Vulnerability Assessment and Community Action Plan

Policy Brief, January 2018

Dili-Ainaro Road Development Corridor (DARDC) GEF-UNDP Timor-Leste


Suco Talimoro


Suco Talitu

Key Messages

- *The assessment identifies strong wind, landslide, drought, flood and fire as the five most affecting and common hazards across the 24 sucos. However, certain sucos such as Edi, Aitutu and others consider thunder storm/ lightening, outbreak of animal disease, and erosion as hazards, but their impact level is not significant.*
- *The average vulnerability index across the 24 sucos is 2.5, falling under the high-risk category, whereas the average value for adaptive capacity of local communities is 2.2, which is inadequate to cope with the scale of existing disaster risks.*
- *Suco Aitutu has the highest risk of hazards as its vulnerability index value is 4.2 which falls under very high-risk category. Suco Fatisi has the lowest vulnerability index value of 1.3, but still falls under the medium risk category.*
- *The most common adaptation plans proposed for identified hazards are: plantation of forest trees, bamboos, and vetiver; construction of gabions, check dams, and retaining walls, and bioengineering practices. Similarly, application of the mulching technique, establishing a water harvesting system, drip irrigation practices, rehabilitation of coffee plantations, preparation of fire lines, practicing conservation-oriented agriculture, changing house design, use of strong roofing materials are other interventions proposed under community action plans.*
- *Cross cutting issues across 24 sucos which require serious attention include: insecure land tenure arrangements, inadequate human and financial resources, poor infrastructure, lack of enabling policies laws and regulation, weak coordination on planning and implementation of adaptation plans.*
- *Strengthening the system of Tara Bandu in the villages is strategic way to ensure effective implementation of action plans proposed to cope with natural disasters..*

Background

A participatory community-based vulnerability assessment (CVA) and development of climate risk responsive community action plan (CAP) have recently been completed covering 24 sucos in Aileu, Ainaro, Manufahi, and Ermera municipalities across Dili Ainaro Road Development Corridor (DARDC) in Timor Leste. The main objectives of the assessment were to identify climate induced key hazards in each suco; support communities to develop a climate risk responsive community action plan (CAP) for resilience and identify mechanisms for integration of CVA findings into the Integrated Municipal Development Planning (PDIM) process. The assessment process was divided into two phases. The first phase included testing of methods and tools developed for CVA focusing on disaster risk reduction (DRR) and climate change adaptation and piloted at the suco Talitu of Aileu municipality. Following the review and approval of methods and tools by UNDP team and key stakeholders, the second phase covered the CVA in an additional 23 sucos.

Concepts and methods

Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity. These three components are the key factors in determining a system's vulnerability to climate change and provide useful information for assessing and reducing climatic threats. **Exposure** is a measure of the extent to which people, places, and things or assets are subjected to potential threats or existing hazards. **Sensitivity** is the degree to which a system is affected, either adversely or beneficially by climate change. **Adaptive capacity** is the ability of people, places and things to adapt to climate change and reduce risks and take advantage of new opportunities (IPCC, 2014). There are numerous methods and approaches used to determine vulnerability, but for this assessment the team followed the following basic steps to find out the extent of vulnerability and developed action plan.

Step 1: Estimate exposure of people, places and things
Step 2: Estimate sensitivities of people, places and things
Step 4: Estimate adaptive capacity (AC)
Step 3: Determine impact (exposure x sensitivity)
Step 5: Determine vulnerability (impact modified by adaptive capacity)
Step 6: Prioritize vulnerabilities
Step 7: Develop participatory community action plan
Step 8: Mainstreaming and integration of action plan through PDIM process


Suco Aitutu

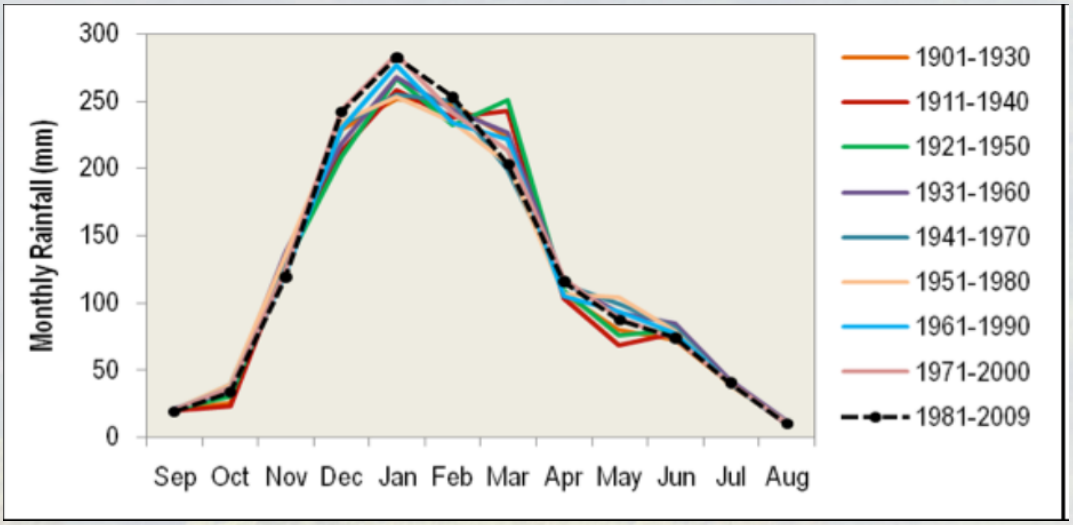
Results and discussion of vulnerability assessment

Based on the data collected from focus group discussion held across 24 sucos and credible secondary sources, the overall results and findings of the vulnerability assessment are discussed below.

Exposure analysis

In most sucos, local communities mentioned changes in the seasonal calendar, mainly during flowering season and to the scale of precipitation during dry and rainy seasons. It was commonly noticed that the duration of rain per year decreased, but the downpour quantity has increased resulting in flash floods. The change in the rainfall pattern seems similar with the trend outlined by INC, 2014 (figure below) with an increased quantity of rainfall during rainy season. Winter rain has significantly decreased as a result; the winter crop production has also decreased. Prolonged summer with decreased rainfall also increased the incidence of forest fire across most of the sucos. Similarly, the flowering month for coffee, avocado, mango, and jackfruit has changed from October to December. Some bird species are disappearing from most of the sucos such as parrot birds (Kakatua) and others. Likewise, there is an emergence of a new type of paddy frog called Interfeet. The pattern of hazards also changes over time such as the occurrence of strong wind which previously only used to happen only in January, but now occurs in December, January and February. In most sucos, the number of landslide hotspots, and the scale and frequency of forest fires have increased significantly. Except in a few sucos, flood is not the major hazard, and local communities have developed their adaptive capacity to address its impact.

Map 1: *Changing trend of monthly rainfall pattern in Timor-Leste*



Source - Initial National Communication (INC, 2014)

Sensitivity analysis

Sensitivity analyses were conducted for agriculture, forests, food security, public health, water and energy sectors. The data obtained from 24 sucos indicated that climate induced hazards impacted negatively on all these sectors at various scale. People have been applying multiple adaptation measures, which however are not adequate in addressing the impact. Therefore, there is a need for focused interventions to help local communities build their adaptive capacity to cope with climate induced hazards. Social resources and hazard maps were also prepared by the communities to create an understanding on which places and resources are used for what purposes in their locality.

Adaptive capacity analysis

Climate induced hazards adversely affected all natural capitals, namely forests, water, land and agriculture in all sucos. The data indicated that the quantity and quality of forests is decreasing, spring water sources are declining, with the production and productivity of crops and land also decreasing in recent years. In terms of physical capital, the number of roads and drinking/ irrigation water systems have increased, but quality and maintenance are poor. In most sucos, coffee remains the major source of household income for local people. In addition, horticultural crops like avocado, jackfruit, mangoes, cloves and black peppers are other options for generating household income. In recent years, due to changes in the seasonal calendar and climate induced hazards, the production of these crops has been declining. Regarding social capital, an existing local institution commonly known as Tara Bandu has been playing an instrumental role to enforce rules and implement adaptation plans as agreed by the communities.

Suco Aisirimou


Suco Edi


Suco Cotolau


Suco Fahisoi


Suco Tohumeta


Suco Holarua


Suco Horai


Suco Maubisse


Suco Seloi Kraik


Suco Maulai

Identification of key hazards with priority ranking (1-5)

The assessment identified ten types of hazards (as listed in table below) prevailing in the selected 24 sucos in Ainaro, Aileu, Ermera and Manufahi municipalities. Out of these hazards, five are counted as the most common categories namely- **strong wind, drought, flood, landslide, and fire**. The data presented in the table shows that the most common and frequently occurring hazard is strong wind, where all (24) sucos identified this as one of the hazards in their location, but with a different level of risk and impact category in each suco. Strong wind is the first priority hazard followed by drought and floods, whereas landslide and fire were categorised as fourth and fifth priority.

Table 1: *Key hazards and their priority ranking*

Hazards Sucos	Landslide	Drought	Strong wind	Flood	Fire	Others
Aisirimou		First	Fourth	Third	Second	
Fahiria	Fifth	Second	Third	First	Fourth	
Seloi Craic	First		Second		Third	
Cotolau	Fourth	Second	First		Third	
Fatisi	Fourth	First	Second		Third	
Madabeno	Second	Fourth	First	Third		
Talitu	Second	First	Fourth		Third	
Tohumeta		First	Third	Fifth	Second	Erosion
Acumau	Second	First	Third		Fourth	
Fahisoi	Third	First	Second	Fourth		
Ainaro	Fourth	Second	First		Third	
Cassa	Fourth		Fifth	First	Third	Animal disease
Aitutu	Third	Second	First	Fourth		
Edi	Second		First		Fourth	Thunderstorm Lightening
Fatubesi	First		Third		Second	
Horai Quic	Third	Fourth	First		Fifth	Animal disease
Maubisse	Fifth		Third		Fourth	Skin itching Animal disease
Maulau	Third		First		Second	
Suco Liurai	Fifth	First	Second			Animal disease Skin itching
Lauala	Second		Fourth	First	Third	
Riheu	Second		First		Third	
Poetete	First		Second		Third	
Talimoro	Second		Third	First	Fourth	
Holarua	Second		First		Third	Rat/bird Thunderstorm and lightening

Colour index with priority ranking

FIRST	SECOND	THIRD	FOURTH	FIFTH

Although fire is not ranked as a first priority hazard by any sucos, it is a common across 19 sucos. Most of the sucos (10 in total) ranked fire as its third priority. Sucos namely Aisirimou, Tahumeta, Fatubesi and Maulau have ranked fire as their second priority. Based on the level of risk categories of the hazards, strong winds, drought, and floods are considered as priority hazards by 9, 7 and 4 sucos respectively. Landslide is ranked as a first priority hazard by 3 sucos, whereas none of the sucos considered fire as a first priority hazard (please refer to table below).

Table 3:
Hazards - their coverage and priority

SN	Hazards	No. of sucos affected by the hazard	No. of sucos considering this as the most affecting hazard (first in priority)
1	Strong wind	24	9
2	Landslides	23	3
3	Fire	19	0
4	Drought	13	7
5	Flood	9	4
Others			
6	Erosion	1	0
7	Animal disease	4	0
8	Thunderstorm lightening	2	0
9	Skin itching	2	1
10	Rat/ bird	1	0


Suco Acumau


Suco Fahiria


Suco Fatisi


Suco Fatubessi


Suco Lauala

Suco Liurai


Suco Madabeno

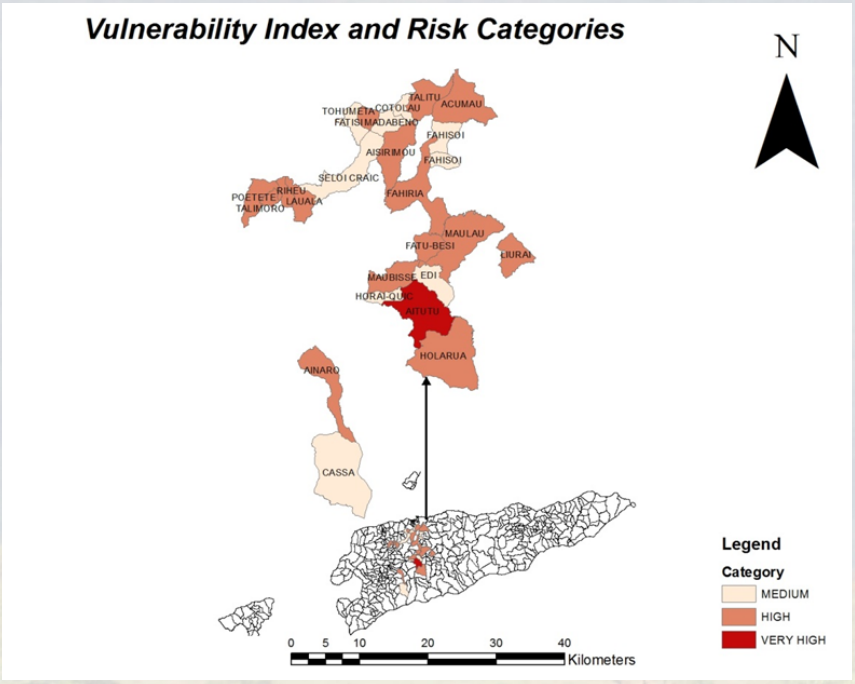
Calculation of vulnerability index

The vulnerability index calculated below indicates that most of the sucos are under the highly vulnerable category with high risk of hazards due to climate induced disasters. The results indicate that there is an immediate need to support local communities to cope with the impact of these hazards and prevent further impact on people and property. Each suco is different in terms of their coping capacity, but in general all sucos have inadequate adaptive capacity as compared to the scale of impact of the identified hazards. The table below gives details on the vulnerability index and risk categories for the 24 sucos. The vulnerability index for each suco was calculated by using IPCC formula where the values of exposure and sensitivity were multiplied, and the product divided by the value of adaptive capacity.

Table 4: *Vulnerability index and risk categories*

Sucos	Exposure	Sensitivity	Adaptive capacity	Vulnerability index	Risk categories
Aisirimou	1.8	2.8	2.2	2.2	HIGH
Fahiria	2.2	2.2	2.1	2.2	HIGH
Seloi Craic	2.0	2.0	2.6	1.5	MEDIUM
Cotolau	2.0	1.7	1.9	1.7	MEDIUM
Fatisi	1.2	2.2	2.0	1.3	MEDIUM
Madabeno	2.4	1.4	2.2	1.5	MEDIUM
Talitu	2.6	1.7	2.1	2.2	HIGH
Tohumeta	2.2	2.5	2.0	2.8	HIGH
Acumau	2.0	2.8	2.0	2.8	HIGH
Fahisoi	2.2	1.7	2.0	1.9	MEDIUM
Ainaro	2.5	3.0	2.3	3.2	HIGH
Cassa	3.0	2.4	2.4	2.9	MEDIUM
Aitutu	2.8	2.7	1.8	4.2	VERY HIGH
Edi	1.5	2.7	2.7	1.5	MEDIUM
Fatubesi	2.1	3.0	2.4	2.6	HIGH
Horai Quic	1.7	2.4	2.1	1.9	MEDIUM
Maubisse	3.0	2.8	2.1	4.0	HIGH
Maulau	2.0	2.6	2.3	2.2	HIGH
Suco Liurai	2.7	2.8	2.1	3.7	HIGH
Lauala	2.0	3.5	2.5	2.8	HIGH
Riheu	2.5	3.0	2.4	3.1	HIGH
Poetete	2.5	3.0	2.3	3.1	HIGH
Talimoro	2.5	3.0	2.3	3.1	HIGH
Holarua	1.7	2.6	2.1	2.2	HIGH
		AVERAGE VULNERABILITY INDEX OF 24 SUCOS		2.5	**HIGH**

Map 7: *Vulnerability index and risk categories of 24 sucos*



Out of 24 sucos, the most vulnerable suco is Aitutu as it scores a vulnerability index value of 4.2, a very high-risk category. Likewise, suco Maubisse has a high-risk category with an index value of 4 meaning that the risk category is close to the very high level. Suco Fatisi has a 1.3 vulnerability index, the lowest value amongst 24 sucos. The table above indicates that there are 8 sucos with a medium risk category, 15 sucos with a high-risk category, and 1 suco with a very high-risk category. These categories are the basis for designing the intervention and prioritizing the suco to extend support in the implementation of community action plan.

Community action plan

The focus group discussion held in each suco identified the following hazards and proposed adaptation plan for each hazard with an implementation time frame as outlined below.

Table 5: *Common hazards and proposed adaptation plans*

Hazards	Adaptation action	Y1	Y2	Y3	Y4	Y5
Landslide						
	Gabions wall construction		x	x	x	
	Tree plantation	x	x	x	x	x
	Bioengineering		x	x		
	Construction of retaining wall		x	x	x	
	Construction of check dam		x	x	x	x
	Bamboo and vetiver plantation	x	x			
	Tara Bandu implementation	x	x	x	x	x
Drought						
	Application of mulching system	x	x	x	x	x
	Drip irrigation system construction		x	x	x	
	Building check dams		x	x	x	
	Implementation of Tara Bandu	x	x	x	x	x
Flood						
	Construction of retaining wall		x	x	x	
	Construction of gabions		x	x	x	
	Tree plantation	x	x	x	x	x
Fire						
	Rehabilitation of coffee plantation	x	x	x		
	Implementation of Tara Bandu	x	x	x	x	x
	Preparation of fire line		x	x	x	
	Weeding inside the forests	x	x	x		
	Practice conservation agriculture		x	x	x	
Strong wind						
	Rehabilitation of coffee plantation	x	x	x	x	x
	Changing design of houses		x	x	x	
	Use of strong roofing materials	x	x	x	x	x
	Plantation of windbreak	x	x	x	x	x
	Bamboo plantation	x	x	x	x	x
Others						
Animal disease	Vaccination	x	x			
	Medicine	x	x	x		
Skin itching	Consultation	x	x			
	Vaccination	x	x			
Erosion	Terrace improvement	x	x	x		
	Tree plantation	x	x			
Rat/ birds	Undertake research	x	x			
	Baiting	x	x	x		
Thunderstorm and lightening	Awareness raising	x	x			
	Supply of earthing materials	x	x			

Conclusions

The vulnerability assessment undertaken in the 24 sucos of Aileu, Ainaro, Ermera and Manufahi municipalities revealed that local communities living around the Dili Ainaro road corridor live under high risk of climate induced natural disasters, namely strong wind, landslide, fire, drought, and flood. Initiatives implemented so far to minimise the risk of these hazards on people and properties are not enough. Some of the key lessons learned with policy recommendations to consider when moving forward are as follows:

- Organising vulnerable communities into a viable and functional group should be a priority action to ensure that the most affected households work collectively to develop plans best suited to them and implement these plans together.
- To increase the effectiveness of the community action plan, **the role of Tara Bandu is vital**, hence it needs to be strengthened further.
- **The role of the private sector** is important mainly in terms of the input, supply and trading of local products (agricultural commodities), provision of financial services, and delivery of vocational knowledge and technology transfers.
- **Promote traditional agro forestry practices** through plantation of suitable tree species, bamboos, vetiver grass, coffee, and other horticultural crops together.
- Promote **community-based resource management** such as community forestry, community-based watershed management, buffer zone community forests etc.
- Livelihoods of local people need **diversification of their farming system** to ensure that food security is safeguarded.
- Adaptive capacity of local communities needs to be strengthened to cope with the impact of climate induced natural hazards.
- Land tenure and its security should remain a key priority to ensure effective implementation of community action plan. Currently, most of households residing across the 24 sucos have informal customary rights.


Suco Poetete


Suco Ainaro


Suco Casa


Suco Riheu

The policy brief is based on the Community Vulnerability Assessment and Community Action Plan undertaken in 24 sucos across the Dili-Ainaro Road Development Corridor (DARDC) in Timor Leste in January 2018.

UNDP-DARDC Project
Office : MSS-NDMD, Bemori, Dili, Timor-Leste
CTA/PM : Dr. Shyam K. Paudel
E-mail : shyam.paudel@undp.org
Telephone : +670 7795 2899