

Climate-smart Community Development Plan Mahogany Heights, Maya Forest Corridor, Belize *May 2024*



**Council and Community Leaders of Mahogany Heights, Belize
District, Belize**

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Technical Data:

Community	Mahogany Heights
Protected Area (if relevant)	Maya Forest Corridor (MFC)
Area of Influence (ha)	13200 ha
Habitat	Broadleaved tropical moist forest
Inhabitants	1086
Families	288
Ethnicity	Creole, Garifuna and Mestizo
Tenure	State land
Date of Plan Development	May 5-19, 2024
Date of Updated Plan	-
Evidence of FPIC¹	Community Minutes August 3, 2024
Leading Impacts of Climate Change	1. Droughts 2. Wildland Fires 3. Heat Waves 4. Extreme Rains 5. Flooding 6. Hurricane
Priority Actions required for Community Adaptation to Climate Change	1. Portable firefighting water pump 2. Install tanks at the school
Participating Organizations	Mahogany Heights Village Council; Wildlife Conservation Society (WCS) Belize program; Belize Zoo; University of Belize Environmental Research Institute (UB-ERI)

¹ FPIC: Previous and Informed Consent

1. Summary

This climate-smart community development plan was developed through 2 participatory workshops held on May 5th and 19th, 2024, with 15 community leaders of the Mahogany Heights community, which buffers the Maya Forest Corridor in the Belize District, Belize. This document represents the community's priorities for actions and investments needed to help them adapt to the impacts of climate change (CC). The summary of local priorities aims to propel the community's sustainable development by enhancing social resilience and promoting the sustainable use of natural resources, helping to create conditions increasing community resilience to climate change and for more effective biodiversity conservation.

2. Goal

2.1. General objective

Consult community leaders 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.

2.2. 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. Methodology²

Detailed in the table is a descriptive summary of the methodology which specifies the steps used to generate the Climate-Smart Community Development Plan.

Table 1. Steps of Climate-Smart Community Development Plan.

Step	Description
1. Preparation	Identified relevant literature on CC and local impacts; Coordinated workshop and logistical aspects with community representatives ensuring equitable representation (gender, youth, and ethnicity); Prepared/reviewed workshop agenda, and agreed on roles and responsibilities with presenters and facilitators.
2. Workshop Introduction	Presented participants, genesis of the BLF Mesoamerica project, and the objectives of the Climate-Smart Development Plan.
3. Workshop Evidence of CC	Introduced the impacts caused by CC at the local/regional level according to data, literature, or previous studies.
4. Workshop Impacts of CC	Presented the impacts of CC in the area; and ratification and/or modification of the main impacts by community participants. Ratification and prioritization of the main impacts in plenary.
5. Workshop Groups 1	Work in groups to evaluate the main effects of CC on 1. People; 2. Livelihoods; and 3. Natural Resources (of importance to the community). Presentation of each group's results in a plenary, followed by quick classification by the facilitators of the common elements between groups.
6. Workshop Prioritization	Analysis and discussion of the results of the groups in plenary, identifying the most important impacts/effects on People, Livelihoods, and Natural Resources.
7. Workshop Groups 2	In groups, the adaptations required to reduce the effects of CC on People, Livelihoods and Natural Resources were defined and prioritized. An estimated cost range was utilized to identify the cost of the adaptations/actions/interventions. If able, workshop facilitators can undertake a quick classification of common elements between groups to share in the plenary.
8. Workshop Validation & Prioritization	Analysis and discussion in plenary to seek ratification of priority adaptations or investments identified by the groups, and to generate a “final list” of priority investments.
9. Workshop Groups 3	If feasible due to time constraints, conduct a third group exercise to identify community priorities regarding: 1. Services needed; 2. Infrastructure; and 3. Livelihoods that the community wishes to develop in view of the impacts of CC, prioritizing within each of the three categories.

² Please see the document “*Methodological Guide for the Generation of Climate Smart Community Development Plans*” (Alvarado et al, 2024) for additional details regarding the methodology.

10. Workshop – Next Steps	Detail next steps and a time frame for each, including: 1. Generation of the final document or “Plan” for presentation to the community; 2. Technical/legal and risk analysis of prioritized investments carried out with community representatives; 3. Presentation of the results of the workshop in a community assembly/meeting to ratify/adjust the results and ensure consensus and free and previously informed consultation, leaving a record of this through “minutes” or other written evidence.
11. Action & Implementation	Initiation of agreed actions including the management of the resources necessary to implement the plan. Implementation of agreed investments or interventions, according to the availability of resources.
12. Monitoring & Adaptation	Monitor the implementation of the “Plan” including the effectiveness of the actions/investments and adjust the plan periodically (every 2 years) according to lessons learned and progress in its implementation.

4. Introduction: Social, Geographic, and Environmental Context

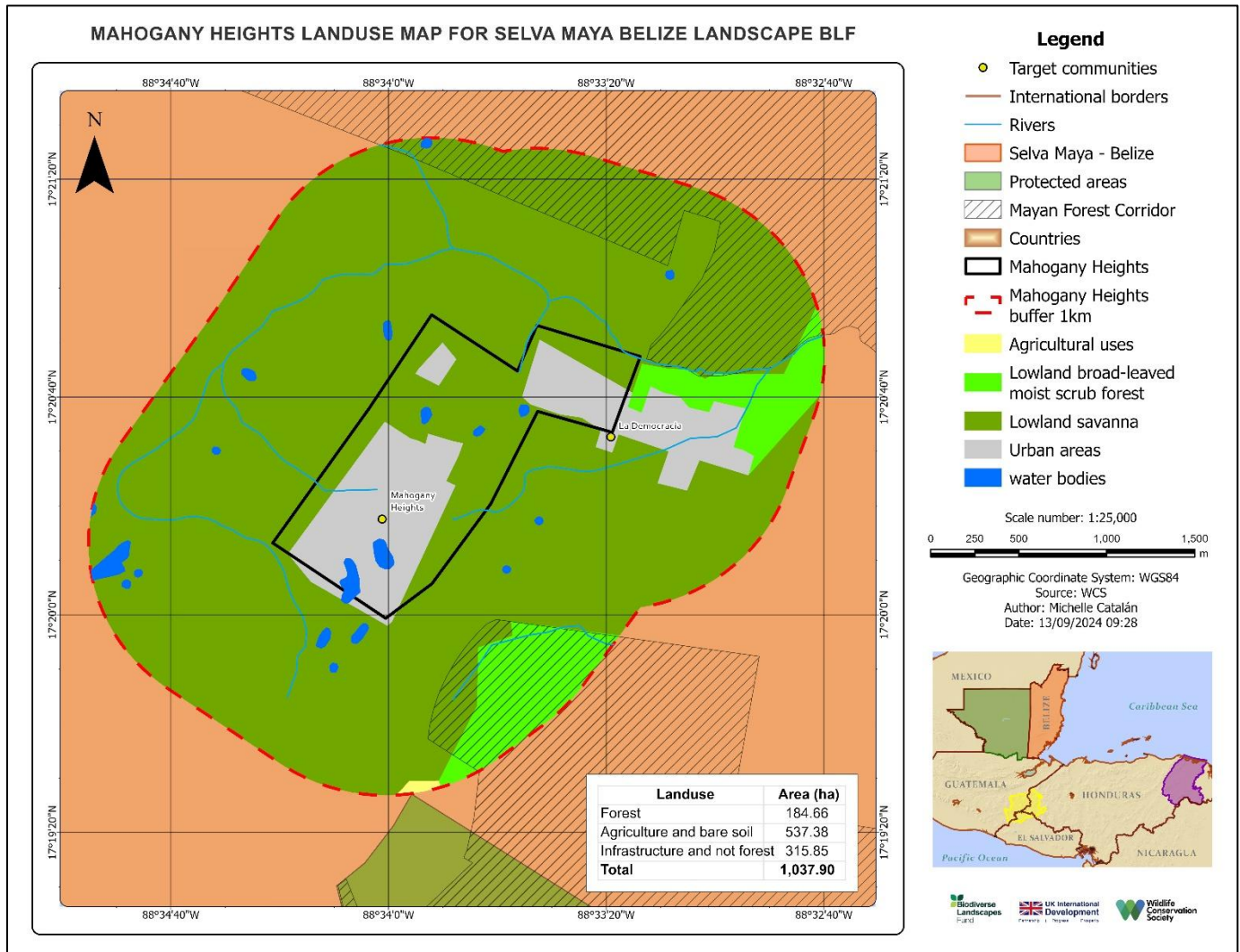
Mahogany Heights is located in the Belize District, central-east Belize (Figure 1). It was established in 2002 as a planned community and community boundaries are a part of the Maya Forest Corridor (MFC Scoping Exercise, UB ERI, and WCS, 2020). Alongside MFC managers, government, NGOs, and the private sector, it was one of the 21 communities that assisted in developing the first conservation action plan for the Maya Forest Corridor.

The village comprises around 288 households with a population of 1069, of which 70% are children (aged between 0 and 12). Ethnically, the community is diverse, with the primary ethnicities being Creole (61%), Garifuna (23%), Mestizo/Hispanic (12%), and Other (1%) (MFC Buffer Community Socio-economic Assessment, 2024). More than half of the heads of households have Primary (33%) or Secondary (28%) level education, and 33% of the population have no formal education. The recent Socio-economic Assessment (2024) reports that 40% of households own their land parcels while 60% only have leased lands from the Government of Belize. While most community members commute to Belize City or other areas for employment, only a few are engaged in agricultural activities. Most households utilize butane as the primary cooking fuel and have access to water from Belize Water Services (MFC Buffer Community Socio-economic Assessment, 2024).

Pine Savanah, a fire prone habitat, surrounds Mahogany Heights and subsequently wildland fires are an annual threat to the community. The smoke produced affects human health and property at risk of damage due to flames. To address this, the community has received Fire Management Trainings through the WCS, Belize Zoo, and US Forest Service. Additionally, land tenure is uncertain, but the community is in dialogue with the

Government of Belize, through the Lands Department, for members to obtain property titles.

Figure 1. Mahogany Heights, Belize District, Belize



5. Major Impacts of Climate Change on People

The results of the community consultations provided insights into the community's climate vulnerabilities. The results of the consultations show how the community ranked the main climate change vulnerabilities affecting people as follows: 1st. Forest Fires; 2nd. Droughts; 3rd. Extreme Rains; 4th. Heat Waves; 5th Flooding; and 6th. Hurricanes.

Forest fires and droughts, the top two climate vulnerabilities, have a severe impact on the Mahogany Heights population. These vulnerabilities directly affect human health, leading to a decrease in workforce productivity and a subsequent reduction in family income. The combination of droughts and heat waves has resulted in water scarcity due to the increased use of water, affecting the health of the entire population over the past two decades.

Forest fires and droughts significantly affect community members' mental health in addition to their environmental impact, highlighting the urgency of a collective effort to address these climate vulnerabilities.

Below is a summary of the climate change vulnerabilities and impacts on the wellbeing of the Mahogany Heights population, associated with the severity of the impact and the percentage of the affected population (Table 2).

Table 2. The impact on the well-being of the Mahogany Heights Community population resulting from the identified climate change vulnerabilities.

Vulnerability ³	Impact Requiring Mitigation	Severity (1-10) ⁴	Frequency ⁵		% Population Affected
			Years	Days	
Forest Fires	Increase in health issues such as allergies,	10	5	122	100

³ Vulnerability: Potential categories include Droughts, Flood, Forest Fires, Heat Waves, Extremes Rains, Flooding and Hurricanes

⁴ Severity (Scale of 1 to 10): 1 = minimal impact, human activities still proceed normally, but notice the change; 5= moderate impact, some humans are noticeably impacted/impeded; 10 = human beings are strongly disabled/affected.

⁵ Frequency: For "years" if classified as 1/20 = the vulnerability manifests itself once every 20 years according to recent community perception; if classified as 20/20 = manifests itself every year for the last 20 years, according to community perception, etc. For "days", list the average number of days that this vulnerability impacts people each year, i.e., 2 = two days per year, and 365 = every day of the year.

Vulnerability ³	Impact Requiring Mitigation	Severity (1-10) ⁴	Frequency ⁵		% Population Affected
			Years	Days	
	infections, respiratory complications and water-borne illness				
	Affects the mental health of the community members (agitation and worry)	9	20	90	40
	Reduces the resting hours (underlying conditions)	10	10	50	100
Droughts	Lack of water Supply	8	20	60	100
	Dried up plants/Flowers	5	20	90	40-50
	Increase in health issues such as allergies, infections, respiratory complications and water-borne illness	8	20	42	60
Extreme Rains	Increase in health issues related to water-borne illness	7	20	90	60
	Affect the implementation of domestic activities	5	20	14	60
Flooding	Family Displacement	3	20	14	10
	Property damage around the communities	3	20	14	5
	Limited transportation therefore unable to attend school and go to work	3	20	14	5
	Increase in health issues such as allergies, infections, respiratory complications and water-borne illness	3	20	30	100
	Reduces productivity of people's daily activities	3	20	14	5
Hurricane	Increase in health issues such as allergies, infections, respiratory	5	3	183	100

Vulnerability ³	Impact Requiring Mitigation	Severity (1-10) ⁴	Frequency ⁵		% Population Affected
			Years	Days	
	complications and water-borne illness				
	Reduce recreational activities	5	3	30	70
	Reduce water supply and availability	9	3	14	100
	Affects the mental health of the community members (agitation and worry)	5	3	183	100
	Family Displacement	3	3	14	10

6. Major Impacts of Climate Change on Livelihoods

In reference to how climate change has an impact on the livelihoods of the Mahogany Heights population, the community identified the following vulnerabilities as priorities: 1st. Drought; 2nd. Forest Fires; 3rd. Heat Waves; 4th. Extreme Rains; 5th. Flooding; and 6th. Hurricane. It is of utmost importance that the community is fully prepared and equipped to address these potential threats, as they can significantly impact the community.

Drought, forest fires, and heat waves severely affect 30-100% of the residents. Community members are affected mainly in their productive activities and physical, emotional, and mental health, leading to household income loss and deterioration of human health. Furthermore, they are concerned about the increased probability for property damage or loss significantly increases during forest fires.

Below is a summary of the vulnerabilities and impacts on livelihoods that occurred in the community (Table 3), in terms of their severity and the percentage of the affected population.

Table 3. The impact on the livelihoods of the Mahogany Heights Community population resulting from the identified climate change vulnerabilities.

Vulnerability ⁶	Impact Requiring Mitigation	Severity (1-10) ⁷	Frequency ⁸		% Population Affected
			Years	Days	
Droughts	Plants and flowers are dried up	8	10	30	40
	Insufficient grass for farm animals	3	2	60	15
	Increase in economic loss due to rising cost of living	1	2	60	15
Forest Fires	Reduces food security	5	5	122	30
	Property damage around the communities	5	6	122	30
	Loss of income	8	20	120	30
	Reduces productivity of people's daily activities	9	20	120	90
Heat Wave	Increase cost of living (Increase prices for food and utilities)	5	5	48	100
	Increase use of utilities	9	20	240	80
	Loss of income	9	10	20	10
Extreme Rains	Limited transportation therefore unable to attend school and go to work	5	20	14	80
Flooding	Increase in economic loss due to rising cost of living	7	20	14	100
	Limited transportation therefore unable to attend school and go to work	3	20	14	5

⁶ Vulnerability: Potential categories include Droughts, Flood, Forest Fires, Heat Waves, Extremes Rains, Flooding and Hurricanes.

⁷ Severity (Scale of 1 to 10): 1 = minimal impact, livelihoods still proceed normally, but local people notice the change; 5= moderate impact, some livelihoods are noticeably impacted/impeded; 10 = livelihoods are strongly impeded/degraded.

⁸ Frequency: For "years" if classified as 1/20 = the vulnerability manifests itself once every 20 years according to recent community perception; if classified as 20/20 = manifests itself every year for the last 20 years, according to community perception, etc. For "days", list the average number of days that this vulnerability impacts people each year, i.e., 2 = two days per year, and 365 = every day of the year.

Vulnerability ⁶	Impact Mitigation	Requiring	Severity (1-10) ⁷	Frequency ⁸		% Population Affected
				Years	Days	
Hurricanes	Property damage around the communities		7	3	60	100

7. Major Impacts of Climate Change on Natural Resource

The community prioritized the climate change vulnerabilities on natural resources as follows: 1st. Drought; 2nd. Forest Fires; 3rd. Heat Waves; 4th. Extreme Rains; 5th. Flooding; and 6th. Hurricanes.

Drought and forest fires, which severely affect 100% of the residents, directly affect the MFC's biodiversity. The simultaneous occurrence of these vulnerabilities have detrimental affects the community and the surrounding natural resources. Prolonged periods of drought increase the fuel load surrounding the community, increasing the risk of fires and when fire incidents occur, the intensity of the fires is severe. Intense and severe fires disrupt wildlife movement, increase biodiversity loss, and affect the water availability of 100% of the community population.

Below is a summary of the vulnerabilities and impacts on natural resources that occurred in the community (Table 4), in terms of their severity and the affected population's percentage.

Table 4. The impact on the natural resources surrounding the Mahogany Heights Community resulting from the identified climate change vulnerabilities.

Vulnerability ⁹	Impact Requiring Mitigation	Severity (1-10) ¹⁰	Frequency ¹¹		% Population Affected
			Years	Days	
Droughts	Increase in fire affecting wildlife and habitat	10	20	120	100
	Dead dried plants (increase in the fire fuel)	8	20	60	100
Forest Fires	Destruction of the forest	10	3	122	100
	Increase wildlife mortality	8	3	122	60
	Biodiversity loss	10	20	120	40
Heat Waves	Reduce food productivity (Trees)	3	5	6	30
	Increase water consumption	3	10	24	100
	Slow down plant reproduction	9	20	120	80
Extreme Rains	Increase the Mortality of plants	3	20	30	10
Flooding	Water Pollution	3	20	30	5
	Increase mortality of plants	3	20	30	10
Hurricanes	Restrict wildlife movement	3	3	90	10
	Loss of natural habitat	3	3	180	5

⁹ Vulnerability: Potential categories include Droughts, Flood, Forest Fires, Heat Waves, Extremes Rains, Flooding and Hurricanes

¹⁰ Severity (Scale of 1 to 10): 1 = minimal impact, local capture of natural resources continues, but local people notice the change; 5= moderate impact, local capture of natural resources is noticeably impacted/reduced; 10 = capture of natural resources is strongly impeded/degraded.

¹¹ Frequency: For “years” if classified as 1/20 = the vulnerability manifests itself once every 20 years according to recent community perception; if classified as 20/20 = manifests itself every year for the last 20 years, according to community perception, etc. For “days”, list the average number of days that this vulnerability impacts people each year, i.e., 2 = two days per year, and 365 = every day of the year.

8. Actions/Investments Required to Adapt

The community identified six main impacts that needed to be addressed. The most pressing concern for the community members of Mahogany Heights was the increase in health problems associated with climate change vulnerabilities. To address this, they proposed expanding the health center, ensuring medications are in stock, conducting public outreach on water sanitation, installing water filters, and implementing air quality monitoring along with an information-sharing strategy. Another priority impact was limited transportation, which affected people's ability to go to work, translating to reduce household income generation capacity. The community also highlighted the need for better coordination with the National Emergency Management Organization (NEMO) to prepare and better respond to the impacts of climate change.

Additionally, fires have led to the loss of natural resources in and around Mahogany Heights. Fire also has a crosscutting impact on people and their livelihoods. To tackle this, the community suggested equipping themselves with a portable firefighting trailer and personal protective equipment and ensuring critical areas have hydrants. Table 5 summarizes these proposed mitigation measures.

Table 5. Actions to mitigate climate change impacts.

Category	Impact Mitigation Requiring	Priority ¹²	Action/Intervention	Cost Range ¹³	Community Contribution
People	Increase in health issues such as allergies, infections, respiratory	1	Expanding the health centre and supplying it with the needed medication	5	Advocate for the resources
			Public outreach on water sanitation techniques	2	Participation in the activities

¹² Ranked 1 through 15.

¹³ Cost Range: An initial or "rough" estimate of how much each action or investment could require dollars, to later be evaluated in a technical-financial analysis. In this case the categories are: 1. <\$1000; 2. \$1001-\$5000; 3. \$5001-\$12000; 4. \$12001-\$20000; 5. >\$20000.



Category	Impact Mitigation Requiring	Priority ¹²	Action/Intervention	Cost Range ¹³	Community Contribution
	complications and water-borne illness		Installation of water filters	4	Maintenance
			Install an air quality monitoring device and develop an information sharing strategy	1	Public advisories and warnings
	Property Damage around communities	2	Education and or awareness campaign on fire management	2	Community Volunteers to help distribute outreach materials and inform residents
			Fire Alert Sign	2	Community Volunteers to change the flags of the sign
			Signage at the entrance of community about fire management	2	Billboard structure owed the village council will be available
			Open and maintain firebreaks around community	2	Labour
	Reduce water supply and availability	3	Install second water reservoir or upgrade the old system	5	Technical expertise, labour and procedural support in attaining permits
			Install water tanks at the school to ensure adequate supply to students and teachers	3	Labour and network for discounts
			Educational Awareness on water conservation	2	Community Volunteers to help distribute outreach material and inform residents
	Reduce Productivity of daily activities	4	Provide fans to the elderly and babies	2	Conduct a survey of vulnerable population



Category	Impact Mitigation	Requiring	Priority ¹²	Action/Intervention	Cost Range ¹³	Community Contribution
				Build shaded areas in public spaces	3	Labour
				Plant trees within the community	2	Labour and maintenance
				Install water fountain and restrooms	5	Labour, maintenance and cleaning
Livelihood	Limited transportation unable to attend work	5		Increase communication and coordination between NEMO and Community	2	Update, socialize and execute community emergency plan; community participation
				Increase public awareness on natural disasters and response	2	Community participation
Natural Resources	Augment biodiversity loss in area especially because of fires	1		Equip the community with a portable firefighting trailer and personal protective equipment	5	Advocate for resources; Maintenance of the equipment, security and accountability
				Installation of community water hydrants	4	Labour

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

As a result of the consultation process, the community members identified and listed priority sustainable development projects in the community. This session helped identify the connection between these services and the actions needed to adapt to climate change, resulting in the following:

9.1. Priority Services

1. Expanding Health Post- Increase access to medical supplies, presence of resident doctor and nurse
2. Establish an Emergency Response System to natural disasters and fires in the community
3. Solid waste (garbage) Collection System
4. Rapid Response Fire Team with all the protective guard and firefighting equipment
5. Afterschool programs or summer programs focusing on academic, vocational trade, and sports

9.2. Priority Infrastructure

1. Replacement of sewer system
2. Construction and equipping of a polyclinic
3. Proper road and drainage Network
4. Improve and expand the school infrastructure
5. Expansion of potable water system
6. Community vending stalls
7. Beautification of community

9.3. Priority Livelihoods

1. Vocational training (Sewing, barbering, cosmetology, plumbing etc.)
2. Identify clusters of teams in sewing and other activities to provide finances for members and the community.
3. Promote activities to build Ecotourism opportunities
4. Capacity building in agriculture, cooperative, backyard gardening, and entrepreneurship
5. Land tenure issue- limit development (Land documents)

10. References/Literature Cited

MARN/SEGEPLAN/Rainforest Alliance (2022). Plan de Adaptación al Cambio Climático, Departamento de Petén, Versión Resumida, 42 pp.

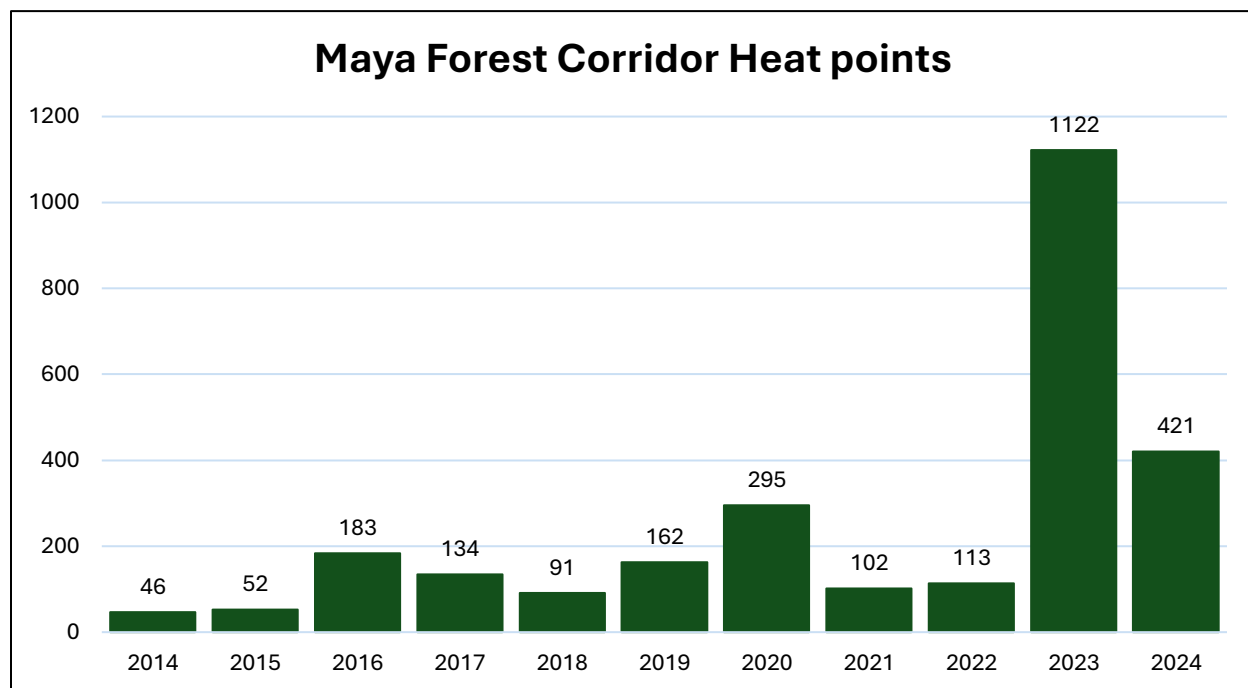
Maya Forest Corridor (MFC) Buffer Community Socio-economic Assessment, 2024

Maya Forest Corridor (MFC) Scoping Exercise, UB ERI, and WCS, 2020

11. Annexes

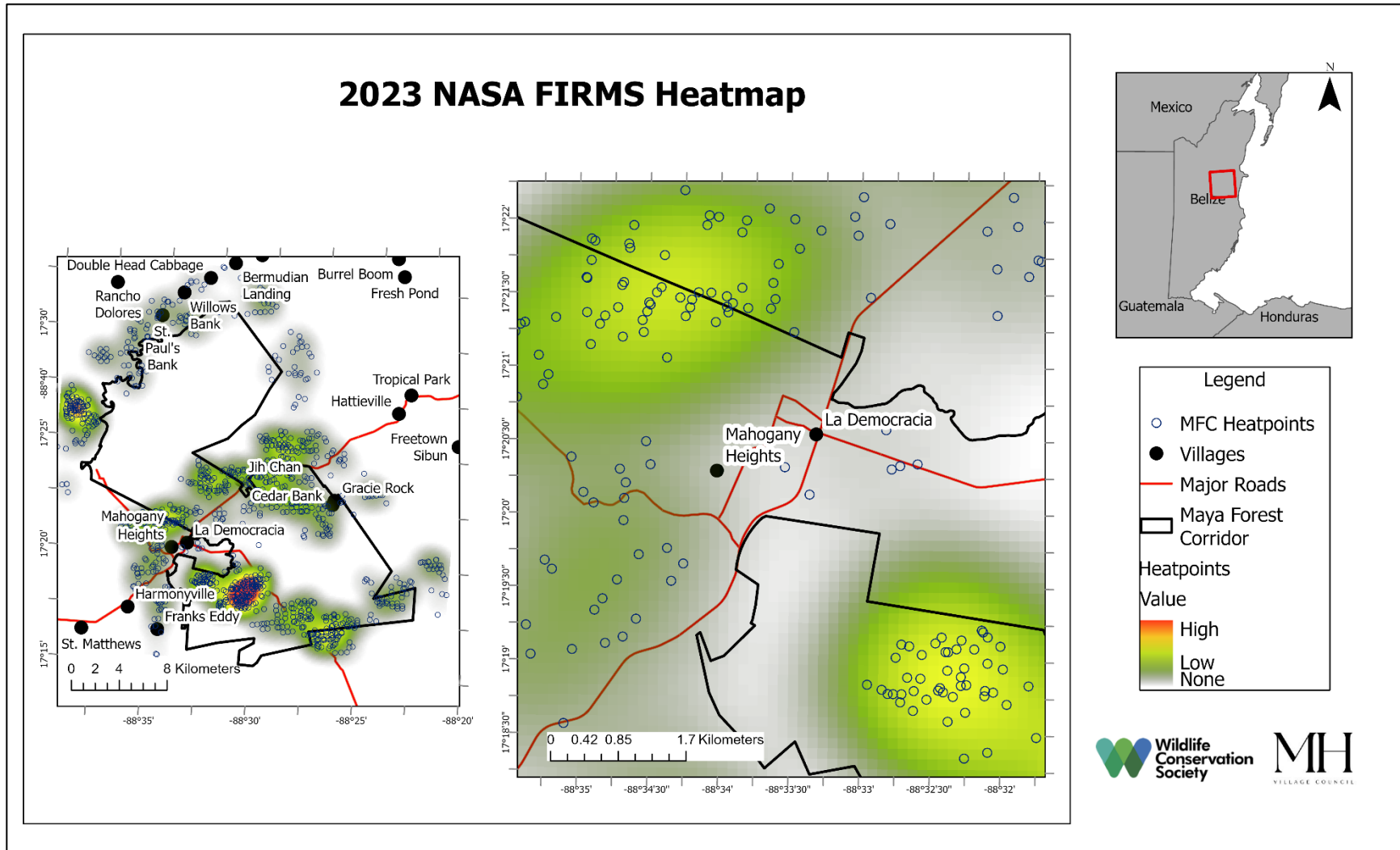
11.1. Annex 1. Fire Risk

NASA FIRMS heat points detected in the Maya Forest Corridor and buffering communities





Hotspot map of the NASA FIRMS heat point during the 2023



11.2. Annex 2. Workshop Photos

First Workshop May 5, 2024

