – see the recommendations below.

	Roads (Total=1.3km)	Houses (Total=273)	Schools (Total=2)	Health Facilities (Total=1)
Landslides	Disagree	Agree – low/no risk	Agree – low/no risk	Agree – no risk
Soil Erosion	Disagree	Disagree	Disagree	Disagree
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	Agree – no risk

Recommendations:

The main risks in this community are towards soil erosion affecting houses and one of its schools. Furthermore, houses located on the river bank face additional risk to flooding. Protective measures and mitigation strategies affecting these infrastructures could be addressed through action planning and implementation of its plan. The houses on the river bank susceptible to erosion and flooding could be considered to be relocated. Further work needs to be done with the community to ensure they are better informed on what erosion is, and the impact it can have on their community.

Suco Coilate-Letelo, Administrative post Hatolia, Ermera Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (93.6%)* Low (0.9%) Med (2.3%) High (3.2%)	Low (2.3%) Med (42.4%) High (55.3%)	No Risk (99.9%) At Risk (0.1%)
CVCA (m)	High (2.11)**	Not identified	Not identified
CVCA (f)	High (2.3)	Not identified	Med (1.67)

*as % of total in suco= 2,688 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Coilate-Letelo Suco is similar to Ailelo, densely populated and intensively farmed in higher areas, but more sparsely populated on the less accessible lower slopes. Its land is at extremely high risk of erosion. The impacts of this are also noticeable as deposits of sand and rock in the floodplains of the Marobo and Lois Rivers. The total land area of Coilate-Letelo Suco is 2,688 hectares, all (100%) in the Lois River Catchment. A total of 69 community people (55 men and 14 women) participated in the CVCA workshop.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=16.2km)		Houses (Total=606)		Schools (Total=0)		Health Facilities (Total=2)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (99.6%) Med (0.4%)	High (3.0)/ High (3.0)	No Risk (99.8%) High (0.2%)	Med (2.0)/ High (3.0)	n/a	n/a	No Risk (100%)	Med(2.0)/ Not identified	Water system, Small bridges/ Water system
Soil Erosion	Low (1.9%) Med (58.4%) High (39.7%)	Not identified/ Not identified	Low (3.5%) Med (35.0%) High (61.5%)	Not identified/ Not identified	n/a	n/a	Med (50%) High (50%)	Not identified/ Not identified	Not identified/ Not identified
Flood	No Risk (99.9%) At Risk (0.1%)	Not identified/ High (3.0)	No Risk (100%)	Not identified/ No Risk (0.0)	n/a	n/a	No Risk (100%)	Not identified/ Not identified	Not identified/ Not identified

Landslides have occurred **almost every year**, resulting in the destruction of coffee plantations, water systems (springs, pipelines and main storage tank), community houses, rural roads, and electricity posts. There are absences of road side drain and the road is gravel and soil surfacing, without any concrete surfacing. Community members plant local trees alongside the road in an effort to combat landslides. During landslides the community members monitor the situation and take initiatives to fix the damaged roads and remove the soil from the top of the road to make the road passable. The community members evacuate their homes as required during landslides and rebuild the houses with their own initiatives.

In Coilate-Letelo Suco, 2,687 hectares (99.9%) are considered to be not at risk of flooding and one hectare (0.1 %) is at risk of flooding. The female group stated that the flood risk is medium, specifically in **Aldeias Manu Lete and Hauhei** where flooding occurs almost every year, resulting in the destruction of farmlands and rural roads including drainage systems. The road side drainage in this suco is soil/manual drainage but there is no concrete drainage.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=16.2km)	Houses (Total=606)	Schools (Total=0)	Health Facilities (Total=2)
Landslides	Disagree	Disagree	n/a	Agree – no risk
Soil Erosion	Disagree	Disagree	n/a	Disagree
Flood	Disagree	Agree – low/no risk	n/a	Agree – no risk

Recommendations:

While the community clearly has positive action planning to respond to risks of landslide, the community can benefit from concrete road side drainage to further protect its roads. However, the community does not perceive a risk of soil erosion, though over 98% of houses are at medium or high risk to this hazard. The community could benefit from specific planning around protection against soil erosion of its houses.

Suco Leimea-Sorinbalo, Administrative post Hatolia, Ermera Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (90.6%)* Low (1.6%) Med (1.7%) High (6.1%)	Med (22.7%) High (77.3%)	n/a
CVCA (m)	Med (1.62)**	Low (0.46)	n/a
CVCA (f)	Med (1.5)	Not identified	n/a

*as % of total in suco= 859 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Leimea-Sorinbalo Suco is small, remote and sparsely populated. However, much of the land area is severely degraded – all of it falls into the medium to high-risk categories for erosion. The total land area of Leimea-Sorinbalo suco is 859 hectares, all in the Lois River Catchment. A total of 85 community members (56 men and 29 women) participated in the CVCA workshop.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=3.8km)		Houses (Total=120)		Schools (Total=0)		Health Facilities (Total=0)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (100%)	High (3.0)/ High (3.0)	No Risk (99.2%) High (0.8%)	Med (2.0)/ Low (1.0)	n/a	n/a	n/a	n/a	Small bridges, Water system/ Bridges, Water system
Soil Erosion	Med (25.7%) High (74.3%)	Not identified/ Not identified	Med (9.2%) High (90.8%)	Not identified/ Not identified	n/a	n/a	n/a	n/a	Water system/ n/a
Flood	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	

A landslide occurred in **2013 in Aldeia Aipule** and in almost every year since 2003 in **Aldeias Taka Mata, Brogbou, Aipule and Hambulu**, resulting in the destruction of coffee and vanilla plantations, rural roads, and paddy fields. Landslides have completely destroyed the paddy fields and the community can no longer utilize the land.

Leimea-Sorinbalo has the largest proportion of its area at high risk for erosion. The community members plant local trees to strengthen the soil structure and evacuate their house when landslides hit and repair them with support from MSS.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=3.8km)	Houses (Total=120)	Schools (Total=0)	Health Facilities (Total=0)
Landslides	Disagree	Disagree	n/a	n/a
Soil Erosion	Disagree	Disagree	n/a	n/a
Flood	n/a	n/a	n/a	n/a

Recommendations:

The most significant threat to this community is soil erosion affecting its houses. The community has shown clear effort towards mitigation strategies to protect its roads such as planting to strengthen soil structure. The houses that are at risk could be further assessed to further mitigate damages from soil erosion. With further information being passed to the community, action planning and implementation could be effective.

Suco Fahilebo, Administrative post Bazartete, Liquica Municipality:

	Landslide	Soil Erosion	Flood
GIS	No Risk (93.8%)* Low (3.2%) Med (2.2%) High (0.8%)	Low (3.5%) Med (47.5%) High (49.0%)	No Risk (99.5%) At Risk (0.5%)
CVCA (m)	Med (1.38)**	Low (0.94)	Not identified
CVCA (f)	Med (1.08)	Low (1.00)	Not identified

*as % of total in suco= 2,410 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Fahilebo Suco is remote with extremely limited access. Although it does not have the steepest slopes, it is hilly and poorly vegetated, making the risk of erosion the greatest hazard. The total land area of Fahilebo Suco is 2,410 hectares, with 1,851 hectares (76.8%) in the Comoro River Catchment and 559 hectares (23.2%) in the Moraeloa River Catchment.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=0km)		Houses (Total=211)		Schools (Total=1)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	Not identified	High (3.0)/ High (3.0)	No Risk (95.7 %) Low (2.4%) Med (1.4%) High (0.5%)	Low (1.0)/ No Risk (0.0)	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	Small Bridges/ Water system
Soil Erosion	Not Identified	High (3.0)/ Med (2.0)	Low (1.4%) Med (39.8%) High (58.8%)	Low (1.0)/ Low (1.0)	High (100%)	No Risk (0.0)/ No Risk (0.0)	High (100%)	No Risk (0.0)/ No Risk (0.0)	Small bridges/ Water system
Flood	Not Identified	Not identified/ Not identified	No Risk (99.5%) At Risk (0.5%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	Not identified/ Not identified

Fifty-one community members (27 men and 24 women) who attended the CVCA workshop stated that **Fahilebo Suco** is a medium risk area for landslide. They also commented that landslides occurred in **2000 to 2015**, resulting in the destruction of small trails, small bridges, community houses, farmlands, coffee plantations and water springs in **Aldeias Titneta, Baunalogeun, Baunamaria, Talkuku, Bouhaet, Mau-Orailalan, Tuhitu leten, hatsarlelo and Burean**. The community pointed out that the landslides originated from the area near to the river side.

The GIS maps did not identify any official roads, but the community members believe the threat of landslide to roads is extremely high According to the women's CVCA group, the houses are not at risk of landslide and according to men group the level of risk for the houses under landslide is low considering landslides occurred **from 2000 to 2015** and houses receiving little damage. As a coping mechanism the affected families evacuate to the safe place and rebuild/repair the houses receiving support from MSS.

During CVCA the women's group described **Fahilebo Suco** as a medium risk for erosion whereas the men's group described it at low risk. The community also commented that erosion occurred almost every year which mostly affects farmland, streams and road side drainage. According to the community the level of erosion risk to houses is low since only minor damages have been experienced. While the community recognise the risk to the school, they currently have no coping strategy.

The community members shared there is no flood risk in Fahilebo Suco but experienced flash flooding every year in **Aldeias Hatalin, Ermeta and Fatuneco**, which resulted in damage to rural roads, community houses and farmlands. There was originally no river in Fahilebo Suco but because no specific action was taken towards the streams, the small streams have become a river, which can cause flood damage.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=0km)	Houses (Total=211)	Schools (Total=1)	Health Facilities (Total=1)
Landslides	Disagree	Agree – low/no risk	Agree – low/no risk	Agree – no risk
Soil Erosion	Disagree	Disagree	Disagree	Disagree
Flood	Agree – no risk	Agree – low/no risk	Agree – low/no risk	Agree – no risk

Recommendations:

The most significant threat to this community are due to soil erosion affecting its school and health facility as both are in a high risk area, while the community does not perceive the risk and therefore does not have a coping strategy in place. Other risks seem to be well mitigated or minimised through community efforts. Action planning and further information on soil erosion hazards to its school and health facility would benefit the community. GPS coordinates of roads and tracks should be taken, in order to have a better idea of the risks they face. The community should receive action plan training with regards to coping with damage to the school and health facilities.

Suco Fatumasi, Administrative post Bazartete, Liquica Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (466%)* Low (14.7%) Med (6.8%) High (9.7%)	Low (3.5%) Med (24.2%) High (72.3%)	No Risk (99.8%) At Risk (0.2%)
CVCA (m)	Low (0.94)**	Low (0.94)	Not identified
CVCA (f)	Low (0.88)	Low (0.94)	Not identified

*as % of total in suco= 677 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Fatumasi Suco is at high elevation and on steep slopes. It is at high risk from landslides and erosion, typical of north facing catchments in Liquiçá Municipality. The total land area of Fatumasi Suco is 677 hectares, with 267 hectares (39.7%) in the Moraeloa River Catchment, 248 (36.7%) in the Carbutaeloa River Catchment, and 160 hectares (23.6%) in the Caicassa River Catchment. A total of 67 community members (37 men and 30 women) participated in the CVCA workshop.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=11.3km)		Houses (Total=262)		Schools (Total=3)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (78.8%) Low (9.7%) Med (5.4%) High (6.6%)	Med (2.0)/ Med (2.0)	No Risk (76.3%) Low (8.4%) Med (6.1%) High (9.2%)	Med (2.0)/ Med (2.0)	No risk (100%)	No Risk (0.0)/ No Risk (0.0)	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	Water system, Small bridges/ n/a
Soil Erosion	Med (21.9%) High (78.1%)	Med (2.0)/ Med (2.0)	Low (0.8%) Med (27.9%) High (71.3%)	Med (2.0)/ Med (2.0)	High (100%)	No Risk (0.0)/ No Risk (0.0)	High (100%)	No Risk (0.0)/ No Risk (0.0)	Water system, Small bridges/ n/a
Flood	Not considered at risk =>								

According to community members landslides have occurred almost every year, **especially since 2013**, and they have affected banana and corn production, community houses, rural roads and small bridges, specifically the construction of the road infrastructure that links **Fatumasi and Lauhata**. The most affected Aldeias are **Durbasa and Metir**.

In **Fatumasi**, where transportation resources are already extremely limited, a landslide taking out just a **single short section of road** can isolate communities, prevent crops from reaching markets, keep children away from school and prove life-threatening to people in need of medical support. Landslides affect road communication and drainage systems. They can also affect soil condition: farmland near the landslide areas in Aldeia Metir is not in use because the condition of the soil during rainy season is so poor. Local trees were planted but did not have a significant effect on the situation. In terms of the impact of landslides on roads, the community members are currently solely depend on outside support. Landslides also impact on the pipelines for water systems in the rainy season.

Erosion occurs almost every year, resulting in destroyed rural roads, road side drainage systems, and impacts a small bridge in Aldeia Metir. During the rainy season the condition of the small bridges becomes very bad and it is not possible to use public transport. The community members do not have any existing coping mechanisms for this, but rather depend on external support.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=11.3km)	Houses (Total=262)	Schools (Total=3)	Health Facilities (Total=1)
Landslides	Disagree	Disagree	Agree – low/no risk	Agree – no risk
Soil Erosion	Agree – med / high	Agree – medium /high	Disagree	Disagree
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk

Recommendations

Given the high percentage of roads at risk from both landslides and erosion, road rehabilitation and maintenance is recommended, including necessary road infrastructure such as small culverts and the placement of gabion boxes where required. This should be strong and of high quality as the community reports roads and gabion boxes have been damaged by heavy rains in the past.

Given that the community is heavily relying on outside support to reduce the impact of any of these risks, and that they are not currently undertaking any activities to prevent or mitigate against potential risks, it is recommended this suco be visited again to develop an Aldeia Resilient Action Plan in order to ensure the community is planning ahead to prevent future impacts of landslides and erosion.

Suco Lauhata, Administrative post Bazartete, Liquica Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (84.1%)* Low (7.7%) Med (7.0%) High (1.2%)	Low (10.5%) Med (45.6%) High (43.9%)	No Risk (94.8%) At Risk (5.2%)
CVCA (m)	Med (1.56)**	Low (0.89)	High (2.00)
CVCA (f)	High (2.14)	High (2.00)	High (2.57)

*as % of total in suco= 2,001 hectares
** as average rating of risk perception through vulnerability matrix with maximum rating 3

Lauhata Suco includes coastal areas, low hills and steep slopes. The main risk is from flooding near the mouths of the two largest rivers. This threatens a lot of houses and roads because the flood risk is highest in densely populated areas in and near Liquiçá Vila. The total land area of Lauhata Suco is 2,001 hectares, with 865 hectares (43.2%) in the Caicassa River Catchment, 682 (34.1%) in the Carbutaeloa River Catchment, 329 hectares (16.5%) in the Inur Pilila Aggregate Catchment, 67 hectares (3.3%) in the Moraeloa River Catchment, and 58 hectares (2.9%) in the Emeta Aggregate Catchment.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=22.5km)		Houses (Total=631)		Schools (Total=3)		Health Facilities (Total=0)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (99.6%) Low (1.8%)	High (3.0)/ High (3.0)	No Risk (97.9%) Low (1.5%) Med (0.2%) High (0.4%)	Med (2.0)/ Low (1.0)	No risk (100%)	Not identified as infrastructure that is at risk	n/a	n/a	n/a/ Water system
Soil Erosion	Low (22.7%) Med (64.1%) High (13.2%)	Low (1.0)/ High (3.0)	Low (10.6%) Med (76.7%) High (12.7%)	Med (2.0)/ Med (2.0)	Med (100%)	Not identified as infrastructure that is at risk	n/a	n/a	n/a/ Water system
Flood	No Risk (94.8%) At Risk (5.2%)	Med (2.0)/ High (3.0)	No Risk (77.5%) At Risk (22.5%)	Med (2.0)/ High (3.0)	No Risk (100%)	Not identified as infrastructure that is at risk	n/a	n/a	n/a/ Water system

Community members commented that landslides have occurred every year in the higher risk areas, resulting in the destruction of: community houses; farmlands; plantation; retaining walls, and water systems in **Aldeias Pisu Leten, Kamalehu, Raukesa, Kamegiulu and Pisu Kraik**. As a coping mechanism the community plants trees, removes the sedimentation from the road side drains and organizes Tara bandu. However the women's group felt the level of risk to houses from landslides is medium, and the men's group felt the risk is low, considering that landslides do occur every year. As a coping mechanism, the affected families evacuate to a safe place in the event of a landslide and rebuild/repair the houses with the support of MSS after.

During the CVCA, the women's group described the Suco at medium risk from erosion whereas the men's group described it as low risk. The women's group also commented that erosion occurred in **2015**, which mostly affected water springs, drainage ditches and community farmland, specifically in **Aldeia Kamegiulo, Raukasa, Pisu Kraik and Pisu Leten**.

According to the women's group, the level of risk for roads from erosion is high and according to men's group the risk is medium, considering the erosion that occurred in **2015**. As a coping mechanism the community plants trees, removes the sedimentation from the road side drains and organizes Tara bandu. Families repair their housing when erosion occurs.

The flood-prone areas are almost entirely in lower catchment areas, close to the mouths of the rivers. The two largest areas of **Bazartete AP** that are prone to flooding are in and around the built-up areas of **Liquiçá Vila and Lauhata**. The processes most responsible for flooding here are large volumes of water coming down very steep slopes after periods of prolonged rain (several hours or even days), or after short, intense downpours. As is often the case, human activity exacerbates the

problem – the building of infrastructure in the two towns has not provided adequate drainage to let the water through. The towns themselves act as dams, forcing the water to back up and spill over the banks of the river channels. During the CVCA workshop, the women's group described the suco as being at high risk from flooding while the men's group described it at medium risk. The women's group commented that flooding occurred in **2011** and mostly affected community houses and water systems, specifically in **aldeias Kamalehou** and **Puke Leten**. The men's group commented that flooding occurred in **2008-2015** and mostly affected community houses, animals and plantations, specifically in **aldeias Raukasa, Pisu Leten, Pisu Kraik and Kamalehu**. As a coping mechanism to mitigate the risk of flooding damaging roads the community plants trees, removes the sedimentation from the road side drains and organizes Tara bandu. In the event of flooding which impacts on houses, as a coping mechanism the affected families repair the houses.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=22.5km)	Houses (Total=631)	Schools (Total=3)	Health Facilities (Total=0)
Landslides	Disagree	Disagree	Agree – low/no risk	n/a
Soil Erosion	Agree – medium/high	Agree – medium risk	Disagree	n/a
Flood	Disagree	Disagree	Agree – low/no risk	n/a

Recommendations:

Given that the areas at highest risk and being affected by landslides and floods are relatively small it would be recommended to work with the community to focus on preventative strategies in these areas in order to yield quick wins in terms of mitigating risk. The community mentions that it is already planting trees as a preventative mechanism yet damage is still being reported, therefore it is recommended that the approach and methodology the community is using is reviewed with follow up as needed to make this activity more effective.

Suco Leorema, Administrative post Bazartete, Liquica Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (87.8%)* Low (6.0%) Med (2.0%) High (4.2%)	Low (1.0%) Med (44.5%) High (54.5%)	No Risk (99.9%) At Risk (0.1%)
CVCA (m)	High (1.75)**	Not Identified	Not identifed
CVCA (f)	High (2.50)	High (2.33)	Not identified

*as % of total in suco= 2,235 hectares
** as average rating of risk perception through vulnerability matrix with maximum rating 3

Leorema Suco is very densely settled considering that it is very remote. It has numerous small rivers and very steep slopes. Erosion is the biggest risk, with some areas at high risk of landslides in the north. The total land area of Leorema Suco is 2,235 hectares, with 1,243 hectares (55.6%) in the Comoro River Catchment, 864 (38.7%) in the Lois River Catchment, 94 hectares (4.2%) in the Moraeloa River Catchment, and 34 hectares (1.5%) in the Carbutaeloa River Catchment.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=19.6km)		Houses (Total=793)		Schools (Total=5)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (91.1%) Low (4.6%) Med (2.5%) High (1.8%)	Med (2.0)/ High (3.0)	No Risk (94.8%) Low (1.7%) Med (1.1%) High (2.4%)	Low (1.0)/ High (3.0)	No risk (100%)	Not identified as infrastructure that is at risk	No Risk (100%)	Not identified as infrastructure that is at risk	Not identified/ Not identified
Soil Erosion	Low (2.2%) Med (53.4%) High (44.4%)	Low (0.0)/ High (3.0)	Low (0.9%) Med (33.8%) High (65.3%)	Low (0.0)/ Med (2.0)	Med (60%) High (40%)	Not identified as infrastructure that is at risk	Med (100%)	Not identified as infrastructure that is at risk	Not identified/ Not identified
Flood	No Risk (100%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	Not identified/ Not identified

. In terms of total area, Leorema Suco has the most land at high risk for landslides with 94 hectares. Most of this is in the Comoro River Catchment. An interesting aspect of the risk areas in the Comoro Catchment is that some of them are high risk areas in the extreme upper reaches in Leorema Suco. Fifty-seven community members (33 men and 24 women) attended the CVCA workshop. The men commented that landslides occur every year resulting in the destruction of community houses and plantation in **aldeias Kutulau, Bukumera, Urema, Railuli, Urluli and Hatuhoui**. The women commented that the most serious landslides occurred **in 2004 and 2014**, and resulted in destroyed roads, houses, plantation and water systems in **aldeias Kutulau and Railuli**. The community members usually use locally available materials and voluntary labour to make minor repairs to damaged roads and small bridges after a landslide. They also plant local trees to try to protect the soil from landslides, using their own initiative. The chief of the suco normally communicates with the district authority for major repairs.. According to the community's perception, the men explained the houses are at a low level of risk of landslides based on their experience of the landslides that occur each year, while the women felt that houses are under a high level of risk based on the landslides that occurred in **2004 and 2014** in **aldeia Kutulau**. As a coping mechanism, affected people evacuate their house to a safe location and then try to repair the house with the help of other community members.

During the CVCA workshop the community described the suco as being at a high risk for erosion, commenting that erosion occurred from **2008-2015**, mostly affecting community farmland, specifically in **aldeias Manulateten, Railuli, Urema and Fatuhou**. According to the community, the risk level for roads from erosion is medium, based on their experience of erosion from **2008 to 2015** which mainly affected small bridges. As with landslides, the community members usually use locally available materials and voluntary labour to make minor repairs to damaged roads and small bridges. They also plant local trees to protect the soil, under their own initiative. The chief of the suco normally communicates with the district authority for major repairs. According to the community's perception the men felt that the houses are

under a medium level of risk of erosion, due to erosion that occurred between **2008- 2015**. As a coping mechanism, affected people try to repair the house with the help of other community members after erosion occurs.

The community members did not consider flooding as a risk. However, they stated that the possibility of flash flooding is very high. The men's group mentioned there was a big flash flood in **2007-2008** which resulted in damage to farmlands, plantation and community houses.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=19.6km)	Houses (Total=793)	Schools (Total=5)	Health Facilities (Total=1)
Landslides	Disagree	Disagree	Agree – low/no risk	Agree – low/no risk
Soil Erosion	Agree – medium / high	Agree – medium risk	Agree – medium risk	Disagree
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk

Recommendations:

The community is currently undertaking very few preventative measures to reduce the risk of impacts, especially to erosion and landslides. Given that they are reporting damage to infrastructure based on this it is recommended that the community should be visited again to develop an Aldeia Resilient Action Plan in order to mitigate the risk of negative impacts. Despite being an area at low risk form flooding, the community does report roads, bridges, drainage and water systems being damaged significantly by flash flooding, therefore it would be recommended to explore these issues further to identify specific areas and causes of these flash floods and explore approaches to mitigate the impact of these events.

Suco Metagou, Administrative post Bazartete, Liquica Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (64.7%)* Low (19.2%) Med (6.0%) High (10.1%)	Low (0.3%) Med (28.6%) High (71.2%)	n/a
CVCA (m)	Med (1.19)**	Not identified	Not identified
CVCA (f)	Med (1.19)	Med ()	Not identified

*as % of total in suco= 626 hectares
** as average rating of risk perception through vulnerability matrix with maximum rating 3

Metagou Suco is primarily in north-facing catchments with substantial risk of landslides and almost all areas at medium to high risk of erosion. The total land area of Metagou Suco is 626 hectares, with 312 hectares (49.8%) in the Carbutaeloa River Catchment, 266 (42.5%) in the Gularloa River Catchment, and 48 hectares (7.7%) in the Lois River Catchment. A total of 69 community members (56 men and 13 women) participated in the CVCA workshop.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=7.1km)		Houses (Total=285)		Schools (Total=1)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (82.6%) Low (14.4%) High (3.0%)	High (3.0)/ High (3.0)	No Risk (82.1%) Low (7.7%) Med (2.1%) High (8.1%)	Low (1.0)/ Low (1.0)	No risk (100%)	No Risk (0.0)/ No Risk (0.0)	No Risk (100%)	Not identified as infrastructure at risk	Small bridges, Water system, Electricity post/ Small bridges, Water system, Electricity post
Soil Erosion	Med (52.5%) High (47.5%)	Not identified/ Not identified	Med (36.5%) High (63.5%)	Not identified/ Not identified	High (100%)	Not identified/ Not identified	Med (100%)	Not identified as infrastructure at risk	Not identified/ Not identified
Flood	Not considered at risk =>								

Landslides occur almost every year resulting in damage to coffee plantations, rural roads, drainage, community houses, electricity posts, water tanks and small bridges, particularly in **aldeias Asorlema and Metiluly**. The community members plant local trees under their own initiative to try to prevent landslides from occurring.

The community members highlighted that heavy rains had significant impact on rural roads, ditches and small bridges. Given that heavy rains cause the most impact in areas that suffer from high soil erosion it is likely that erosion was an important cause in areas where damage was high.

None of Metagou Suco is considered to be at risk of flooding.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=7.1km)	Houses (Total=285)	Schools (Total=1)	Health Facilities (Total=1)
Landslides	Disagree	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk
Soil Erosion	Disagree	Disagree	Disagree	Agree – Medium risk
Flood	n/a	n/a	n/a	n/a

Recommendations:

The main concerns and issues raised by the community were around road infrastructure and given the high risk of erosion, road rehabilitation and maintenance initiatives are recommended, which include small road infrastructure like small culverts and road side drainage. The community needs some capacity building training in order to recognise the signs of erosion, and know how to combat it.

Suco Vaviquinia, Administrative post Maubara, Liquica Municipality

	Landslide	Soil Erosion	Flood
GIS	No Risk (80.8%)* Low (5.7%) Med (10.0%) High (3.5%)	Low (5.4%) Med (46.3%) High (48.3%)	No Risk (97.3%) At Risk (2.7%)
CVCA (m)	Med (1.43)**	Not identified	Low (1.0)
CVCA (f)	High (2.33)	Not identified	Not identified

*as % of total in suco= 1,946 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Vaviquinia Suco includes coastal areas and steep slopes. Maubara Vila is in this suco, where the biggest problems are soil erosion and, along the coast to the east, increased risk of flooding. The total land area of Vaviquinia Suco is 1,946 hectares, with 771 hectares (39.6%) in the Mausako Aggregate Catchment, 439 (22.6%) in the Babono River Catchment, 423 hectares (21.7%) in the Morae River Catchment, and 313 hectares (16.1%) in the Sia Maubara Aggregate Catchment.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=13.4km)		Houses (Total=627)		Schools (Total=3)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (97.2%) Low (1.4%) Med (1.4%)	High (3.0)/ High (3.0)	No Risk (96.2%) Low (1.0%) Med (0.8%) High (2.0%)	No Risk (0.0)/ High(3.0)	No risk (100%)	Not identified as infrastructure at risk	No Risk (100%)	Not identified as infrastructure at risk	Water system/ Water system
Soil Erosion	Low (9.9%) Med (75.5%) High (14.6%)	Low (1.0)/ High (3.0)	Low (5.1%) Med (76.7%) High (18.2%)	Med (2.0)/ Med (2.0)	Med (66.7%) High (33.3%)	Not identified as infrastructure at risk	Med (100%)	Not identified as infrastructure at risk	Not identified/ Not identified
Flood	No Risk (93.8%) At Risk (6.2%)	Med (2.0)/ Not identified	No Risk (98.4%) At Risk (1.6%)	Med (2.0)/ Not identified	No Risk (100%)	Not identified as infrastructure at risk	No Risk (100%)	Not identified as infrastructure at risk	Not identified/ Not identified

A total of 74 community members (43 men and 31 women) attended the CVCA workshop. The women's group described Vaviquinia Suco as being at high risk for landslides and the men described it as medium risk. They made these comments based on landslides that occurred almost every year in **aldeias Pametapu, Nunuana, Darulara and Delesivaty** which resulted in the destruction of plantation areas, farmland, community houses, and rural roads which included road side drainage system, capitation tanks and pipelines. Landslides mainly occur in areas that are located on steep slopes connected to a river or a watercourse. Capitation tanks have been broken due to landslides, some parts of pipeline have been destroyed, and landslides have also affected the springs.

The community perception of risk from landslide is at odds with the GIS data: according to the community members, the risk level for roads from landslides is high; this is because some part of the road (particularly drainage ditches and road body) in aldeia Nunuana have been significantly damaged when landslides occur. As a coping mechanism the community members, especially those living near the affected areas, took the initiative to ensure that damaged parts of the road could be used again by removing soil materials that block the road. However, the **community members suggested implementing a bio-engineering initiative on the road side area**. Landslides affect community housing each year and as a coping mechanism, the affected people evacuate their house to a safe location and then later try to repair the house with the help of other community members and external support.

Despite the data showing that there is significant medium level risk of erosion in the suco, they community did not identify this as a major hazard they are currently facing.

The community said that there is also a medium risk in terms of the possibility of flash flooding. The men's group mentioned there was a big flood in **2014** in **aldeias Morae** and **Vaviquinia Vila**. In **Morae** it occurred along the coastal area. This event was also associated with strong winds blowing from the sea towards the mountain. The flooding mainly came from the watercourse located at the hill behind the aldeia. Because there was no vegetation in the area, the speed of surface run off increased rapidly and drained much of the water into the residential areas.

In **aldeias Morae** and **Vaviquinia Vila** some parts of the roads were significantly damaged, drainage ditches were blocked due to mud and the road body was affected by flooding. As a coping mechanism the community members, especially those living near the affected areas, took the initiative to ensure that damaged parts of the road could be used again by removing soil materials that blocked the road. However, the community members suggested also implementing a bio-engineering initiative here on the road side area. The men's group felt the risk level for the houses from flooding is medium, this was based on the experience in **aldeia Morae** where a big food occurred in **2014**.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=13.4km)	Houses (Total=627)	Schools (Total=3)	Health Facilities (Total=1)
Landslides	Disagree	Disagree	Agree – low/no risk	Agree – No risk
Soil Erosion	Agree - medium / high	Agree – medium risk	Disagree	Agree – Medium risk
Flood	Disagree	Disagree	Agree – low/no risk	Agree – no risk

Recommendations:

Despite many areas being at a fairly low risk, the community has experienced a number of events in recent years that have had significant impact and caused damage. These are in specific areas and have had the biggest impact on roads. The community however is already making suggestions about how to prevent these kinds of impacts in future, and it would therefore be recommended to support these initiatives. This includes implementing bioenginerring initiatives for the road affected by landslides aldeia Nunuana. Also to assess the watercourse area that caused flooding in Morae, it was recognised that the lack of vegetation here was a problem and an appropriate intervention may reduce the risk of future flood in the area. Road damage was also experienced in aldeias Vaviquinia Vila and Morae and again the community members suggested implementing bio-engineering initiatives at the road side areas that are recommended for support.

Suco Maubaralissa, Administrative post Maubara, Municipality Liquiça

	Landslide	Soil Erosion	Flood
GIS	No Risk (74.7%)* Low (8.8%) Med (13.5%) High (3.0%)	Low (5.2%) Med (46.9%) High (47.9%)	n/a
CVCA (m)	Med (1.50)**	Not identified	n/a
CVCA (f)	Med (1.62)	Not identified	n/a

*as % of total in suco= 1,252 hectares
** as average rating of risk perception through vulnerability matrix with maximum rating 3

Maubaralissa Suco is an upland suco, straddling the ridge between the Babono and Lois River catchments. The north-facing slope in the Babono River catchments is at the highest risk of landslides. Erosion risk is medium or high throughout the suco. The total land area of Maubaralissa suco is 1,252 hectares, with 765 hectares (61.1%) in the Babono River Catchment and 487 (38.9%) in the Lois River Catchment.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=6.4km)		Houses (Total=275)		Schools (Total=1)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (89.2%) Low (5.6%) Med (5.2%)	High (3.0)/ High (3.0)	No Risk (87.6%) Low (4.4%) Med (5.5%) High (2.5%)	No Risk (0.0)/ No Risk (0.0)	No risk (100%)	Not identified as infrastructure at risk	No Risk (100%)	Not identified as infrastructure at risk	Water system, small bridges/ Water system
Soil Erosion	Low (13.7%) Med (55.9%) High (30.4%)	Not identified/ Not identified	Low (10.5%) Med (49.8%) High (39.6%)	Not identified/ Not identified	Low (100%)	Not identified/ Not identified	High Risk (100%)	Not identified/ Not identified	Not identified/ Not identified
Flood	Not considered at risk =>								

. The 93 community members (65 men and 28 women) who attended the CVCA workshop stated that **Maubaralissa Suco** overall is a medium risk area for landslide. The women also commented that landslides occurred in **2012**, resulting in the destruction of coffee plantations, coconut plantations, maize fields and some minor products like taro. These landslides also affected the rural roads and drainage systems in **aldeias Nunulete and Darulema**. The male group also commented that landslides occurred in **1991, 2012 and 2015**, resulting in the destruction of water capitation tanks, coffee plantations, farmland and rural roads in **aldeias Mukulara, Watupu, Kaliwatu and Patuge**.

Community members believe the roads are overall at a high risk from landslides and this is likely to be based on their experience of the **2012** landslide and the damage it caused.

None of Maubaralissa Suco is considered to be at risk of flooding. The community members agreed there is no general risk of flooding in Maubaralissa suco but shared that they experienced flash flooding in **2000** and **2002-2012** at a medium level in **aldeias Nunulete** and **Darulema**. The flash flooding resulted in the destruction of maize plantations (including ripe maize cobs that were ready to be harvested), cassava, and livestock diseases. During the rainy season, rural roads and drainage systems are the infrastructure that suffers the most from flash flooding.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=6.4km)	Houses (Total=275)	Schools (Total=1)	Health Facilities (Total=1)
Landslides	Disagree	Agree – low/no risk	Agree – low/no risk	Agree- no risk
Soil Erosion	Disagree	Disagree	Agree – Low risk	Disagree
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	Agree – no risk

Recommendations:

Despite there being a fairly low risk of landslides and flooding across the suco, aldeias Nunulete and Darulema have been affected by flash flooding and landslides leading to damage to infrastructure and property. It is therefore recommended that Aldeia Resilient Action Plans be developed with the community in these aldeias to mitigate against negative impact from future landslides or flooding.

Suco Lissadila, Administrative post Maubara, Municipality Liquiça

	Landslide	Soil Erosion	Flood
GIS	No Risk (96.2%)* Low (1.6%) Med (1.7%) High (0.5%)	Low (14.4%) Med (70.1%) High (15.4%)	No Risk (90.4%) At Risk (9.6%)
CVCA (m)	Med (1.31)**	Not identified	Not identified
CVCA (f)	Med (1.50)	Not identified	Not identified

*as % of total in suco= 5,495 hectares
** as average rating of risk perception through vulnerability matrix with maximum rating 3

Lissadila Suco is one of the largest of the SSRI-supported sucos. It is mainly on moderate slopes and includes an extensive area of the Lauveli River floodplain, where flooding is a serious risk. The total land area of Lissadila Suco is 5,495 hectares, all (100%) of which is in the Lois River Catchment.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=16.9km)		Houses (Total=759)		Schools (Total=2)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (97.6%) Low (1.2%) Med (0.6%) High (0.6%)	High (3.0)/ Med (2.0)	No Risk (98.2%) Med (0.7%) High (1.1%)	Med (2.0)/ Med (2.0)	No risk (100%)	Low (1.0)/ High (3.0)	No Risk (100%)	Low (1.0)/ Not identified	Water system/ Water system
Soil Erosion	Low (16.0%) Med (68.5%) High (15.6%)	Not identified/ Not identified	Low (7.1%) Med (65.9%) High (27.0%)	Not identified/ Not identified	Med (50%) High (50%)	Not identified/ Not identified	Med (100%)	Not identified/ Not identified	Not identified/ Not identified
Flood	No Risk (86.6%) At Risk (13.4%)	Not identified/ Not identified	No Risk (90.8%) At Risk (9.2%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	No Risk (100%)	Not identified/ Not identified	Not identified/ Not identified

The 100 community members (58 men and 42 women) who attended the CVCA workshop agreed that overall they felt Lissadila Suco is a medium risk area for landslides. The women's group also commented that landslides occurred in **2015**, resulting in the destruction of paddy fields, community houses and plantation area in **aldeias Lebuai** and **Mankabia**. The men also commented that landslides occurred in **1999, 2007-2009** and **2014-15**, resulting in the destruction of paddy fields, rural roads, plantation areas and community houses in al**deias Diru Anwei, Lissa Luli, Mau-Bara, Kai-Pu, Nunu-Lau, Manieki, Degenu-Siku and Ulo-Ana**.

The community members did not identify erosion as a hazard they are currently facing or concerned with.

Lissadilla suco is inside of the Lois River Catchment with most at risk of flooding. The community members said they felt there is no general flood risk in Lissadila Suco but shared that they experienced flash flooding at a high level. Both groups mentioned flash flooding in most years, including in **aldeias Daru Watu-Lau, E´e Solo So, Gou Mau Lua, Nunu-Lau, Manleki, Degenu-Siku**, which resulted in the destruction of community houses, maize fields, drinking water pipelines, water systems and the deaths of livestock. Flash flooding is the main problem for this suco because most of its land and assets are located close to the water. Most of the flood-prone roads are unpaved, or if they were once paved, the asphalt has been destroyed and the roads have reverted to dirt and gravel tracks.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=16.9km)	Houses (Total=759)	Schools (Total=2)	Health Facilities (Total=1)
Landslides	Disagree	Disagree	Disagree	Agree – no risk
Soil Erosion	Disagree	Disagree	Disagree	Disagree
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	Agree – no risk

Recommendations

Areas prone to flash flooding and close to the water – go back and do a thorough assessment, ARAP and conduct capacity building training to ensure the community is better informed on what erosion is, how to spot it and how to tackle it.

Suco Gariuai, Administrative post Baucau vila, municipality Baucau

	Landslide	Soil Erosion	Flood
GIS	No Risk (100%)*	Low (73%) Med (26.8%) High (0.2%)	No Risk (100%)
CVCA (m)	Not identified**	Low (1.24)	Not identified
CVCA (f)	Low (0.47)	Not identified	Not identified

*as % of total in suco= 4,378 hectares
** as average rating of risk perception through vulnerability matrix with maximum rating 3

Gariuai Suco is primarily flat and high, and therefore the hazard it faces is erosion, for which it is mostly low and medium risk. The total land area of Gariuai suco is 4,378 hectares, with 4,227 hectares (96.6%) in the Seiçal River Catchment, and 151 hectares (3.4%) in the Baucau Aggregate Catchment. 96 community members (46 men and 50 women) attended the CVCA workshop. Despite the low risk generally of flooding, the community members also reported frequent flash flooding and related impacts.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=18.6km)		Houses (Total=697)		Schools (Total=6)		Health Facilities (Total=0)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (100%)	Not identified/ No Risk (0.0)	No Risk (100%)	Not identified/ No Risk (0.0)	No risk (100%)	Not identified/ No Risk (0.0)	n/a	n/a	Not identified/ Not identified
Soil Erosion	Low (81.2%) Med (18.3%) High (0.5%)	No Risk (0.0)/ Not identified	Low (86.2%) Med (13.8%)	No Risk (0.0)/ Not identified	Low (66.7%) Med (33.3%)	No Risk (0.0)/ Not identified	n/a	n/a	Water system/ n/a
Flood	Not considered at risk =>								

The women did mention that landslides did occur in 2012, resulting in the destruction of plantations and some parts of the forestry area in **aldeia Uatacamana**.
Erosion is a potential threat to the flood plain of the **Seiçal River**, and is considered a medium level risk overall. The primary contributing factors are poor vegetation cover and the sandy, friable nature of the soil. Sucos in the Seiçal River Catchment have large areas of land that are exposed to a medium risk of erosion. During the CVCA workshop the men's group described the suco as being at medium risk for erosion. They also commented that erosion occurred in **2010 and 2013**, which mostly affected farmland, paddy fields and irrigation systems in aldeias **Lorituni, Wailesu and Bana´a**. The women's group did not highlight erosion as a hazard or concern.

The women's group commented on flash flooding in 2012**-15 in aldeias Uai Resa, Loro Tuni, Uai Lolo, Liliba Builukilori and Wailesu**, which resulted in the destruction of paddy fields and plantation areas, drinking water pipelines, food crops (maize and banana), rural roads and livestock. The men's group commented on flash flooding that has occurred regularly since **2000** in **aldeias Lacunabu´u, Samabere, Liu Isi-Loritui, Waires, Buidura, Cailolo, Wailesu, Sabileu and Lisibina**, which has resulted in the destruction of paddy fields, teka and banana, livestock, water systems, gabion boxes and irrigation systems. Flooding is the main problem highlighted by the community in Gariuai Suco. This type of hazard contributes to the destruction of the rural roads, small bridges and water systems. Flash flooding also affected the irrigation in the area and over 10 hectares of paddy fields.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=18.6km)	Houses (Total=697)	Schools (Total=6)	Health Facilities (Total=0)
Landslides	Agree – no risk	Agree – low/no risk	Agree – low/no risk	n/a
Soil Erosion	Disagree	Disagree	Disagree	n/a
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	n/a

Recommendations:

It is recommended that follow up assessment takes place in this suco to explore strategies to reduce erosion and the impacts of flash flooding.

Suco Bahu, Administrative post Baucau vila, municipality Baucau

	Landslide	Soil Erosion	Flood
GIS	No Risk (100%)*	Low (81.1%) Med (17.2%) High (1.7%)	No Risk (100%)
CVCA (m)	Low (0.43)**	Not identified	Not identified
CVCA (f)	Low (0.48)	Not identified	Not identified

*as % of total in suco= 1,147 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Bahu Suco runs from the Baucau plateau down the escarpment at Baucau Vila to the coast, and the only hazard it faces is erosion, which is mostly low risk, with some medium risk and a little high risk. The total land area of Bahu suco is 1,474 hectares, 786 hectares (53.3%) in the Seiçal River Catchment and 688 hectares (46.7%) in the Baucau Aggregate Catchment. A total of 60 community members (20 men and 40 women) attended the CVCA workshop.

	Roads (Total=9.0km)		Houses (Total=660)		Schools (Total=3)		Health Facilities (Total=1)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (100%)	No Risk (0.0)/ Low (1.0)	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	No risk (100%)	No Risk (0.0)/ No Risk (0.0)	No Risk (100%)	No Risk (0.0)/ No Risk (0.0)	Not identified/ Not identified
Soil Erosion	Low (88.9%) Med (10.0%) High (1.1%)	Not identified/ Not Identified	Low (65.3%) Med (33.5%) High (1.2%)	Not identified/ Not Identified	Low (100%)	Not identified/ Not Identified	Low (100%)	Not identified/ Not Identified	Not identified/ Not identified
Flood	Not considered at risk =>								

None of Bahu suco is considered to be at risk for landslides. The community group confirmed this by rating Bahu Suco as a low risk area. **T**he women's group however also commented that landslides did occur in **2011 and 2013**, resulting in the destruction of rural roads, plantation area and paddy fields in aldeias Central and Watudere. The men commented that landslides occur every year in **aldeias Batevai and Builе** where they damage drainage channels and paddy fields.

The community did not highlight erosion as a hazard they are experiencing or concerned about.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=9.0km)	Houses (Total=660)	Schools (Total=3)	Health Facilities (Total=1)
Landslides	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	Agree – no risk
Soil Erosion	Agree – low/no risk	Disagree	Agree – low/no risk	Agree – low/no risk
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk

<u>Recommendations:</u>

Bahu Suco is not a priority area for further intervention.

Suco Ossoala, Administrative post Vemasse, municipality Baucau

	Landslide	Soil Erosion	Flood
GIS	No Risk (91.8%)* Low (1.9%) Med (3.9%) High (4.4%)	Low (38.0%) Med (38.8%) High (23.2%)	No Risk (98.1%) At Risk (1.9%)
CVCA	Med (1.38)**	Not identified	

*as % of total in suco= 6,508 hectares
** as average rating of risk perception through vulnerability matrix with maximum rating 3

Ossouala Suco is very sparsely populated. Some of its infrastructure is at risk of flooding but generally it is built far from the flood-prone areas. The total land area of Ossouala suco is 6,508 hectares, with 4,561 hectares (70.1%) in the Vemasse River Catchment and 1,947 hectares (29.9%) in the Laleia River Catchment. A total of 62 community members (25 men and 37 women) attended the CVCA workshop.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=2.0km)		Houses (Total=201)		Schools (Total=2)		Health Facilities (Total=2)		Other
	GIS	CVCA *	GIS	CVCA	GIS	CVCA	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (100%)	High (2.5)	No Risk (100%)	Med (1.5)	No risk (100%)	No Risk (0.0)	No Risk (100%)	No Risk (0.0)	Water system (pipes)
Soil Erosion	Low (70.0%) Med (30.0%)	Not identified	Low (58.7%) Med (39.3%) High (2.0%)	Not identified	Med (100%)	Not identified	Low (100%)	Not identified	Not identified/ Not identified
Flood	No Risk (100%)	Not identified	No Risk (88.6%) At Risk (11.4%)	Not identified	No Risk (100%)	Not identified	No Risk (100%)	Not identified	Not identified/ Not identified

*Facilitator did not identify data as male or female

The community group that attended the CVCA workshop stated that Ossoala is overall a medium risk area for landslides. The women's group commented that landslides occurred in 2013, resulting in the destruction of community houses, plantation area, farmland, rural roads, water tanks, and drinking water pipelines in aldeia Noinewai. The men commented that landslides occurred every year in aldeias Kaunura, Boiloibora, Uaicaihu, and Huineuai, resulting in the destruction of irrigation systems, paddy fields, water chanels, rural roads, drainage channels, and community houses.

The men agreed with the GIS maps that the houses are not at risk from erosion, however, the women's group felt the houses are at a high level risk of landslides, possibly due to damages to houses sustained in the 2013 landslide.

According to the GIS maps, there is generally low - medium risk of impact to infrastructure from erosion according to the data, and the community members did not see erosion as a risk.

The community members said there is no general flood risk in **Ossouala Suco**, but they did share that they had experienced flash flooding at a medium level. The women's group commented on flash flooding in 2014 in aldeia Noinewai which resulted in the destruction of plantation areas, farmland, houses, rural roads, and irrigation systems. The men commented on flash flooding in **2011-2014 in aldeia Huineuai**, which resulted in the destruction of paddy fields, plantation area, community houses, rural roads, irrigation systems, and water systems (pipeline). The community rated the risk of flooding as low, but countered this by saying that the risk to roads from flash flooding is high, and to homes it is medium.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=2.0km)	Houses (Total=201)	Schools (Total=2)	Health Facilities (Total=2)
Landslides	Disagree	Disagree	Agree – low/no risk	Agree – no risk
Soil Erosion	Agree – low risk	Disagree	Disagree	Agree – low risk
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	Agree – no risk

Recommendations:

Despite some community concerns around landslides the overall risk is low and there is little concern around erosion. While general flooding is seen as low risk, flash flooding has been highlighted as a concern so it is recommended this Suco is revisited in order to assess in more detail the causes of the flash flooding and potential mitigation strategies.

Suco Lacoliu, Administrative post Quelicae, municipality Baucau

	Landslide	Soil Erosion	Flood
GIS	No Risk (92.6%)* Low (1.3%) Med (3.6%) High (2.5%)	Low (7.0%) Med (59.6%) High (33.4%)	No Risk (100%)
CVCA (m)	Low (1.18)**	Not identified	Not identified
CVCA (f)	Med (1.93)	Not identified	Not identified

*as % of total in suco= 741 hectares

** as average rating of risk perception through vulnerability matrix with maximum rating 3

Lacoliu Suco is a fairly densely settled area at the foot of the Matebian Massif. Some of its land and infrastructure are in areas prone to landslides and erosion. The total land area of Lacoliu suco is 741 hectares, with 464 hectares (62.6%) in the Seiçal River Catchment and 277 hectares (37.4%) in the Uai Muhi Catchment. A total of 62 community members (36 men and 26 women) attended the CVCA workshop.

Comparison of GIS Data and Community Perception according to Hazard and Infrastructure by Risk Level

	Roads (Total=3.6km)		Houses (Total=501)		Schools (Total=2)		Health Facilities (Total=0)		Other
	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	GIS	CVCA (m/f)	CVCA (m/f)
Landslides	No Risk (95.3%) Low (1.7%) Med (3.0%)	Med (2.0)/ High (3.0)	No Risk (92.8%) Low (1.0%) Med (3.2%) High (3.0%)	Low (1.0)/ High(3.0)	No risk (100%)	Low (1.0)/ Low (1.0)	n/a	n/a	Water system/ Water system
Soil Erosion	Low (3.5%) Med (53.7%) High (42.8%)	Not identified/ Not identified	Low (11.2%) Med (57.9%) High (30.9%)	Not identified/ Not identified	Med (50%) High (50%)	Not identified/ Not identified	n/a	n/a	Not identified/ Not identified
Flood	Not considered at risk =>						n/a	n/a	

The community group that attended the CVCA workshop stated that Lacoliu is a medium risk area for landslides. The women's group commented that landslides occurred in **2010-2015**, resulting in the destruction of plantation areas and staple crops in **aldeias Bikasi and Suri-Isi**. The men commented that landslides occurred in **2008-2015**, resulting in the destruction of paddy fields, farmlands and plantation areas in **aldeias Sira-Isi, Bugata, Buidiga and Suti-Isi**.

None of Lacoliu Suco is considered to be at risk of flooding. The community members agreed there is no general flood risk in Lacoliu Suco but shared that they experienced flash flooding at a medium level and the women's group commented that flash flooding occurred in 2010-15 in **aldeias Bikasi, Sira-isi, Togu Bere Isi, Birikasi Isi and Buagata**, resulting in the destruction of paddy fields and candle nut. The men's group commented on flash flooding in 2012 in aldeias **Sira-Isi, Bugata, Buidiga, Suti-Isi and Toho-Isi**, which resulted in destroyed paddy fields and farmlands.

Overview of likely Risk based on GIS + Community ratings

	Roads (Total=3.6km)	Houses (Total=501)	Schools (Total=2)	Health Facilities (Total=0)
Landslides	Disagree	Disagree	Agree – low/no risk	n/a
Soil Erosion	Disagree	Disagree	Disagree	n/a
Flood	Agree – low/no risk	Agree – low/no risk	Agree – low/no risk	n/a

Recommendations:

The community raised concerns over landslides and flash flooding and cited examples of recent and past events that have led to damaged or destroyed assets and infrastructure. While this may not be the highest priority suco for follow up it is recommended that an aldeia resilient action plan would be beneficial to develop with the community to identify mitigation strategies and reduce future impacts.

4.1 CVCA Meta Analysis

Overall the comparative analysis of the GIS technical data and the community experiences, perceptions and priorities has yielded some interesting results as outlined below.

Perception of risk

While some sucos are starting to show clear signs of having significant risks to infrastructure, others are confirming that they are experiencing lower risks and this helps with planning processes. Interestingly, and not unexpectedly, there are a number of areas where the GIS data and community responses differ quite substantially, and while some differences are natural where there are significant serious differences this may suggest an area where, for example, a specific location has a large amount of risk and therefore interventions in that particular area are likely to have a particularly big impact. For example if only a small part of road is at high risk from landslide the GIS data may suggest this is not a priority (it could be 98% low risk). However, the community will have identified if that 2% is actually being impacted regularly and the level of impact it has on the community; by working on that small piece of road it may be possible to bring large benefits to the whole suco. This analysis therefore provides a valuable overview to target interventions, however further assessment of specific areas/infrastructure would be needed to take this forward. Areas that are facing clear risks would also benefit from taking the next step from CVCA and analysis to developing community plans (such as aldeia resilient action plans) to start implementing strategies to mitigate these risks. Table 70 in the Recommendations sections gives a breakdown of risks and recommendations by suco. Overall it seems that more work is required in twenty three out of the twenty four sucos, but before any infrastructure based intervention is made it is important for further investigation to be carried out at aldeia level for those aldeias perceived to be at risk from landslide, flooding and/or soil erosion.

Although the overwhelming conclusion with regard to flooding from community responses could be that it rarely happens, it is important to be aware that the community did identify flash flooding as an issue. This does not come under the same category as flooding for the purposes of the GIS mapping. Flash flooding however appears to happen on an extremely regular basis and should be looked into, either as part of a follow-up for this project or a separate entity. It is also possible that the community confused landscape management with climate change – a possible explanation for the occurrence of flash flooding could be deforestation and desertification of the environment.

EVAS Team members' participations in CVCA workshops

During phase-1 of the CVCA, participation from EVAS members was negligible. However, in phase-2 their presence was very good. Out of 13 locations, in all except 3 areas members of EVAS participated in CVCA process and actively facilitated the session based on the training learnt from the ToT. Their participation ensures their ownership of this project, even though this is a very new technique for them to implement. It was observed that the participation of EVAS members depends on respective DDO, however, most of the EVAS members were very interested and they are aware of their roles and responsibilities. It is important to mention here that the transportation is essential for the EVAS members to visit the field either in terms of transport or in terms of transport cost.

Womens participation in CVCAs

From the total number of participants in the 13 CVCA workshops, 44% were female and 56% were male. While this is a fairly good mix in terms of attendance, during the workshop it was observed that only around 25% of women participants were actively involved in the discussions and others did not participate actively except during the mapping exercise. The female groups drew very accurate maps compared to male groups and took great care in the details; this perhaps is a reflection of what they are comfortable with and what is within their

own knowledge. It is likely that when it comes to responses to hazards and the impacts of the risks in the community men would traditionally be the ones making decisions and responding. This means women would be less aware of some of these

processes, which came out more in the historical timeline and vulnerability matrices. It was also suggested that due to women's reduced mobility in the community as compared to men, their knowledge and experience is more restricted to the immediate vicinity of their homes. A further observation was that the women tend to be more comfortable using their local language, and many do not understand Tetun. As often experienced in rural communities, the women were not comfortable discussing new topics and often left it to the men to answer and lead the discussion. The women were more reticent in front of the Xefe Aldeia, who had been used to explain the situation on many occasions. The duration of the CVCA was limited to one day; this was flagged as a problem for the whole community but was especially difficult for the women, who struggled to fit this in with their daily tasks and chores. Therefore there has been some key learning throughout this process on the need to consider women's schedules, to give more time to the process, ensure interpreters and female facilitators are available and maintain separate male/female groups for discussions as well as activities in order to further promote women's active participation.

Community Coping Mechanisms

As part of the CVCA process communities were asked what kinds of coping mechanisms they use related to different types of hazard, and the different infrastructures in the community. These coping mechanisms provide a picture of the community capacity to deal with climate hazards before, during and after they occur. It is important that existing effective community capacity and coping mechanisms are built into any support, planning or response interventions in order to use local skills and build ownership. In order to assess the effectiveness of the community coping mechanisms we can consider 4 levels of community capacity in the face of climate risks:

- Absorptive/acceptance: the extent to which the communities can and do just absorb or accept the effects with little or no response
- Responsive: the ability of the community to react and respond with solutions to immediate issues (fixing, clearing)
- Adaptive: the extent to which communities can and do change their behaviour and implement new activities to prevent future impacts, usually based on the previous impacts experienced
- Transformative: the ability of the community to become more resilient – to develop and implement planned actions and strategies both to prevent and respond to climate risks, including those that have not been previously experienced

By considering the existing community coping mechanisms in place we can better understand the capacity level of the community. At present there are limited strategies in place at community level for coping with climate risks, with a number of communities stating that when a hazard takes place they depend on external support from government and NGOs to respond to it. However a number of other responses came out of the CVCA workshops as detailed below.

Evacuation

The majority of communities involved with CVCA workshops stated that evacuating the relevant infrastructure was a primary coping mechanism in the face of climate risks. In practical terms this means that when a hazard occurs community members will gather any critical items for survival (food, water, clothing, money, medical items) and leave the area. This coping mechanism was mentioned most commonly in the case of houses. As a coping mechanism this is purely at the absorptive level as while individuals are removing themselves and other items to safety, they are not responding to the impacts of the hazard. This is an effective way to reduce further impacts on people or property but not a sufficient coping mechanism.

Cleaning and Fixing

Another common coping mechanism cited by communities was to clean up roads, remove sedimentation from drains and ditches and make temporary repairs to bridges, water supplies, roads and houses in order to make them usable in the interim before proper rebuilding can take place. T his includes, for example, people whose houses are affected by flash flooding draining out the water and cleaning the mud and other sediment from the houses, or communities fixing up roads that have collapsed with pieces of wood so they can be used. It was clear that in many communities this is a regular activity and groups work together to ensure damage to infrastructure is responded to. This is a responsive coping mechanism which provides immediate short term solutions to the impacts of climate hazards, which is necessary but again not sufficient in terms of coping mechanisms as the damage is still occurring and requires significant inputs to be fully fixed or rebuilt.

Rebuilding

Rebuilding infrastructure was another common response, here talking about more permanent repair and reconstruction work to infrastructure after the initial impact. The majority of community groups consider rebuilding as an important coping mechanism with some receiving support from other community members, some from NGOs and some from the government. This is, although longer term, still a responsive coping mechanism as while it does address the impacts from specific climate hazards that take place, it does not prevent or plan for these.

Planting trees

About half of the communities that undertook CVCA reported that they planted trees near springs or on land that is prone to landslides in order to protect it, 'hold the soil' and prevent further damage. The majority of these were reported as mechanisms employed after a hazard had been experienced in a certain area, so still responsive to some extent, although it is considered an adaptive capacity in that it is change in normal behaviours in order to prevent future or further damage. These communities clearly had a basic understanding that the planting of trees is an effective way to mitigate climate risks, however their detailed knowledge of how, where and when planting should occur to maximise the effect was mixed.

Protection of infrastructure

A small number of communities reported that they do undertake certain activities to prevent damage to specific infrastructure in the form of using stone barriers or blocks to prevent damage, or by ensuring ongoing maintenance of the infrastructure in question. Again this shows that the communities in question understood the need for infrastructure to remain strong in order to prevent damage from potential climate hazards, although a number of these were reported as being undertaken after a significant hazard had taken place. One or two communities actually suggested specific methods for prevention of climate related hazard damage, such as use of gabions to divert or reduce flood waters and bioengineering activities. This shows that communities are starting to consider more transformative approaches to coping mechanisms such as pre-emptive prevention, planning and strategies.

Overall, while communities do appear to be employing some coping mechanisms these are mostly responsive and do little to prevent future damage or prepare for climate hazards. What they are doing is effective for its purpose of minimising damage responsively, but is not effective in terms of overall capacity to be resilient. However, certain communities are starting to think about prevention based on their historical experience of impacts and damage to their infrastructure. This is a natural response, and it is common that preventative measures are not taken until the community really understands the impact of such events (ie after they have experienced one). This also represents an opportunity to use these experiences encourage the community in

question and others around it to take a more transformative approach to prevention, planning and disaster risk reduction.

As specific community level responsive coping mechanisms are present in some areas it would be recommended that these are further built on with capacity building in the communities to better understand the causes and effects of specific hazards and how specific coping mechanisms such as tree planting, building back safer and protection or maintenance activities can reduce the risk of negative impacts. Training and demonstration on specifically how to do this would be important. In order to take a really transformative approach and to build communities resilience at a higher level a more in depth process of understanding the risks and possible solutions, prioritising key infrastructure and developing and implementation activation plans as a community to address these would be vital. This can be done through the adleia resilient action planning process and the intent would be that any such action plans developed would link in to Administrative Post planning processes, thus ensuring decision makers have the necessary detailed information in order to fully support community resilience.

5.0 Limitations and Learning

GIS Mapping

As with any scientific research, the results of the mapping study represent a compromise between the ideal and the feasible. The scope of the mapping work was further defined at the beginning of the study, as TMAP learned more about the needs of SSRI, the types of risk of most interest to the program, the nature of the data available for this kind of work, and the location and extent of the area to be analysed and mapped.

Accurate, detailed, up-to-date spatial data is in short supply for Timor-Leste. In the context of this study, the most significant data limitations were for soils, rainfall and certain types of infrastructure such as irrigation systems, water supply systems and bridges. Partial datasets for some of these do exist, but they are poorly documented, lacking in detail, outdated, and often incomplete. In the case of bridges, for example, the data available includes only 21 bridges for the entire study area; this is clearly incomplete and indicates that many of the bridges in Timor-Leste have not yet been mapped.

A further limitation is that much of the data that does exist isn't well documented and isn't clearly understood. This is a common problem for GIS analysts and other scientists, and additionally not knowing the source of data, how old it is, how it was produced and how it was classified makes it more difficult to process and analyse. Identifying the best available datasets, getting copies of them, and then researching them to understand what exactly they show, all take time, and the narrow timeframe for this study meant compromises had to be made in this respect. This is one of the lessons learnt from this project; given the scope of the work and the current quality and availability of data in Timor-Leste a 12 month timeframe for the overall project would have enabled more rigorous analysis. Nonetheless, we have in the time available been able to produce extremely valuable information that helps to start identifying areas of greater and lesser risk and use this technical information as a start point to engage communities and enrich our understand using community experience.

The project ultimately assessed the contribution of 4 main geographical factors to 3 different types of risk (landslide, erosion and flood) at 3 different levels (low, medium and high) and examined relationships between spatial variations in risk and the distributions of 4 different types of infrastructure, across the territory occupied by 8 administrative posts, 79 sucos and parts of 34 river catchments. The output of this ambitious scope is a huge amount of data and information and the interrelationships among all these variables are complex and numerous. Understanding them, documenting them and presenting them in clear, meaningful ways has been a challenge but ultimately has resulted in more detailed information than has ever been available before and a huge amount of learning around areas of risk and hazard in the target locations.

CVCA Workshops

Following the mapping process, the project then carried out CVCA workshops in the selected sucos in order to validate, enrich and gain a greater depth of understanding of the risks and impacts the communities have and do face. As with the mapping activity, a key limitation was around timelines. This was partly due to the fact that the project was ambitiously framed within a short 6 month timeline, but also due to delays in the mapping activity caused by the difficulty in identifying the necessary technical expertise within Timor-Leste to carry out GIS mapping with the appropriate technology. As the time available for CVCA workshops did not allow for aldeia level CVCAs, we conducted suco level CVCA workshops which would in effect draw on all of the infrastructure across the suco in the mapping and discussion. In the past these workshops have been held at aldeia level and a major learning here was that at suco level one day for the CVCA workshop is too short to gather the depth of information required. Nonetheless, we were able to gather a significant amount of data about the risks and hazards faced by communities, their past experience and key areas of vulnerability. We were also able to improve the approach during the course of the project by identifying a need and opportunity after the first phase of workshops to include discussions on community coping mechanisms as part of the vulnerability matrix analysis. This provided valuable additional information on the types of activities and responses communities are currently employing in order to either mitigate or respond to hazards.

In terms of the implementation of the CVCA workshops themselves, one major limitation was around the security situation in Baucau. While we were hopeful that this would not prevent us from conducting work with the community in all areas, ultimately it meant we were unable to complete 3 of the planned CVCA workshops and one district level workshop. However, we were able to make the most of the opportunity in other districts to include a new activity involving the training and capacity building of district level staff in the use of the maps. This was not in the original workplan, however through the course of the project it became clear that having these basic skills and knowledge would make a huge difference to the relevant staff, making them better positioned to make use of this valuable data in the future.

Community participation was a challenge in some sucos, with participants arriving late in many instances leading to further strain on the already limited time available. We also encountered difficulty in ensuring a representative number of women attended, in one suco actually having to cancel the workshop because no women were invited by local leaders. This highlighted an important need to work with local leaders and the communities early in the project to understand and support women's participation. We appreciated UNDP's support in this decision as it is vital that women are actively engaged in these discussions. This is both because they hold valuable knowledge and experience and bring a different perspective to the conversation, and also in order to empower them directly to play a greater role in community issues. While for many workshops we did have at least 40 - 60% female participants, in many they were not active in their participation. It was noted that this differed greatly from suco to suco but also highlights a further need (and learning) that significant time needs to be invested into working with the communities both to understand the value and importance of the CVCA workshops, but also the importance and necessity of women's active participation. Furthermore the workshops could be better designed to meet women's needs including being spread over a number of days to allow for women's daily tasks and chores, to ensure the venue is appropriate and easy to access, that there are female facilitators and interpreters (as we found women were more comfortable using local languages over tetun).

A major limitation to this project, and tied into the timeframe of it, was the inability to collect water point locations. This would have been useful in informing us about flooding, but the data is only now being collected by BESIK, and has not been shared widely yet.

Finally it was not possible given the timeframe and resources of this project to include verification activities such as visiting identified infrastructure (present and absent) to take GPS coordinates and observe the conditions. This would have added significant value given the quality and availability of existing data and the necessary subjectivity of community perceptions. However, despite the limitations outlined, ultimately this

project has provided a vast amount of data both quantitative and qualitative and accompanying analysis that has never been generated before and will ultimately help to inform and guide future work in this area.

6.0 Recommendations

GIS Mapping

A number of recommendations can be made specifically in relation to the mapping component. First is to understand the strengths and weaknesses of the mapping study and to use the maps and statistics it generated appropriately. The risk profiles documented here provide a basis for broad-scale regional planning and this will have added benefits if results reported here are updated or refined when new, more detailed input data becomes available. Inappropriate uses would include making site-selections for specific small-scale infrastructure projects, determining the routes and alignments of roads or pipelines, or designing bridges, roads or water control structures, based solely on the GIS mapping component of this study.

Secondly, it is recommended that a number of follow-up initiatives are undertaken to maximize the value of the GIS mapping component. The series of complex maps in a range of different formats, and the large collection of GIS data and detailed risk statistics generated by this project can be used in many ways by many different stakeholders, but it is likely that potential users will need help in understanding and interpreting the maps and tables. To help make these useful to as wide a group of stakeholders as possible, it is recommended that some or all of the following are undertaken:

- translate key parts of this report into Tetun
- develop, document and implement a plan for managing and disseminating the maps and statistics
- hold a series of workshops to explore different uses of the maps by different groups of stakeholders
- institute mechanisms for capturing feedback from users to inform managers and researchers as to how useful outputs from this study have been, and how they might be improved in future studies

Finally it is recommended that Timor-Leste's government and broader development community take steps now to help meet Timor-Leste's future data requirements. This means initiating and providing long-term support for a wide range of data-collection and management initiatives. Examples of the types of data that are essential for monitoring the sustainability of a nation's development include weather and climate statistics; groundwater and surface water quantity, quality, use and recharge rates; changes in land cover, land use and land management practices; and inventories of the nation's infrastructure assets.

To be most useful, data in these categories are needed in great detail and with national coverage. They also needed to be updated frequently and regularly, because the world is dynamic and conditions change. Just as Timor-Leste has instituted a program for conducting national population and housing censuses every five years, and is currently investing in a detailed, nationwide topographic and land cover mapping initiative, it needs similar programs for a wide range of other types of data. Only by identifying these needs, initiating long-term data-collection programs, finding institutional homes for those programs and committing sufficient resources to sustain them in the future, will the country be able to build up the data resources its political leaders, scientists, engineers and programme managers are going to need 10, 20 and 50 years from now

Climate Vulnerability and Capacity Analysis:

The findings of the CVCA workshops and information provided and analyses from the GIS mapping activity provide an important insight into specific risks and hazards faced by communities in the target sucos. This is extremely valuable information and it is recommended that is be used to help prioritise areas, at aldeia, suco or administrative post level, for targeted support. It also highlights areas that are potential 'hotspots' for more detailed investigation and further assessment. Where particular communities or infrastructure is at high risk and current coping mechanisms have not been identified, these communities could be prioritized for further and more detailed discussion at the aldeia level to understand at a greater depth the risk. This would be

particularly interesting in aldeias that were highlighted in the suco CVCAs as suffering particularly high impacts from hazards, or areas where the community inputs were different than would have been expected based on the mapping data. An overview of the cross analysis is presented in Table 70.

Suco	Level of Priority	Details
Ponlala, Ermera	Low/medium	Aldeias Hatuposi, Nunupu and Sacoco need community resilient action planning.
Mertutu, Ermera	High	Highly susceptible to erosion and landslide. Water supply aspect needs reviewing. Community action plan required
Luala, Emera	Low/medium	Bioengineering needed for roads. Discrepancy between perceived and actual risks. Community action planning would benefit community.
Estado, Ermera	Medium	Discrepancy between perceived and actual risk. Road rehabilitation and maintenance would benefit community and as well as action planning to tackle erosion and landslide
Raimerhai, Ermera	High	Annual landslides in: Aldeia Karimbala, Moris Foun, Loumou, Nazere, Timlete, Raimaran and Mate Restu. High risk of erosion in every community, further investigation and community action planning recommended
Ailelo, Ermera	Medium	Focus on roads throughout suco. Flash flooding in: Aldeia Leirema, Nakrobo, Turema, Hohuú Bestarn, Aitos and Erleta
Talimoro, Ermera	Medium/High	Focus on flash flooding in: Aldeias Lebui, Mankabia, Daru Watu Lau, E'e Solo so, Gou Mau Lau, Manleki, Degenu-siku for action plans
Leguimea, Ermera	High	Focus on Aldeias Villa Maria, Vila Rei, Rai Masin, Fatmaunalo, Bisokmou and Pohuia for community action planning – landslides and erosion
Leimea – Craic, Ermera	Low/medium	Focus on houses located next to river and erosion around housing and school.
Coilete – Letelo, Ermera	Low	Roads – concrete side drainage requires action planning Awareness raising around erosion.
Leimea-Sorinbalo, Ermera	Medium/High	Awareness raising around erosion. Action planning required in Aldeias Taka Mata, Brogbou, Aipule and Hambulu.
Fahilebo, Liquica	Medium	Plot roads Action planning required in: Aldeias Titneta, Baunalogeun, Baunamaria, Talkuku, Bouhaet, Mau-Orailalan, Tuhitu leten, hatsarlelo and Burean (erosion)
Fatumasi, Liquica	High	Crops, homes, roads and bridges highly vulnerable to landslide and erosion throughout suco.
Lauhata, Liquica	Low/medium	Preventative strategies should be taught to communities
Leorema, Liquica	Medium/High	Focus on Aldeias Kutulau, Bukumera, Urema, Railuli, Urluli and Hatuhoui (landslide and erosion) for community action planning
Metagou, Liquica	Low/Medium	Road rehabilitation and maintenance and capacity building training needed, would benefit from community action plans.
Vaviquinia, Liquica	Medium/High	Support bio-engineering initiative on roadside area following further investigation
Maubaralissa, Liquica	Medium	Aldeias Nunulete and Darulema at risk of flash flooding. Community action planning recommended
Lissadila, Liquica	Medium	Focus on homes in: aldeias Diru Anwei, Lissa Luli, Mau-Bara, Kai-Pu, Nunu-Lau, Manieki, Degenu-Siku and Ulo-Ana. Flash flooding in: aldeias Daru Watu-Lau, E´e Solo So, Gou Mau Lua,

Suco	Level of Priority	Details
		Nunu-Lau, Manleki, Degenu-Siku affects most infrastructure in communities
Gariuai, Baucau	Low/medium	Flash flooding affected most infrastructure in aldeias Daru Watu-Lau, E´e Solo So, Gou Mau Lua, Nunu-Lau, Manleki, Degenu-Siku
Bahu, Baucau	Not a priority	
Ossoala, Baucau	Low	Assessment required to find cause of flash floods
Lacoliu, Baucau	Low	ARAP would benefit the community

Table 70. Overview of recommendations by Suco

It is recommended that specific aldeias can now be identified to undertake Aldeia Resilient Action Plans (ARAPs). An ARAP is a tested model of participatory community planning to increase resilience based on working with communities to analyse the outcomes of the CVCA process and plan projects and interventions required based on this. By facilitating a discussion around the vulnerabilities and risks already identified, communities are able to develop these plans for the mitigation and minimization of priority risks and problems. This planning activity can then be supported through implementation and linked into to suco, administrative post or even municipality level planning processes. The ARAP process also provides a more transformative approach to community coping mechanisms, and therefore reliance, as it encourages communities to consider risks and likely impacts ahead of any azard taking place, which in turn allows for effective preventative and response measures to be put in palce or planned for.

Some communities would benefit from capacity building and awareness raising around the understanding of what the potential risks are. As is stated in the findings, many communities do not know what erosion is as it is not a tangible occurrence like a landslide. We believe the community would benefit from learning the link between soil erosion and landslides and flooding, and to be given the tools to combat it before it turns into a more serious disaster. This could link in to the capacity building recommended in community level coping mechanisms, particularly around protection of infrastrucrure, planting of tress and building back safer. These three mechanisms are ones already raised by the community as coping mechanisms they use and these would be more effective with further support.

Clearly some communities are at greater risk than others, and some communities are making a proactive effort to combat risks such as landslides. A scaled up approach should be adopted so the appropriate level of intervention for each community is implemented.

As was stated earlier in the report, the CVCA is usually conducted at aldeia level, but we were advised by the sub-district leaders that they had all of the necessary data. This proved to be an error as we were unable to collect in depth data about each individual community. As part of the supplementary project we would advise in depth aldeia study, and the collection of coordinates for each community's key pieces of infrastructure. Once we are able to locate infrastructure on the GIS maps, we can triangulate the community information and provide an appropriate response with regards to how they tackle the relevant risks. It is advised to start at the aldeia level as when you have the information necessary for work on the foundations of society; it is easier to scale up the project to suco level, and eventually role it out over the whole of Timor-Leste. Due to the cost of constant repairs on infrastructure, it makes economic sense to conduct more of these projects throughout the country – empowering and enabling the communities to maintain their own infrastructure. This in turn will make decentralisation easier as the communities will already be self-reliant.

7.0 Conclusions

This study has produced a collection of maps, geographically referenced data and statistics, community perceptions and qualitative data and analysis of community vulnerabilities and capcity that together comprise a very valuable information resource. Most of the data processed and analysed isn't new, and for many, the information gleaned from it will come as no surprise. People who live in Quelicai already know that landslides are common on the slopes of *Foho* Matebian; people from Guiço know the area they live in and farm next to the Lois River is prone to flooding; and farmers in Fatubessi, Leguimea and Ponlilala know soil erosion is a persistent problem there. What this project has done is: gathered the evidence together, processed and analysed it systematically, and packaged the findings in such a way as to make them accessible and useful to a wide range of stakeholders. People whose houses, schools, water supply systems, irrigation canals and roads are under persistent threat from floods, landslides and soil erosion, now have documentary evidence to support their experience and perceptions.

Equally as important, outputs from this project will serve to inform people who ***don't*** have first-hand knowledge about weather-related risks in the areas analysed and mapped. Many decisions about what infrastructure is built and where it is built are made in Dili, and frequently the politicians, program managers, planners and engineers who make those decisions do not have much information on which to base them. The maps, GIS data layers, risk statistics and social information made available through this study will help to inform decision-makers about the nature, magnitude and extent of natural hazards in remote, rural areas. In this respect, they will make small but significant contributions towards filling the information gap and better decision-making.

In using the statistical and geographic risk information, it is important that people are aware of some of its strengths and limitations. The maps show ***general*** variations in the distributions of risks of flooding, landslides and erosion. They are good for locating major 'hotspots' and for characterising individual administrative posts and *suco*-catchments as 'low', 'medium' or 'high' for a particular risk category. They are good indicators of ***relative*** risk. What they show are red areas, which have a higher risk than yellow areas, which have a higher risk than green areas. Whilst they will be useful for broad-scale planning and infrastructure development, they will not be adequate for detailed feasibility or engineering design work. The maps and risk statistics will give useful guidance as to where to build and how to build there, they will help to identify areas for further intervention, but in this respect they are only a starting point. In-depth studies with extensive field work and using a wider range of more detailed datasets will be needed in identified areas to fully understand threats to infrastructure from floods, landslides and erosion at specific sites.

The quality of the outputs is to a large extent a reflection of the quality of the inputs. In common with most projects of this kind for Timor-Leste, the quality of available data was very mixed. Good data for elevation and slope, the locations of houses, schools and health facilities, and for river channels was obtained, but the data for land cover, roads and soils was highly generalised and not up-to-date. It was also poorly documented, so it was difficult to understand exactly what it showed and how to use it. Other datasets, such as rainfall, bridges, water systems and administrative boundaries, were weak in terms of detail, accuracy and completeness. Also, selecting which datasets to use, classifying that data, assigning risk values and weights and interpreting the results were all subject to some degree of informed judgement. Analysts on this project have, to the extent possible, reviewed the literature and consulted with subject matter specialists, but there is no single recipe that says 'this is the best way' or 'this is the right way' to conduct risk analysis in Timor-Leste'. There is no single set of criteria that is definitively better or more correct than all the others. Geologists, hydrologists, soil scientists and engineers have different levels of knowledge, different backgrounds and different opinions about where and how to build structures.

Equally community knowledge and understanding of some of the theoretical causes and technical aspects of climate hazards, causes of damage and risk and, while this project provided an excellent opportunity to educate communities in some of these issues, this does have an impact on responses given. As noted above responses are also likely to be biased based on proximity and personal experience of recent hazards. However, none of these short-comings invalidate the results of the project, but people making decisions based on those

results should be aware that what they give is a general overview of relative risks and threats over large areas; perceptions and reactions from the community of risks and vulnerabilities and they cannot be used as a prediction of what kind of hazards may in fact take place, or exactly what impacts and damage will result in the future.

The outputs from this project should not be seen as 'final'. They represent one interpretation of certain data produced at a particular time for a particular purpose. They are a step along the way to improving understanding of threats to infrastructure from weather-related hazards in rural Timor-Leste, but they are by no means definitive. For the scientists, technicians and facilitators involved in conducting this project, the research has certainly improved the understanding of the underlying causes of floods, landslides and soil erosion here. We hope that the information presented in the form of maps, GIS data, risk statistics and this technical report will serve to inform others. For the community members and government representatives this has also provided a valuable opportunity to both deepen their understanding of risks and hazards, vulnerabilities and priorities within the communities and some of the technical tools to analyse this. This puts them in an excellent position to go on to use this information to conduct well informed and effective community level action planning. This project can be seen as a starting point where technical information and initial community perceptions have been collected to help initiate further analysis into specific risk areas where targeted follow-up and interventions with the community can be made. This can take place in the form of sharing the technical data with communities, building the community capacity in terms of coping mechanisms as per the recommendations and developing community resilient action plans to help enforce current efforts, and to identify interventions to minimize or mitigate future threats.

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