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Climate-Smart Community Development Plan

Vaca Community, Vaca Forest Reserve Area, Cayo District, Belize

August 2024

***Written with the technical assistance of**:*

Salvador Mesh, Esther Sanchez Sho, and Eduardito Mendez. Friends for Conservation and Development.

Cover Photos:
Top: Covered structures and cabbage patch in the Vaca Forest Reserve.
Bottom: Vaca Community consultation session.

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1. Technical Data:

Community	Vaca Community
Protected Area (*if relevant*)	Vaca Forest Reserve
Protected Area Zone (*if relevant*)	N/A
Management Area (*if relevant*)	Multiple Use- East and Buffer
Area of Influence (*ha*)	Vaca Forest Reserve: 16,313.9 ha De-reserved area: 4,704.5 ha
Habitat	Tropical evergreen seasonal broad-leaved lowland forest over calcareous soils
Inhabitants	Ca.200
Families	Ca. 60
Ethnicity	Mestizo
Tenure	Public and Private Lands
Date of Plan Development	27 September, 2024
Date of Updated Plan	27 September, 2024
Evidence of FPIC[1]	Community Minutes: • July 31, 2024 • August 22, 2024
Leading Impacts of Climate Change	1. Change in weather patterns including: - Droughts - Intense rain - Flooding - High temperatures - Hurricanes 2. Forest Fires 3. Strong Winds
Priority Actions required for Community Adaptation to Climate Change	1. Improved agricultural practices 2. Fire prevention and management 3. Improved Livestock Management 4. Water management 5. Reforestation and Restoration 6. Multipurpose building 7. Alternative livelihoods 8. Change in working hours 9. Technical Support (extension services), disaster preparedness plans, Ministry of Health Outreach 10. Road upgrade
Participating Organizations	Wildlife Conservation Society Belize Forest Department Department of Agriculture Belize Botanic Gardens Caan Livestock Farmers Association

[1] FPIC: Free Previous and Informed Consent

2. Summary:

This climate-smart community development plan was developed through a participatory workshop held on July 31st, 2024, with 24 representatives of the Vaca Community, located in the de-reserved portion of the Vaca Forest Reserve, in the Cayo District, Belize. A validation session was held on the 22nd of August with the participation of 10 community members. This document reflects the community's priorities regarding the actions and investments required to help them adapt to the impacts of Climate Change (CC). This summary of local priorities is designed to propel the sustainable development of the community - increasing social resilience and the sustainable use of the community's natural resources, helping to create the conditions for more effective biodiversity conservation.

Goal: Consult community members and stakeholders to generate a "living document" that can be periodically updated to guide actions and investments required to help the community adapt to the impacts of climate change and achieve its sustainable development goals.

I. Specific Objectives:

- **Introduce the BLF:** Introduce the community to the project entitled "*Resilient and Biodiverse Landscapes of Northern Mesoamerica*" supported by BLF/DEFRA, clarifying programmatic goals and how the community can participate in the project.
- **Define CC Impacts:** Undertake participatory analysis of the impacts of climate change on the community, its livelihoods, and natural resources, prioritizing the predominant impacts.
- **Determine Adaptations:** Identify adaptation and/or mitigation actions that, according to the community, are required in the short term to reduce the impacts of CC on people, their livelihoods, and their natural resources.
- **Prioritize Actions and/or Investments:** Develop a list of the main actions or investments required to promote the community's adaptation to CC in the short/medium term, estimating the cost or effort required for each action or investment.
- **Consultation and Consensus:** Generate a plan document that details community priorities ratified through a process of free prior informed consent (FPIC) by the larger community and/or their representatives, ensuring evidence of consent.
- **Management and Investment:** Share the final version of the plan with the community and its allied organizations so that the document can be used to detail the impacts of the CC to third parties, and to guide BLF investments as well as additional resources from future funding sources.

3. Methodology

The community workshop was held in Spanish. All material used/prepared were in Spanish.

Step	Description
1. Preparation	Relevant literature on climate change vulnerabilities for the Caribbean and the region were compiled into a presentation. The methodology of the workshop was refined, agendas, consent forms, signup sheets, and supporting material were prepared. Invitations to farmers and stakeholders were issued 2 weeks in advance.
2. Workshop – Introduction	The role of FCD in the Vaca Area, and the BLF Mesoamerica project were discussed. The objectives of the Climate-Smart Development Plan were also presented.
3. Workshop – Evidence of CC	The impacts caused by CC at the local/regional level were presented and discussed.
4. Workshop – Vulnerabilities of CC	Community members identified the climate change vulnerabilities they currently face, and ratified the sectors identified by the BLF (People, Livelihoods, and Natural Resources).
5. Workshop – Groups Activity 1	In groups, community members identified the impacts of climate change vulnerabilities to 1. People; 2. Livelihoods; and 3. Natural Resources (of importance to the community). They determined the severity, the duration, as well as the percent of population suffering the impacts. Each group presented the outcomes of the discussion.
6. Workshop – Groups Activity 2	In the same groups, community members identified intervention required to reduce the effects of CC on People, Livelihoods, and Natural Resources, prioritized them, estimated the costs of actions/interventions, and identified other stakeholders who can assist with the implementation of interventions. These interventions were presented and discussed. also, if able, workshop facilitators can undertake a quick classification of common elements between groups to share with the plenary.
7. Summarization and translation of	Outcomes of the session were translated to English. The community's inputs were grouped into thematic areas and more technical language was used.

workshop outcomes	
8. Validation session	English summary was translated once more to Spanish and brought back to the community for validation. During the validation session, community suggestions were integrated into the final list of vulnerabilities and prioritized interventions.
9. Priority service, infrastructure and livelihood	During the validation session, community members identified and prioritized 1. Services; 2. Infrastructure; and 3. Livelihoods that the community wishes to develop in view of the impacts of CC
10. Action & Implementation	FCD highlighted the importance of the plan in guiding the implementation of interventions under the BLF project. FCD compromised in supporting interventions in agroecology, and to use the document to guide the application of grants in the future,

4. Introduction: Social, Geographic, and Environmental Context of the Vaca Forest Reserve and Vaca Community

4.1. Geographic Context:

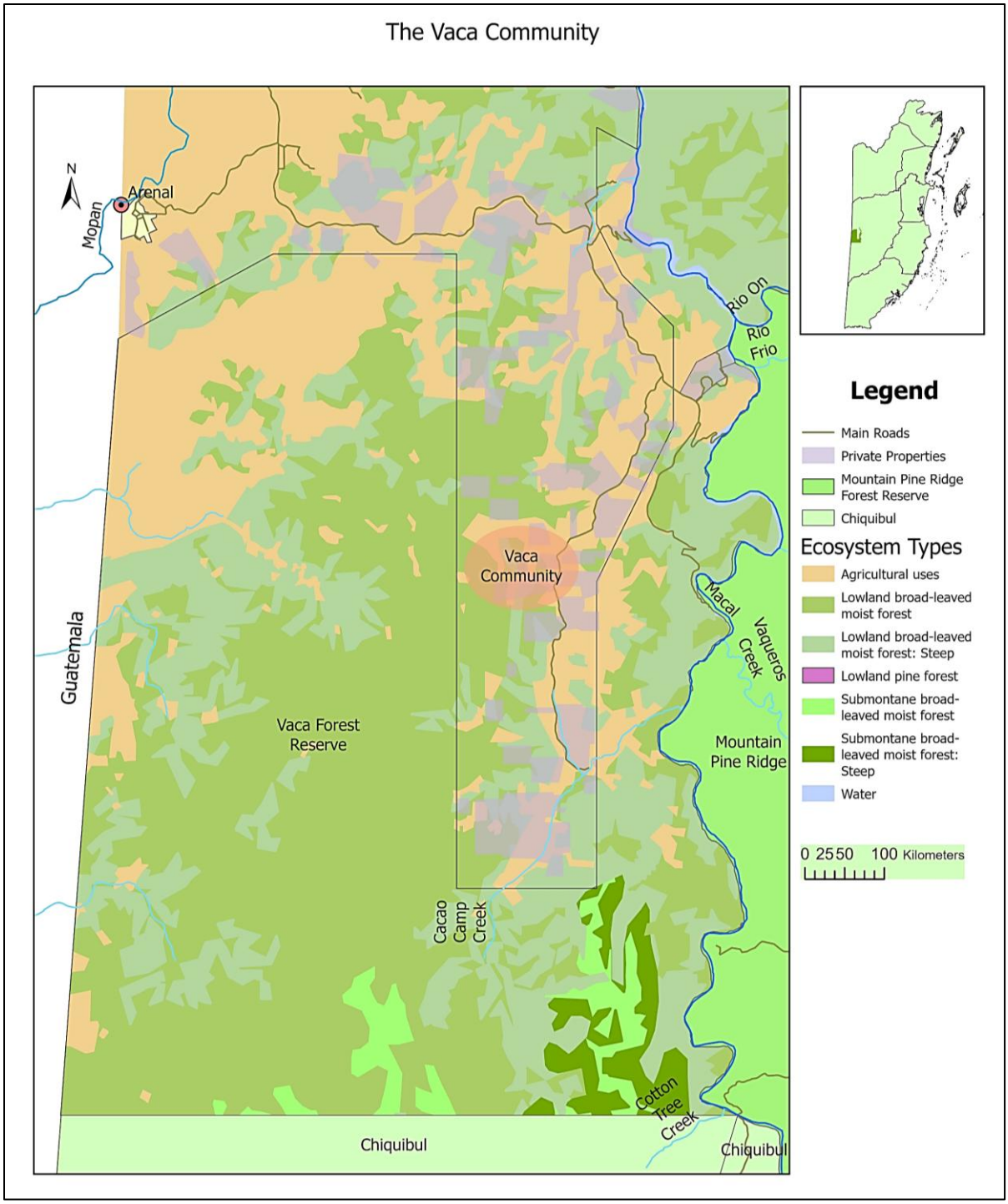


Figure 1. Geographical location of the Vaca Community.

The Vaca Forest Reserve (VFR) is in the Cayo District, along the Western Border of Belize with Guatemala (Figure 1.). The Reserve is part of the larger Western Maya Mountains Massif, which is a critical region for biodiversity and ecosystem conservation. In 2003, the Government of Belize signed a Forest Reserve Consolidation Order which allocated Reserved lands to buffering communities, giving rise to the Vaca Community, and reconfiguring the size of the reserve to 40,312.6 acres (16,313.9 ha).

The Geography of the VFR and Vaca Community is a combination of rugged terrain, decreasing dense forest coverage, and areas that have been impacted by human activities such as logging, farming and forest fires. The hilly landscape of the Vaca Area has elevations ranging between 50m to 250m above sea level (Meerman & Boomsma, 2017). The terrain is characterized by steep slopes, valleys, and ridges, making it a challenging environment for both human habitation and agricultural activities. Soils are well drained, variably stony gray or brown clays over calcareous substrate. The area receives an average of about 2,000mm of rainfall on an annual basis, with a pronounced dry season which lasts between February to May.

4.2. Environmental Context:

The VFR is dominated by tropical evergreen seasonal broad-leaved lowland forest over calcareous soils. This forest is a mix of primary and disturbed forests. Historically, the VFR has been logged for commercial species including Mahogany (*Swietenia macrophylla*), Salmwood (*Cordia alliodora*), Cabbage bark (*Lonchocarpus castilloi*), Nargusta (*Terminalia amazonia*), Granadillo (*Dalbergia sp./Platymiscium dimorphandrum*) amongst others. Today, these species are less common in forests close to buffering communities and the western border due to legal logging, and incursions for illegal logging, crop agriculture, cattle ranching and the impacts of forest fires. An assessment by Guerra in 2022 reported that at least 34.7% (5,669.6 ha) of the reserve was impacted by forest fires (Annex 1). By contrast, the Vaca Community landscape is a mosaic of remnant forests, small scale agricultural clearings used for crop production and pasture lands (Figure 1).

Still, these disturbed forests are home to endangered and keystone species such as the Jaguar (*Panthera onca*), Puma (*Puma concolor*), Baird's Tapir (*Tapirus bairdii*), Yucatan Black Howler Monkey (*Alouatta pigra*), Red Brocket Deer (*Mazama americana*), White Tailed Deer (*Odocoileus virginianus*) and a more than 244 species of birds. However, residents in the area have reported a low abundance of these, probably due to extensive forest disturbance and uncontrolled hunting.

The Vaca area is an important watershed catchment area for the Macal and Mopan River. The Macal River borders the Eastern portion of the VFR, while the Mopan River drains into Guatemala before re-entering Belize and joining the Macal River to form the Belize River. The most notable surface water occurring in Vaca Community is the Cacao Creek which runs Northeast through the southern portion of the community until it joins the Macal River (Figure 1).

4.3. Socioeconomic Context:

The Vaca Community is in the de-reserved portion of the VFR. The community is an unincorporated settlement, and as such does not have a local government and lacks official municipal governance. Several inhabitants also reside in nearby communities of Arenal Village, San Jose Succotz Village, and Benque Viejo Town. The community can be described as a small-scale agricultural community, primarily producing vegetables, livestock, agroforestry products, and honey.

Although most farming occurs in the de-reserved areas, several farmers (about 30) are "allowed" by the Belize Forest Department to occupy and use lands within the VFR. These farmers have organized themselves in the past to obtain tenure for the land they cultivate; however no mechanism has been adopted by the Belize Forest Department. Farmers within the VFR, and those with land adjacent to the reserve engage in the production of watermelon, corn, tomatoes, cabbage, bell pepper, beans and cattle (Table 1). A stocktaking exercise by FCD in 2023 suggested that farmers buffering the VFR, and those farming in the south-eastern portion of the VFR, produced about 2.1M BZD worth of agricultural produce (Mendez, 2023).

Table 1. Summary of crop and livestock output of farmers working in the Vaca Forest Reserve (Southeast) and in the Buffering private lands.

Product	Number of Farmers Producing	Number of Plants/Animals	Average Yield Per Plant/Animal (Pounds)	Average Price Per Pound	Total
Cabbage	5	13,400	1-2	$2.82	~$76,00.00
Tomato	5	7,600	10	$4.18	$317,680.00
Watermelon	1	1,000	15	$0.69	$10,350.00
Bell Peppers	3	800	4	$5.13	$16,416.00
Corn	1	20,000	2.5-3	$3.20	~$39,000.00
Cattle	7	500	1000	$3.31	$1,655,000.00
Total					$2,114,446.00

The community lacks utilities such as electricity, potable water system, telephone coverage and internet service. Community spaces such as community gathering centers, pre- and primary schools, health centers and other essential communal infrastructure are

nonexistent. Community members must travel more than 20 miles to access education, health care and other basic services.

Little is known about the use of natural resources by the community. Short and long-term logging is not allowed in the VFR. Reports and observations however indicate that the community utilize timber and non-timber forest products such as bush sticks, bay and cohune leaves, and game.

There are other economic activities within and around the Vaca Community. Fortis Belize operates 2 hydroelectric facilities on the Macal River within the vicinity of the VFR: supplying about 35% of national electricity demand (Fortis Belize Ltd., 2024). The Martinez Family has a pontoon tour operation on the Vaca Reservoir. Better in Belize, a 130-acre eco-village enclave in the VFR, offers real estate properties along the Macal River.

5. Climate vulnerabilities:

In descending order of severity, the Vaca Community has identified the following vulnerabilities to climate change (1) Change in weather patterns (2) Forest Fires, and (3) Strong Winds. Changes in weather patterns include droughts, intense rain, flooding events, high temperatures, and hurricanes. The community agrees that these vulnerabilities affect livelihoods, people, and natural resources. However, their impacts are similar or interconnected, therefore, to avoid duplication, not all climate change vulnerabilities are evaluated in sectors.

5.1. Major Impacts of Climate Change on People

Prolonged droughts have led to increasing water scarcity, especially for households distant from permanent water sources or lacking water harvesting and storage mechanisms such as dugout ponds or reservoirs. During droughts, the community struggles with limited access to potable water for drinking and cooking, as well as non-potable water for hygiene and other purposes. The accompanying high temperatures during these droughts further reduce physical endurance, negatively affecting the health and productivity of community members. Heat waves have caused dehydration, reduced physical endurance, and forced changes in working hours, which have in turn lowered overall productivity. Those with pre-existing conditions, such as hypertension, face additional health risks during these periods.

Intense rain impacts the household's economy when crops are lost due to rainfall-related plant diseases such as fungal, bacterial, or viral infections. Flooding, though localized due to the area's topography, still causes economic losses through damage to infrastructure

and the destruction of crops. The deterioration of road conditions brought by periods of intense rain and flood events impedes mobility and transportation, making it difficult for residents to travel to and from the community. Schoolchildren are particularly affected, as they must travel several miles, often on foot or bicycle to the pickup point of the school bus. Additionally, flooding events lead to mosquito outbreaks, increasing the risk of vector-borne diseases like malaria and dengue.

Hurricanes similarly affect the community's mental and emotional health, as residents face the dangers and losses associated with these storms, including damage to property and crops. The disruption extends to education, as schoolchildren miss classes during hurricane events.

The unpredictable changes in weather patterns make it increasingly difficult for the community to plan agricultural activities and daily routines, contributing to heightened uncertainty and stress.

Forest fires, occurring with increasing intensity every two years, have serious repercussions on the community's physical health. The fires have led to respiratory issues, particularly among young children, the elderly, and those already ill, as well as heightened allergies due to smoke and poor air quality. Community members also experience chronic fatigue from the constant need to monitor and combat fires on their properties. The psychological toll is substantial, with stress and anxiety arising from the persistent threat to lives and property. This emotional strain is compounded when families suffer the loss of crops, livestock, and homes.
Strong winds exacerbate the spread of wildfire and increase air contamination with smoke. Meanwhile, these winds, often associated with other climate events like hurricanes, make it difficult for the community to manage fires, adding to the burden on their well-being and environmental sustainability.

Table 2. Tabular representation of climate vulnerabilities experienced by the Vaca Community and identified impacts on people that require mitigation, as well as its severity, frequency and percentage of population affected by identified impacts. See Annex 2 for severity ranking.

Vulnerability		Impact Requiring Mitigation	Severity (1-10)	Frequency		% Population Affected
				Years	Days	
Change in weather patterns	Drought	Scarcity of non-potable water.	5	4	90	80
		Scarcity of potable water	10	20	90	100
	Intense rains	Stress (difficulty in planning planting cycles)	7	20	90	100
		Economic loss	8	20	365	100
	Flooding	Reduced mobility	8	20	90	100

Vulnerability		Impact Requiring Mitigation	Severity (1-10)	Frequency		% Population Affected
				Years	Days	
		Physical health (disease spread by vectors-mosquitoes)	5	20	90	100
		Economic losses	8	20	15	100
	Heat waves	Physical (hypertension, dehydration)	6	20	18	100
		Reduced physical endurance	5	20	90	100
	Hurricanes	Physical health	5	4	15	100
		Mental health (due to loss of crops and property)	10	20	180	100
		Fewer school days for children	6	4	15	70
Forest fires		Negative emotional impact	10	4	90	100
		Health (respiratory, fatigue, allergies)	5	4	90	100
		Physical danger and loss of homes.	5	4	90	50
Strong winds		Air contamination (Physical health)	3	20	90	100

5.2. Major Impacts of Climate Change on Livelihoods

The livelihoods of the Vaca Community have been significantly impacted by various climate-induced vulnerabilities, each contributing to economic losses and increased vulnerability.

Droughts have pressured farmers to sell cattle at lower market values due to the scarcity of water and seasonal shortage of pasture. It has also led to reduced crop yields and, in many cases, complete crop failures. Reduced agricultural productivity has reduced food security, so families must purchase goods that are often expensive. This has raised the cost of living, compounding the economic strain on the community.

Flooding and intense rains, another critical concern, leads to direct crop losses, further diminishing the community's agricultural output and food security. Hurricanes amplify these effects, causing both crop destruction and damage to essential infrastructure, such as farm buildings and covered structures.

High temperatures, particularly during heat waves, have reduced crop production. High temperatures have rendered covered structures useless during the dry season as it results in crop damage and reduced yield. Additionally, high temperature results in low weight gain in livestock. High temperatures during the dry season and heat waves have forced farmers to reduce their hours of work; resulting in overall low productivity.

Forest fires have exacerbated these challenges by destroying pasture lands and crops—fruit trees and agroforestry plots. Fires have also destroyed essential infrastructure such as fencing and buildings. Forest fires also disrupt the production of forest honey by degrading forests and decimating nectar sources. When fires threaten property, community members are forced to reallocate scarce water resources to fight fires, which could otherwise be used for domestic needs and irrigation.

Table 3. Tabular representation of climate vulnerabilities experienced by the Vaca Community and identified impacts on livelihoods that require mitigation, as well as its severity, frequency and percentage of population affected by identified impacts. See Annex 2 for severity ranking.

Vulnerability		Impact Requiring Mitigation	Severity (1-10)	Frequency		% Population Affected
				Years	Days	
Change in weather patterns	Drought	Economic loss: pressure to sell cattle	8	10/20	120	100
		Low crop yields	8			
		Increased cost of living	8			
		Crop failure or loss.	8			
		Reduction of market value of cattle.	8			
	Flooding (and intense rains)	Loss of crops	7	5/20	15	50
	Heat waves	Reduced hours of work	10	5/20	120 and increasing	100
		Low crop and livestock production	10			
	Hurricanes	Loss of crops and infrastructure	7	7/20	90-180	100
Forest fires		Loss of pasture	7	5/20	60	100
		Increase in the cost of living	7			

Vulnerability	Impact Requiring Mitigation	Severity (1-10)	Frequency		% Population Affected
			Years	Days	
	Loss of nectar sources for forest honey production.	7			
	Loss of infrastructure	7			
	Water resource re-allocation	7			

5.3. Major Impacts of Climate Change on Natural Resources

The natural resources of the Vaca Community have been severely affected by a range of climate-induced events, each contributing to the degradation of the local environment and ecosystem.

Prolonged droughts events have caused trees to die off. Scarcity of rainfall and water has induced stress on vegetation, especially in cultivated fruit trees resulting in low fruit production and poor and out of season flowering. Additionally, drought stress has heightened the vulnerability of plants and animals to pests and diseases. Poor vegetative cover around ponds and watering holes, the absence of riparian forests around streams, combined with high temperatures lead to the rapid evaporation of soil and surface water, exacerbating water shortage. The overall scarcity of water has become a pressing issue, affecting the entire ecosystem.

Intense rains and flooding, on the other side of the problem, have also left their mark on the community's natural resources. These heavy downpours lead to soil erosion and landslides, which not only degrade the land but also cause the death of trees and animals. Wet conditions promote the spread of pests and diseases among plants and animals, further weakening the resilience of the ecosystem.

Forest fires have had a devastating impact on the environment, leading to widespread tree mortality, effectively contributing to forest degradation and deforestation. The intense heat from the fires accelerates the evaporation of water sources. Furthermore, the loss of forest cover accelerates water evaporation and loss of soil moisture, exacerbating water scarcity. Forest fires have also killed and displace wild animals, disrupting local biodiversity and increasing human-wildlife conflicts as animals encroach on human habitats in search of food and shelter.

Together, these climate-induced challenges are deteriorating the natural resources that the Vaca Community relies on, threatening both the environment and the livelihoods connected to it.

Table 4. Tabular representation of climate vulnerabilities experienced by the Vaca Community and identified impacts on natural resources that require mitigation, as well as their severity, frequency and percentage of population affected by identified impacts. See Annex 2 for severity ranking.

Vulnerability		Impact Requiring Mitigation	Severity (1-10)	Frequency		% Population Affected
				Years	Days	
Change in Weather Patterns	Drought	Trees die off	9	7/20	90	80%
		Water dries faster	10			100%
		Low fruit production. Low inflorescence. Fruit trees	8			100%
		Increase pests and disease in plants and animals	5			100%
		Water scarcity	9			
	Intense rains	Trees die	9	4/20	3	60%
		Animals die	2			20%
		Soil erosion and land slides	9			100%
		Increased pests and disease in plants and animals	2			100%
Forest Fires		Kills trees (deforestation)	9	3/20	20	100%
		Wild animals are killed or displaced	5			40%
		Increased human wildlife conflict	4			5%
		Increased evaporation of water (dries faster)	10			100%

6. Actions/Investments Required to Adapt

The Vaca Community has identified several cross-cutting interventions which can address the vulnerabilities they face against climate change. These are referred to as cross-cutting since one intervention can offer resilience to more than one climate change

vulnerability, several impacts, and to multiple sectors identified by the BLF and community. These interventions, ranging from improved agricultural practices to disaster preparedness plans, are aimed at safeguarding livelihoods, protecting natural resources, and ensuring the well-being of the people and community. Below is a summary of the prioritized interventions and how they mitigate the impacts of various climate-induced challenges; the prioritization is based on the tally of prioritizations identified by the Vaca Community.

5.4. Improved agricultural practices:

As a farming community, improving current farming techniques is the primary intervention envisioned by the Vaca Community. The identified practices that farmers would like to adopt include:

- Adopting soil management practices which improve moisture and water retention while at the same time promote proper drainage; improve nutrient content of soils; and increase organic matter content as a means to improve crop yields.
- Adopting improved varieties of seeds which are adapted to high temperatures and drought conditions.
- Adopting an improving tropical covered structure design that reduces heat stress on crops.
- Adopting agroforestry systems to diversify household income.
- Undertaking crop diversification to reduce economic impact brought by crop failures.
- Adopting cover crops to improve nitrogen content, reduces soil erosion, and improves infiltration.
- adopting live/tree fences/barriers to reduce wind action and reduce soil erosion.

5.5. Fire prevention and management:

Interventions which seek to prevent and manage fire is second on the list of interventions envisioned by the Vaca Community. Fire prevention interventions include:

- Outreach to local farmers and community members on fire prevention and management.
- The utilization of live fences along pasture lands buffers and barriers to contain fires.
- Training of farmers and local community members on how to conduct proper agricultural burn practices.
- Establishing a communication mechanism between farmers and local authorities to communicate burn plans, and report wildfires.

Fire management interventions should include:

- Development of community fire management plans.

- Establishing and equipping a community fire brigade.
- Training community fire brigade on fire management.
- Upkeeping of fire lines and trails within the community and in the Vaca Forest Reserve.

5.6. Improved Livestock Management:

As a third priority, Vaca livestock producers identified several interventions to enhance their livestock production in response to climate change vulnerabilities:

- Creating fodder storage to ensure sufficient forage during dry months and improve livestock nutrition.
- Adopting live fences and barriers to protect pastures from wildfires and minimizing land degradation.
- Implementing silvopastoral systems to provide shade for animals during high temperatures, while also generating alternative income sources through integrated tree and pasture farming.

These interventions aim to strengthen the resilience of livestock production in the face of drought, high temperatures, and forest/wildfire threats.

5.7. Water management:

Water management techniques were identified as the fourth priority intervention by the community. These include:

- Expanding rainwater harvesting and storage through infrastructures such as vats, ponds, watering holes, and increasing the capacity of existing storage systems.
- Implementing drip irrigation systems and enhancing overall irrigation practices to ensure the efficient use of water resources.
- Drilling and installing communal wells to improve access to water for households and agricultural activities.
- Constructing a community water system to ensure reliable distribution of water.

These interventions will mitigate the impacts of droughts by increasing water availability, while also capitalizing on intense rains and flooding by reducing surface runoff and improving water retention.

5.8. Reforestation and Restoration

Restoring degraded lands and reforesting denuded areas within the community and the Vaca Forest Reserve has been identified as the fifth priority intervention. These restoration and reforestation efforts should align with the National Landscape Restoration Strategy for Belize. The specific areas identified by the community for restoration include:

- Areas surrounding water bodies such as ponds, watering holes, and wells.
- Riparian zones along rivers and streams.

These efforts aim to enhance ecosystem services, improve water retention, and prevent further loss of forest resources.

5.9. Multipurpose building:

The construction of a multipurpose building, designed to function as a health center, hurricane shelter, and emergency response hub during climate events, was identified as the sixth priority intervention. This facility will support the community's adaptation to the impacts of hurricanes, intense rain, and flooding by providing essential services and safe refuge during emergencies.

5.10. Alternative livelihoods:

Diversifying income sources has been identified as the seventh priority intervention for the community. This includes promoting activities such as:

- Diversified and integrated farming such as beekeeping and agrotourism.
- Agroforestry systems to produce cacao, coffee, breadnut (*Brosimum alicastrum*), and other commodities and products.

These strategies are aimed at reducing the community's economic dependency on vulnerable farming sectors that are frequently impacted by changes in weather patterns and forest fires.

6.8. Change in working hours:

Adjusting work schedules, while a community-led intervention, has been identified as a necessary strategy to mitigate the impacts of climate change. By shifting work hours to avoid peak heat times will reduce exposure to high temperatures, minimize physical strain, and enhance overall productivity.

6.9. Technical Support (extension services), Disaster preparedness plans, Health Outreach:

Continuous agricultural technical support through extension services provided by the Department of Agriculture, FCD Extension Technician, and other organizations has been recognized as a vital intervention. This support is aimed at enhancing the community's knowledge and encouraging the adoption of climate-smart agricultural and livestock management practices that help build resilience against climate change vulnerabilities.

Another important intervention identified is the development of farm disaster preparedness plans. These plans should focus on:

- Developing the capacity of farmers in seed selection, processing, and preservation, for the creation of seed banks.
- Establish nurseries that enable farmers to quickly replenish their fields following extreme weather events such as hurricanes.
- Adopting crop diversification models to spread the risk of crop failures caused by extreme climate events.

Interventions from the Ministry of Health were also emphasized, including:

- Health outreach through mobile clinics to address climate-related health issues such as heat stress, vector-borne diseases, respiratory problems, and mental health support in the aftermath of extreme climate events.
- Community education sessions to raise awareness about climate-related health risks and promote the prevention of climate-sensitive diseases such as malaria, dengue…

6.10. Road upgrade:

Upgrading of the Mollejon and Mollejon-farm Road was identified by the vaca community as the 10th priority intervention. This improvement will ensure accessibility and mobility to and from the community.

Although these interventions are prioritized at the community level, it would be inaccurate to assume that they can be uniformly adopted by all farmers and community members. The geography of the community, along with the varying levels of natural, financial, physical, and human capital among community members, influences the severity of the

climate impacts experienced. Interventions should therefore be tailored to the priority of households and farmers.

The following table outlines the specific climate vulnerabilities, their impacts, and the corresponding crosscutting interventions. Implementing these interventions requires close attention to the cost identified by the community, the contribution of the community, as well as the coordinated efforts of the identified partner.

Table 5. Tabular details of community identified intervention for adapting to climate vulnerability; their prioritization; cost range; the community's contribution and other stakeholders who can be engaged to assist with the implementation of interventions. See Annex 3 for intervention priorization category, and Annex 4 for intervention cost ranking.

Category	Impact Requiring Mitigation	Action/Intervention	Priority	Cost Range	Community Contribution	Other stakeholders who can help
Livelihood (drought)	Reduction of market value of cattle.	• Improved livestock management: - Fodder reserves • Technical support: - Consistent extension services	4	>25k	- labor - area for intervention (land)	- Ministry of Agriculture - Belize water services - Fortis Belize - Ministry of Infrastructure, Development and housing - FCD
Livelihood (drought)	Low crop yields and crop failure	• Water management: - Rainwater harvesting/storing - Drip irrigation • Improved agricultural practices - Soil management - Improved varieties of seeds.	4	15k≥ ≤25k		
Livelihood (drought)	Increased cost of living	• Alternative livelihoods - Diversified and integrated farming - Agroforestry systems (coffee, cacao, breadnut...)	3	>25k		
Livelihood (Forest Fires)	Loss of pasture	• Improved livestock management: - Fodder reserves - Live fences/green barriers	4	15k≥ ≤25k	- labor - area for intervention (land)	- Belize Forest Department - Yaaxche - Fortis Belize - BDF

Category	Impact Requiring Mitigation	Action/Intervention	Priority	Cost Range	Community Contribution	Other stakeholders who can help
Livelihood (Forest Fires)	Increase in the cost of living	• Alternative livelihoods - Diversified and integrated farming - Agroforestry systems (coffee, cacao, breadnut...)	3	>25k	- participation in capacity building session. - collection of seeds for reforestation/restoration	- Community groups - Belize Botanic Gardens
Livelihood (Forest Fires)	Loss of nectar sources for forest honey production.	• Reforestation/restoration plan in succinct with the National Landscape Restoration Strategy. • Fire prevention and management: - Community fire brigade - Upkeeping of fire lines and trails. - Burn plan communication - Fire buffers (live fences)	3 4 4 4	>25k >25k >25k ≤1k		
Livelihood (Forest Fires)	Loss of infrastructure					
Livelihood (Forest Fires)	Water resource re-allocation					
Livelihood (Flood)	Loss of crops	• Improved agricultural practices: - drainage systems - raised bed - improved tropical covered structure design.	2	1k≥ ≤5k	- labor - maintenance of drainage	- Ministry of Infrastructure, Development and housing - Fortis Belize - National Emergency Management Organization
Livelihood (Hurricane)	Loss of crops and infrastructure	• Disaster preparedness plan - seed banks - nurseries - crop diversification	4	≤1k	Labor	

Category	Impact Requiring Mitigation	Action/Intervention	Priority	Cost Range	Community Contribution	Other stakeholders who can help
Livelihood (High temperatures (heat waves)	Reduced hours of work	Change in working hours	N/A	N/A	--	--
	Low crop yield and livestock production	• Improved livestock management: - Silvopastoral systems • Improved agricultural practices: - Agroforestry systems - Crop diversification - Improved tropical covered structure design	4	>25k	Labor	- Ministry of Agriculture - Belize Botanic Gardens - Belize Livestock Producers Association
People (Drought)	Scarcity of non-potable water. Scarcity of potable water	• Water management: - Rainwater harvesting/storing - Wells - Water filtration system - Community water system.	3	>25k	Labor	Ministry of Agriculture
	Lower physical endurance	• Change in working hours	4	0	N/A	N/A
People (Forest fires)	Negative emotional impact Health (respiratory, fatigue, allergies) Physical danger and loss of homes.	• Fire prevention and management plan. - Fire reporting and communication system. - Fire training and equipment - Fire breaks and community fire brigades - Fire management and prevention outreach	3 3 3	>25k >25k 1k≥ ≤5k	- Labor - Participation in training	- Forest Department - Kaan Cooperative

Category	Impact Requiring Mitigation	Action/Intervention	Priority	Cost Range	Community Contribution	Other stakeholders who can help
People (Hurricanes)	Physical health Mental health (due to loss of crops and property) Fewer school days for children	• Multipurpose building (also serving as a health center)	4	>25k	Land for construction.	- Ministry of Health - Ministry of Infrastructure, Development & Housing - National Emergency Management Organization
People (Flooding)	Reduced mobility (deterioration of roads)	• Public transport • Road upgrade	3	>25k	Advocacy	- Ministry of Infrastructure, Development & Housing
	Physical health (disease spread by vectors-mosquitoes)	• Multipurpose building (also serving as a health center). • Outreach on vector disease transmission prevention.	4	>25k	Land for construction	Ministry of Health
	Economic losses	• Alternative livelihoods - Diversified and integrated farming - Agroforestry systems (coffee, cacao, breadnut...)	3	>25k	- Participation in training - labor - land for intervention	- Ministry of Agriculture - FCD - Belize Botanic Gardens
People (Heat waves)	Physical danger (hypertension, dehydration)	• Multipurpose building (also serving as a health center) • Mobile clinic	4	>25k		- Ministry of Health - Ministry of Infrastructure,

Category	Impact Requiring Mitigation	Action/Intervention	Priority	Cost Range	Community Contribution	Other stakeholders who can help
	Reduced physical endurance					Development & Housing
People (Strong winds)	Air contamination (Physical health)	• Fire prevention and management plans. - Fire reporting/ communication system - Fire training and equipment - Fire breaks and community fire brigades - Fire management and prevention outreach	3	>25k		- Belize Forest Department - FCD
Natural Resources (Forest Fires)	Kills trees (deforestation) Wild animals are killed or displaced Increased human wildlife conflict Increased evaporation of water (dies faster)	• Reforestation/restoration plan in succinct with the National Landscape Restoration Strategy. • Fire prevention and management plans. - Fire reporting/ communication system - Fire training and equipment - Fire breaks and community fire brigades - Fire management and prevention outreach • Improved agricultural practices	4 4 2 4 4 4 3 1	>25k 15k≥ ≤25k >25k ≤1k ≤1k 1k≥ ≤5k ≤1k	- Labor - Vehicle - Donate water, food	- FCD - Fortis - Forest Department - Department of Agriculture

Category	Impact Requiring Mitigation	Action/Intervention	Priority	Cost Range	Community Contribution	Other stakeholders who can help
		- cover crops-peas/beans • advocate for gob support		1k≥ ≤5k		
Natural Resources (Drought)	Trees die off Water dries faster Low fruit production. Low inflorescence. Fruit trees Increased pest and disease in plants and animals Water scarcity	• Reforestation/restoration around wells, ponds, and riparian areas. • Water management: - more ponds/wells - water harvesting - expansion of ponds/watering holes • Improved agricultural practices/farm management - improved drainage - cover crops - live fences/barriers - improved design of tropical covered structure - crop/livestock management - improved farm practices	4 4 4 4 4	>25k >25k >25k >25k 10k≥ ≤15k	- labor - collection of seeds for reforestation/restoration - land for implementation	- Ministry of Infrastructure, Development & Housing - Belize Forest Department - FCD - Belize Botanic Gardens - Department of Agriculture
Natural Resources (Change in weather patterns (intense rain))	Trees die Animals die Soil erosion and land slides Increased pests and disease in plants and animals	• Improved agricultural practices/farm management - improved drainage - cover crops: peas/beans - live fences/barriers - improved design of tropical covered structure - crop/livestock management - improved farm practices	 3 3 2 3 4	 >25k >25k >25k >25k 10k≥ ≤15k	- labor - collection of seeds for reforestation/restoration - land for implementation	- Ministry of Infrastructure, Development & Housing - Belize Forest Department - FCD - Belize Botanic Gardens

Category	Impact Requiring Mitigation	Action/Intervention	Priority	Cost Range	Community Contribution	Other stakeholders who can help
						- Department of Agriculture

7. Community Priority Development Needs in the Context of Climate Change

As an unincorporated community, the Vaca Community faces limited access to basic services, infrastructure development, and economic opportunities. The list below provides a summary of the community's wish list of services, infrastructure and alternative livelihoods.

Priority Services

1. *Potable water services*: The absence of centralized water systems limits access to clean water for drinking, cooking, hygiene, and irrigation, especially during droughts. This creates additional pressure on water management and use, thus identified as the top priority for the community.
2. *Healthcare*: The Vaca Community lacks a formal healthcare facility, making it difficult to access medical care, especially in emergencies or during climate-related events (e.g., heat waves, forest fires).
3. *Solar electricity*: although there are two hydroelectric facilities in the vicinity of the Vaca Forest Reserve, the Vaca Community is not connected to the national electricity grid. Although the community aspires to this electricity, they would prefer alternative solar energy sources.
4. *Telecommunication service*: The Community is also not connected to the national telecommunication networks. Thus, communication during emergencies and calamities is delayed. Though a priority, the community recognizes that this is the lowest priority on their list.

Priority Infrastructure

1. *Water system*: Same as priority 1 in previous section, including reservoir/s, piping and other necessary infrastructure.
2. *Road upgrade*: The Mollejon, and Mollejon-Farm Road are poorly maintained, and road networks are inadequate, making it difficult to access markets, healthcare, education, and other essential services. A major road upgrade will alleviate these challenges.
3. *Multipurpose building*: The Vaca Community does not have a centralized government and as such, community efforts are difficult to coordinate. The multipurpose building will be the hub for community gathering for education and training purposes, emergency response hub, health service center, and shelter during extreme weather events.
4. *School*: Children from the Vaca Community need to travel long distances to attend school, and educational resources within the community are scarce. Currently,

children attend school in the nearby town of Benque Viejo, with transportation services provided by the Ministry of Education. However, building a school in the community will improve access to education, and alleviate the strain of sending their children to school.

Priority Livelihoods

The Vaca Community has chosen not to prioritize specific livelihood approaches, recognizing that households' ability to adopt new practices varies based on their existing livelihoods, as well as their financial, human, natural, and physical resources. The four livelihoods identified by the community are all agriculture-related and are aimed at improving current practices:

- *Agroprocessing*: This involves transforming raw agricultural products (such as vegetables, fruits, and other crops) into value-added products. Agroprocessing creates new income opportunities, expands market reach, and reduces post-harvest losses.

- *Agrotourism*: Integrating tourism activities such as farm tours, workshops, hands-on experiences, and farm stays generates income beyond traditional crop sales, diversifying the community's revenue sources.

- *Apiculture*: Beekeeping offers income diversification through the production of honey and other byproducts. Apiculture also improves crop pollination and enhances overall ecosystem health.

- *Agroforestry*: Establishing agroforestry plots to produce cacao, coffee, ramon (*Brosimum alicastrum*), and other timber and non-timber forest products reduces the risks associated with monocropping while promoting environmental and ecosystem health.

These activities can serve as alternative livelihoods for some community members by providing new, diverse income streams. For others, they may act as enhancements that improve the sustainability and productivity of their existing farming systems.

8. References

Fortis Belize Ltd. (2024) Operations. Fortis Belize Ltd. Cardinal Points TCI. Retrieved on October 8, 2024, from: https://www.fortisbelize.com/operations

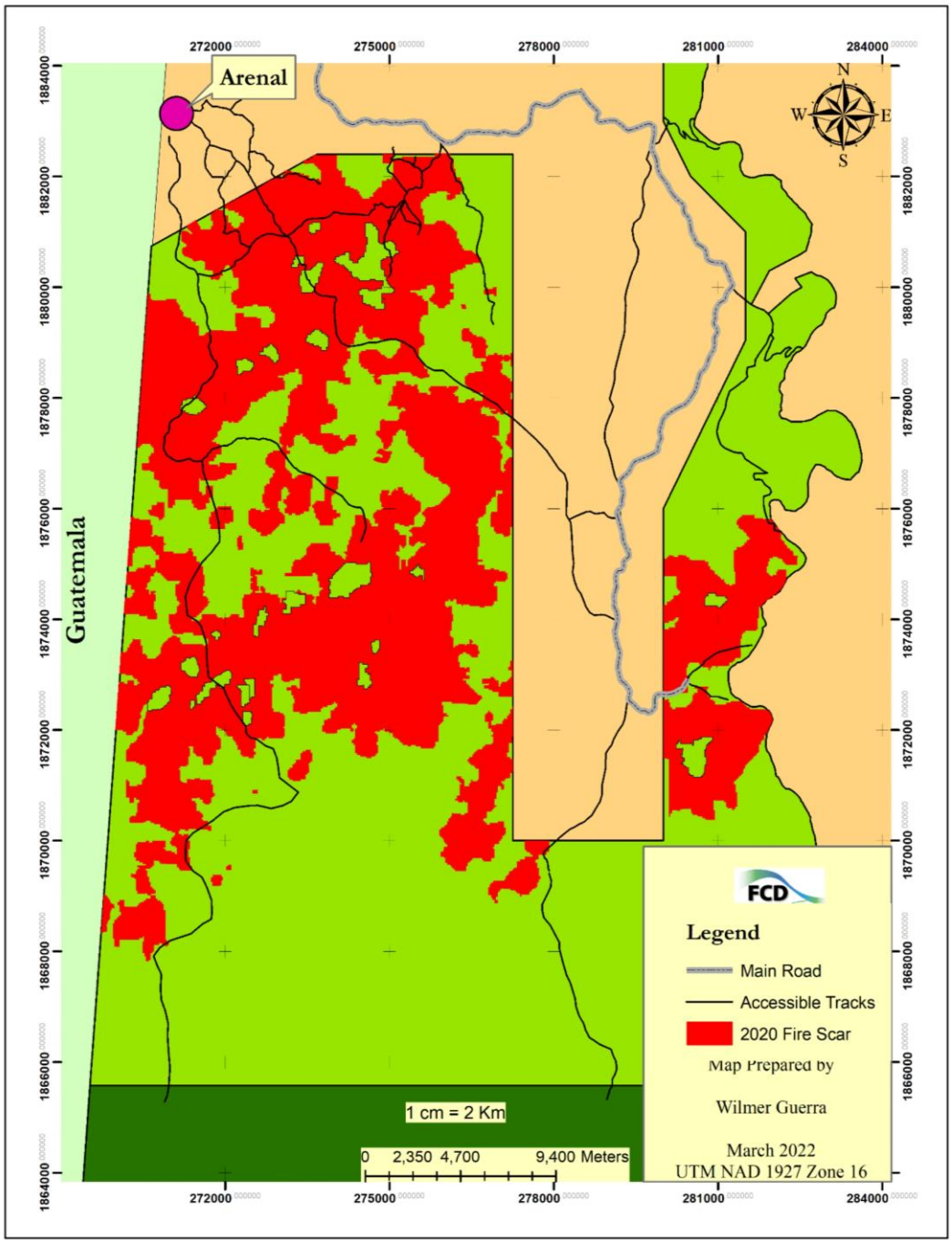
Guerra, W. (2022). A Comprehensive Report of Human Activities and Monitoring Interventions in The Vaca Forest Reserve. Friends for Conservation and Development. Internal document.

Meerman, J. C. & Boomsma T. (2017). Vaca Forest Reserve Management Plan. Belize Forest Department.

Mendez, E. (2023). A Stocktaking Report of Farmers in the Vaca Forest Reserve. Friends for Conservation and Development. Internal Report

9. Annexes:

9.1. Annex 1. Fire scar in the Vaca Forest Reserve in 2020; more than 34% of the reserve was affected by forest fires.



9.2. Annex 2. Scale used for the ranking of the severity of climate impacts resulting from climate vulnerabilities. The consultation session was held in Spanish.

Rango	Descripción	Definición
10	Peligrosamente alto	Impacto peligrosamente alto, con efectos catastróficos que ponen en riesgo la existencia misma de la comunidad.
9	Extremadamente alta	Impacto extremadamente alto, con efectos adversos críticos y extendidos que amenazan seriamente la viabilidad de la comunidad.
8	Muy alta	Impacto muy alto, con efectos adversos severos que afectan gravemente la comunidad
7	Alta	Impacto alto, con efectos adversos importantes y extendidos que afectan considerablemente la comunidad
6	Moderadamente alta	Impacto significativo, con efectos adversos claros y extendidos en la comunidad.
5	Moderada	Impacto claro y perceptible, con algunos efectos adversos en la comunidad.
4	Moderadamente Baja	Impacto moderado, con efectos mínimos en la comunidad.
3	Baja	Impacto leve, perceptible pero no preocupante.
2	Muy baja	Impacto muy leve, apenas perceptible.
1	Sin severidad	No hay impacto perceptible.

9.3. Annex 3: Scale used for the prioritization of interventions. The consultation session was held in Spanish.

Rango	Descripción	Definición
4	Crítica Prioridad	Su falta de implementación puede resultar en consecuencias **graves o catastróficas**.
3	Alta Prioridad	La falta de implementación puede llevar a una **disminución notable en la calidad de vida** y la seguridad de los medios de subsistencia.
2	Moderada Prioridad	Su implementación **puede esperar un tiempo limitado** pero debe ser planificada a mediano plazo.
1	Baja Prioridad	No **requieren recursos inmediatos** y pueden ser implementadas de manera gradual.

9.4. Annex 4: Scale used for the estimation of costs of interventions. The consultation session was held in Spanish.

Rango	Descripción
6	Mas de 25 mil $
5	Entre 15 a 25 mil $
4	Entre 10 mil 15 mil $
3	Entre 5 a 10 mil $
2	Entre mil $ a 5 mil $
1	Mil $ o menos

9.5. Annex 5: Evidence of Prior and Informed Consent (PIC): consultation minutes and validation minutes.

I. Consultation:

Resilient and Biodiverse Landscapes of Northern Mesoamerica.

Workshop/Meeting: Planning Session

Virtual (indicate platform) / Face-to-face:	**Face to face**
Link/Location:	**Melvin Luna Farm, Camp 6 area**
Landscape:	**Selva Maya Belize: Central Corridor Cluster**
Date:	**31.07.2024**
Starting time: 9:00 a.m.	**End Time: 3:15 p.m.**
Component: 1	**Activity: 2.1 Climate Smart Community Development Plan**

DISCLAIMER: MEETING WAS CONDUCTED IN SPANISH

Summary of the meeting:

The meeting started with a welcome from FCD's Executive Director, Rafael Manzanero, who outlined the importance of the VFR as a buffer to the CNP. This was followed by an introduction round of all participants.

Esther Sanches Sho introduced the BLF project as a regional initiative which is also being implemented in Guatemala, Honduras and El Salvador. The project seeks to protect and restore biodiversity, reduce poverty, and reduce the impact of climate change. Esther highlighted the role of FCD in the Vaca Area as supported by the Belize Forest Department. Under this mandate the objective of the workshop is to develop a community development plan this will guide investments under the BLF project, as well as future fundraising efforts to support the development of the community and protection of biodiversity.

Salvador reiterated the objective of the workshop which was "to develop a climate smart community development plan" for the Vaca Community. The expected results were 1.) to enlist the climate change vulnerabilities of the Vaca Community, as well as their associated impacts 2.) prioritization of climate change impacts and identify adaptation mechanisms for these impacts.

Salvador continued the session by asking the participants whether they knew what climate change was? A presentation about climate change then started. Salvador

explained that the alteration of energy balance in the atmosphere is what is influencing climate change; the atmosphere is retaining the heat instead of radiating it back to space. A distinction between weather and climate change was made. Salvador then explained how the greenhouse effect naturally keeps the earth warm, but the alteration of carbon dioxide from industrial activities, forest fires…contributes to an augmented greenhouse effect. The additional heat then disrupts the earth's spheres resulting in flooding, prolonged droughts, forest fires, loss of biodiversity, high temperatures, intense hurricanes, and changes in rainy and dry season patterns.

Participants then engaged in a discussion session where they identified the climate change vulnerabilities are currently affecting them, as well as the impacts they are currently experiencing. Participants identified droughts, intense rains, flooding events, heat waves, hurricanes, forest fires, and strong winds as the primary climate change vulnerability. Although participants identified several impacts, these were categorized into 3 sectors: livelihood, natural resources, and people (community).

The Instructions on approach to the workshop were outlined by Salvador. 3 groups would be created, each responsible for one sector i.e. livelihood, natural resources, and people (community). Each group will identify the impacts of climate change vulnerabilities on the sector they are working on. The severity of the impacts is to be rated between 1 to 10 (1 no severity and 10 dangerously high). The frequency they have experienced the impact over the last 20 years will be noted, as well as the number of days the climate event lasts during the year. Each group will also identify the % of community that is affected by the climate event.

3 groups were created, each consisting of about 8 participants. Dr. Boris Arevalo was assigned to assist with the facilitation of discussions of climate change impacts on the natural resources, Yahaira Urbina on people (community), and Eduardito Mendez on livelihoods.

Each group engaged in discussions until lunch.

After lunch each group presented the outcomes of the discussion sessions.

People:

Drought	Scarcity of water for drinking and household use
Intense rains	Difficulty planning planting season and loss of crops
Flooding	Impacts on roads, loss of crops, health: mosquito outbreak
Heat waves	Health impacts, reduced hours of work
Hurricanes	Psychological impact: worry, fewer school days for children
Forest fires	Negative emotional impacts, smoke impacts health, loss of property/home
Strong winds	Contamination from smoke

Livelihood

Drought	Low crop yields, crop failure and loss, pressure to sell cattle
Intense rains	Loss of crops
Flooding	Loss of crops
Heat waves	Low crop and cattle yield, reduced hours of work
Hurricanes	Crop and infrastructure loss
Forest fires	Loss of pasture, increased cost of living, loss of nectar sources, loss of infrastructure, reallocation of water resources.
Strong winds	N/A

Natural resources

Drought	Loss of forest cover, faster evaporation of soil and surface water, low fruit yields, increase pest and disease on plants and animals, water scarcity.
Intense rains	Loss of animals and trees, soil erosion and landslides, pests and disease in animals and plants.
Forest fires	Deforestation, displacement and loss of wild animals, increased human-wildlife conflicts, faster evapotranspiration.

After presentations Salvador detailed the methodology for the following half of the workshop. Each group should prioritize the identified impacts from 1 to 4: 1 being low priority, and 4 of critical priority. After prioritization, participants are to identify and discuss possible interventions to mitigate the impact, as well as its cost and the urgency of adopting the intervention (from 1 to 4). Lastly, each group should identify what the community can give as a counterpart, as well as other partners/organizations who might be able to assist in the implementation/funding of interventions.

Groups presented after an hour and a half of discussions.

Summary of interventions:

- Improved agricultural practices: soil moisture management, sowing of drought resistant varieties, improved tropical covered structure, agroforestry systems, crop diversification, cover crops, live tree fences/barriers.
- Fire prevention and management: outreach to local farmers and community, life fence barriers, community training on agricultural burns, communication mechanism between farmers and authorities, community fire management plans, community fire brigades.
- Improved livestock management: fodder storage, live fences/barriers, silvopastoral systems.
- Water management: increasing rainwater harvesting capacity, efficient irrigation systems, community wells, community water system.
- Reforestation and restoration in areas around bodies of water, and riparian zones.

- Multipurpose building that can serve as a school, clinic and hurricane shelter.
- Diversified income: apiculture, agrotourism, agroforestry systems with cacao, coffee, breadnut as man products.
- Change in working hours
- Technical support in agriculture and livestock, disaster preparedness and health outreach

Time was not enough to discuss infrastructure and services, seen as priority by the community.

Esther concluded the session by reiterating that the input will be put in a formal document and in technical terms and brought back to the community for validation. The validation date will be announced by FCD's Extension Technician. The expected outcome is a community development plan that will guide the investment of the BLF. Although the project is unable to fund all interventions, the document is an instrument that the community can use to lobby for government action, and FCD to future funding opportunities.

The session ended around 3:15 p.m.

Working Agreements:

- The input of the community will be transcribed, put in more technical terms and brought back for a validation session.
- The extension technician will send validation invitations to community members and stakeholders.

Follow-up Actions:

- A validation session to be held in 3 weeks. FCD staff will deliver invitations 1 week in advance.

Annexes:

1. Agenda.

Resilient and Biodiverse Landscapes of Northern Mesoamerica.

Workshop/Meeting: Workshop

Virtual (indicate platform) / In-person:	**In person**
Link/Location:	**Melvin Luna Farm: Camp 6 Junction (Vaca Area)**
Date:	**July 31, 2024**
Starting time: 9:00 a.m.	**End Time: 3:00 pm**
Component: 1	**Activity: 2.1**

OBJECTIVES: Develop a Climate Smart Adaptation Plan for the Vaca Forest Reserve area

EXPECTED RESULTS:

1. **List of community climate change vulnerabilities and their associated impacts on the Vaca Forest Reserve area.**
2. **Priority ranking of climate change impacts and adaptation measures by community in the Vaca Forest Reserve area.**

AGENDA

Hour	Activity	Responsible
9:00 – 9:05	Welcome	Rafael Manzanero
9:05 – 9:20	Introduction of participants	Salvador Mesh
9:20 – 9:30	Presentation: The BLF Project	Esther Sanchez Sho
9:30 – 9:35	Overview of the session and expected outcomes	Salvador Mesh
9:35 – 9:50	Climate Change: Regional and local perspectives Climate change vulnerabilities	Salvador Mesh
9:50 – 10:15	Discussion Session: Identifying Climate Change vulnerabilities and sectors affected	Led by Salvador Mesh
10:15 – 10:30	Workshop methodology	Salvador Mesh
10:30 – 10:45	BREAK	
10:45 – 11:30	Group session 1: Identifying impacts of climate change on People, Livelihoods, and Natural Resources (severity, frequency, population affected)	Group discussion led by moderators
11:30 – 12:00	Group presentations and validation of impacts of climate change on people, livelihoods, and natural resources (severity, frequency, population affected)	Participants
12:00 – 13:00	LUNCH	
13:00 – 13:40	Group session 2: Prioritizing impacts of climate change on People, Livelihoods, and Natural Resources; identifying adaptation measured, prioritizing them; estimating the costs of adaptation actions/interventions and community contribution	Group discussion led by moderators
13:40 – 14:10	Group presentations and validation of adaptation measures, priority adaptation measures, cost and community contributions	Participants
14:10 – 14:30	Group Session 3: Identification and prioritization of services needed; infrastructure; and livelihoods	Group discussion led by moderators

	community wishes to receive/develop in response to climate change,	
14:30 – 14:50	Group presentation and validation of services needed; infrastructure; and livelihoods	Participants
14:50 – 15:00	Closing Remarks	Esther Sanchez Sho

Time being available

2. Image of participants on virtual platform or photographs.

II. Validation:

Resilient and Biodiverse Landscapes of Northern Mesoamerica.

Workshop/~~Meeting~~: Validation Session for interventions in the Climate-Smart Community Development Plan: Vaca Community

Virtual (indicate platform) / Face-to-face:	In person
Link/Location:	**Melvin Luna Farm: Camp 6 junction**
Landscape:	**Selva Maya Belize: Central Corridor Cluster**
Date:	**22nd August, 2024**
Starting time: 9:00	**End Time: 11:30**
Component: 1	**Activity: 2.1**

Summary of the meeting:

DISCLAIMER: MEETING WAS CONDUCTED IN SPANISH

Esther Sanchez Sho welcomed the participants to the session. Esther acknowledged the participation of Mr. Wilfredo Zetina from the Belize Forest Department.

Salvador outlined the objective of the session: 1.) to validate climate change vulnerabilities and climate change impacts experienced by the Vaca Community, and 2.) to validate identified and prioritized interventions to adapt to climate change impacts.

Salvador summarized the methodology and results of the first consultation session to the Forest Department OIC and other stakeholders who were not part of the first session. Salvador presented the climate change vulnerabilities and proposed that they be regrouped. After some discussion, the community agreed on categorizing the 7 identified climate change vulnerabilities into 3 main vulnerabilities 1.) change in weather patterns 2.) forest fires and 3) strong winds, in order of priority. Changes in weather patterns include drought, intense rain, flooding, heat waves, and hurricanes.

With the assistance of printed documents, participants began the validation process. Each document was separated into the 3 sectors (livelihood, people (community), and natural resources) and had the reworded climate change interventions, as well as additional revisions and suggestions.

Livelihood.

Drought: Crop loss and low crop yield originally identified separately were lumped into one category “low crop yields and loss of crops”. All interventions related to agriculture and crop management were categorized under “improved agricultural practices”. All interventions related to livestock (such as live fences, protein banks, pasture

management…) were categorized under "Improved livestock management". All interventions associated with harvesting rainwater, improving water use, or water retention were categorized under "water management". The community did not identify an intervention for high costs of living, alternative livelihood as a mitigation measure was suggested. The community identified agroforestry and diversified cropping approaches as an intervention to counteract the high costs of living.

Forest fires: to address the impacts of forest fires, the community had identified reforestation and restoration, however, they did not identify priority areas. Riparian areas and areas surrounding water bodies were identified as priority areas for restoration and reforestation. For the same intervention, collection of seeds was identified as an additional community counterpart. All forest fire suppression and prevention interventions were grouped into "fire prevention and management plan".

Flooding: all identified interventions were categorized under improved agricultural practices.

Hurricanes: all identified interventions were categorized under disaster preparedness plans.

Heat waves: all interventions were categorized under "improved livestock management" and "improved agricultural practices". The agriculture department acknowledged that tropical covered structures are no longer effective due to high temperatures and suggested for "improved tropical covered structure design" instead of the regular "bubble house" design. The Belize Livestock Producers Association was identified as stakeholder who can help to improve livestock management.

Natural resources

Forest fires: although many interventions were enlisted during the first consultation 3 major categories were identified: restoration and reforestation, fire prevention and management plan, and improved agricultural practices.

Drought: all interventions for this vulnerability were categorized under "restoration and reforestation" and "water management". Participants identified improved agricultural practices and farm management as another intervention that can help combat pests and diseases brought by drought spells. During the consultation, no community counterpart or additional partners were identified. Labor, collection of seeds for reforestation/restoration, and land for implementation were identified as community counterpart. The Ministry of Infrastructure, Development & Housing, Belize Forest Department, FCD, Belize Botanic Gardens and Department of Agriculture were identified as partners who can help in the implementation of interventions.

Change in weather patterns (intense rains): all interventions (improved drainage, cover crops, live fences...) were categorized under improved agricultural and farm practices.

People (community)

Drought:

- Water use was categorized into potable and non-potable water to encompass water used for hygiene, cooking, and other purposes.
- The severity of lower physical endurance due to heat was raised from a level of 2 to 4.

Forest fires:

- Interventions were all categorized under “fire prevention and management plan”.
- An additional intervention was identified: Fire management and prevention outreach

Hurricane:

- During the consultation a community health center was identified as an intervention to mitigate negative climate change impacts, this was redefined to be a multipurpose building which can serve as a school, health center, community center and hurricane shelter.

Flooding: although economic losses were identified as an impact of flooding to people, no intervention was identified. During the discussion, alternative livelihoods were identified to be the most viable intervention. This includes diversified and integrated farming, and agroforestry systems (coffee, cacao, breadnut...). Participation in training, labor, and land for intervention were identified as the community counterpart. The Ministry of Agriculture, FCD, and the Belize Botanic Gardens were identified as partners who can assist with the implementation of interventions.

Heat waves/high temperatures: while physical health due to high temperatures were identified as an impact, no interventions were identified during the first consultation. Mobile clinics from the Ministry of health and the multipurpose building were identified as feasible interventions to mitigate the risks of high temperatures.

Strong winds: the main impact of strong winds was identified to be the transportation of smoke during the dry season. Community outreach on fire management and prevention was added to the already validated fire prevention planning.

At the conclusion of the validation session, Salvador reiterated that the validated vulnerabilities and interventions will guide the formulation of the climate smart community development plan for the Vaca. This plan will guide BLF investments in Vaca, and future fundraising.

After the validation, Salvador engaged the group in identifying services, infrastructure and alternative livelihoods that the community sees as priority in the context of climate change.

Services:

1. Farmers evidenced that shortage of water is the most severe climate change impact in the community. The community therefore aspires to create a potable water system to supply households and farms with much needed water.
2. Secondly, due to the distance from the closest hospital, a health center with continuous medical services is also seen as a priority for their wellbeing.
3. Thirdly, the community aspires to solar electricity for each household.
4. Lastly, the community members discussed that they feel isolated, especially during the fire season and other natural disasters, so a connection to telecommunication services will help address this challenge

Infrastructure:

1. Water system: A functional community water system was identified as a priority to adapt to climate change impacts.
2. Road upgrade: farmers described the road conditions as terrible and an absolute necessity to transport crops and other agricultural products to and from the community. The road is also a necessity for the daily commute of children to school in the nearby community.
3. Multipurpose building: because the Vaca is not a designated community, no community infrastructure exists. A multipurpose building to serve as a community center, health clinic, hurricane shelter is also a priority for the community.
4. school: a functioning school is also a primary necessity for the community since to date about 40 students commute daily to Benque Viejo Town to access education.

Livelihoods: alternative livelihoods are becoming an increasingly important necessity in the face of crop failures and low yields.

1. Agropocessing. This livelihood was suggested to address the issue of surplus products during the rainy season. Surplus products often go to waste. Making a value-added product from vegetables, fruits, and other products will diversify income, reducing the risks of relying on one single cash crop or harvest.
2. Agrotourism: tourism at farms has been increasing in the vaca area. Some farmers have hosted groups at their farms. These are not only incentives for farmers to adopt sustainable practices but also offer alternative sources of income not related to crop yield and sales.
3. Apiculture: The production of honey in the Vaca community has been affected by forest fires over the past years. Some farmers expressed their interest in restarting honey production, although they recognized that there is an urgency to address forest fires before venturing into apiculture.
4. Agroforestry: diversified agroforestry plots with cacao, coffee and other non-timber forest products can diversify farmer income and create food security.

After the discussion, Salvador opened the floor for additional comments of questions

Jessi from the Agriculture Department told farmers about the small farmer grant programme available to farmers countrywide. The grant seeks to fund climate smart approaches where farmers are expected to fund 40% of the investment, and the grant programme 60%. Farmers can apply for the grant at the agriculture department branch in central farm.

Esther concluded the meeting by thanking farmers for their time and assured that the workshops will contribute to the development of the climate smart community development plan which will guide current BLF investments, and future investments from FCD.

The session ended at 11:30.

Working Agreements:

- Validated climate change vulnerabilities and interventions, and priority infrastructure, services and alternative livelihoods will be included in the final climate smart community development plan,

Follow-up Actions:

- Copies of the Development Plan will be distributed to community members and stakeholders.

Annexes:

3. Agenda.

Resilient and Biodiverse Landscapes of Northern Mesoamerica.

Workshop/Meeting: Workshop

Virtual (indicate platform) / In-person:	**En Persona**
Lugar:	**Rancho de Melvin Luna: Camp 6 Junction**
Fecha:	**Agosto 22, 2024**
Inicio: 9:00	**Finalizando: 11:30**
Component: 1	**Activity: 2.1**

Objetivo: Desarrollar un Plan de Adaptación Climáticamente Inteligente para el área de la Reserva Forestal de Vaca

RESULTADO:

1. **Validación de las vulnerabilidades e impactos del cambio climático hacia la comunidad de Vaca.**
2. **Validación de las intervenciones y la prioridad de las intervenciones.**

AGENDA

Tiempo	Actividad	Persona responsable
9:00 – 9:05	Bienvenida	Esther Sanchez Sho
9:05 – 9:10	Los objetivos de la sesión	Salvador Mesh
9:10 – 9: 15	Validación y priorización de las vulnerabilidades	Discusión con participantes
9:15 – 9:40	Validación de los Impactos	Discusión con participantes
9:40 – 11:00	Validación de las intervenciones y las prioridades	Discusión con participantes
11:00-11:30	Identificación y priorización de servicios necesarios; infraestructura; y medios de vida que la comunidad desea recibir/desarrollar en respuesta al cambio climático	Discusión con participantes
11:30	Palabras de clausura	Esther Sanchez Sho
	Almuerzo	

4. Image of participants on virtual platform or photographs.

9.6. Annex 6: Workshop Photos

Community consultation session (July 31, 2024)

Community validation session (August 22, 2024)