M&E protocol for the adaptation outcome

Disaster Risk Reduction

Overview

Natural disasters, especially cyclone and flooding events, have been a part of life for communities living Vit Levu's Tuva catchment. Driven by climate change, cyclones have become increasingly frequent and severe over the past decade, with Fiji at the receiving end of two category cyclones over the past 4 years alone. Heavy rainfalls associated with these cyclonic events have caused flooding events, creating infrastructure and crop damage, especially in areas where vegetation is degraded. To ensure that communities are adapted to natural hazards and to mitigate impacts, Conservation International Fiji is implementing nature-based solutions (NbS) such as restoration of degraded lands and riparian areas. This is a suggested protocol to track the contribution of NbS to disaster risk reduction that uses a standardized method developed by the Fiji National Disaster Management Office (NDMO) to assess the impact of natural disasters on infrastructure and crops. This protocol can be applied in other places, where information on the impacts of natural disasters on infrastructure and crops is available from other sources or can be collected through time.

Table 1. M&E table overview

Indicator definition/unit	Data collection methods	Data sources/origin	Policies alignment
Changes in damages to agriculture and infrastructure (% and value in local currency)	Observations/damage assessment	Fiji National Disaster Management Office (NDMO)	SDG 13.11.1 Fiji National Adaptation Plan

1. Case study: Fiji Islands (Tuva Catchment)

Located in the South Pacific Ocean, Fiji is an archipelago of roughly 330 islands (110 of which are permanently inhabited), with a population of approximately 900,000, 80% of which live on the two largest islands of Viti Levu and Vanua Levu. Climate change impacts are already affecting human well-being and natural resources in Fiji. Climate change impacts include rapid sea level rise that is eroding coastlines and altering groundwater supply and estuaries as well as increasingly intense tropical cyclones and associated flooding events that are destroying agriculture, damaging mangroves and forests, and causing severe inundation, erosion, landslide events, and freshwater pollution.

The Tuva Catchment is located on the highlands of the main island of Viti Levu, comprised of a highly degraded grassland system, especially in middle and upper catchments. Extreme climatic events, especially intense rainfall, coupled with cultivation on steep erodible soils in riparian zones, degraded hillsides, and poor logging practices over many decades, have massively increased the frequency of damaging flash floods during the wet season (November to April). To increase the resilience of local ecosystems and communities, especially reduced risk of flooding in vulnerable areas, the GEF project, a collaboration between CI and the national government, aims to rehabilitate the degraded landscape and restore ecosystem services through a catchment management approach, which can also lead to carbon sequestration, biodiversity restoration and the sustainment of livelihoods.
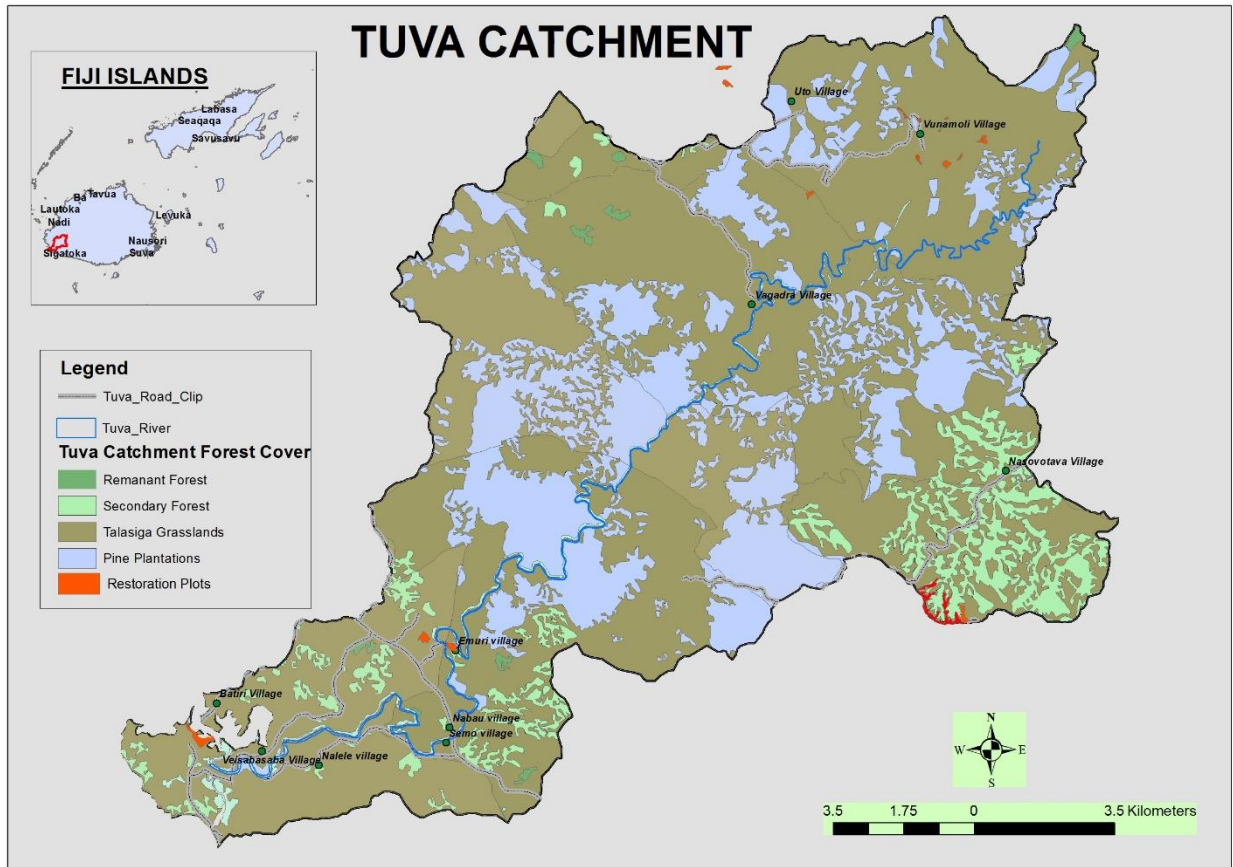
Figure 1: Tuva Catchment: *The Tuva Catchment hosts various land cover types surrounding the river, including remanent forest, secondary forest, talasiga grasslands, and pine plantations. Reforestation plots are highlighted.*
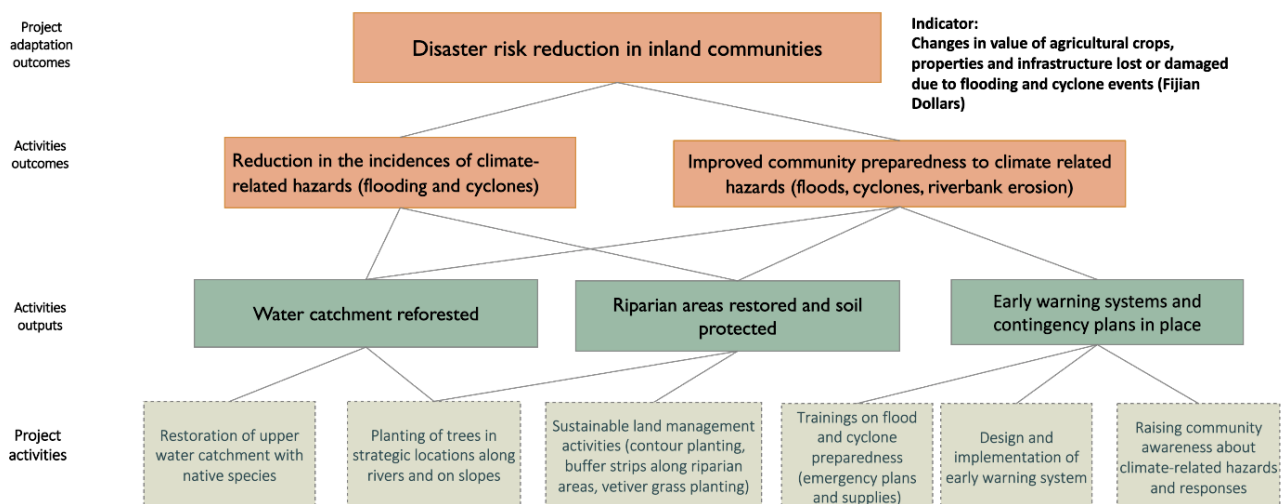
2. Theory of Change

Figure 2: The Theory of Change reflects the implementation of various EbA activities that can lead to reduction of disaster risks in Tuva catchment communities, such as the reforestation of water catchments and riparian areas to reduce flooding risks and the implementation of early warning systems.

2.1. Data measurements/collection

To ensure that communities in the Tuva catchment are more resilient to the impacts of flooding events, the project activities to be implemented include catchment-wide restoration of riparian areas using native tree species, especially for those in the upper and mid Tuva catchment, the design and implementation of early flood warning systems for each community, and community training and awareness on flood preparedness. Connections between specific activities implemented, activities outputs and outcomes, and the adaptation outcome are presented in figure 2.

3. Indicator's rationale and definitions

In order to assess whether the project activities lead to a reduction of flood risks and therefore an improvement in community resilience to climate change, the percentage of damages (and their values) of agriculture and infrastructure due to flooding events will be measured before and after the implementation of activities. Changes in agriculture and infrastructure damages at the settlement level will be based on the detailed damage assessment form (DDA) developed by the Fiji National Disaster Management Office. The DDA is a standardized form used by agencies on the ground to assess the impacts of disasters on human lives (causalities, injuries), infrastructure (dwelling and household items) and sanitation.

3.1. Linkages with national policies and priorities related to adaptation

The adaptation outcome indicator selected for this project is aligned to several international and national policies and frameworks. At the global level, ensuring healthy and resilient ecosystems through nature-based solution is recognized under the Convention on Biological Diversity, United Nation Sustainable Development Goals, United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention to Combat Desertification (UNCCD) and the Sendai Framework for Disaster Risk Reduction. Some of the activity indicators, specifically related to multi-hazard approaches to disaster risk reduction and emergency response, address the guiding policy in the Fiji National Disaster Risk Reduction Policy (2018). Increasing resilience and reducing vulnerability of Fiji's communities to the impacts of climate change and disasters is addressed under objective 5 of the Fiji National Climate Change Policy (2012). The Fiji National Adaptation Plan (2018) articulates that the country is threatened by climate change induced events such as tropical cyclones, storm surges, droughts, and flooding events. These climate change related hazards impact food and nutrition security, health, human settlements and infrastructure and biodiversity and the environment. In addition, the NAP specifically notes the need to implement ecosystem-based approaches to adaptation to protect, maintain, and restore degraded habitats including watersheds, riparian, and coastal zones with active community, NGO, and private sector engagement. To mitigate and adapt to these climate change related disasters, the integration of 'ecosystem-based' approaches such as restoration of catchments, development of early warning systems, identification and prioritization of adaptation needs and associated health risk exposures of communities and populations most vulnerable to climate variability and change, and riparian zone rehabilitation are recommended by the NAP. The 2014 Fiji Green Growth Framework also aligned to the adaption indicator through thematic area one, specifically relating to building resilience of communities to climate change and disasters. The Fiji National Biodiversity Strategy and Action Plan 2017– 2024 (NBSAP) under principle 2 of the strategy notes the value of biodiversity conservation to risk reduction – including disaster and climate risk reduction in key sectors. Principle 5 of the NBSAP requires the need to adopt an ecosystem-based management approach to maintain healthy, productive, and resilient ecosystems.

3.2 Definitions

Disaster Risk Reduction- the concept and practice of reducing disaster risks through systematic efforts to analyze and reduce the causal factors of disasters. Examples of disaster risk reduction include reducing exposure to hazards, lessening vulnerability of people and property,

wise management of land and the environment, and improving preparedness for adverse events. (UNISDR, 2009)

Dwelling partially damaged- dwelling that suffered minor damages and once repaired can be occupied safely

Dwelling destroyed- dwelling that is structurally and physically destroyed and cannot be used as a shelter

Early warning system- The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare to act promptly and appropriately to reduce the possibility of harm or loss (WGII).

Ecosystem services- Ecological processes or functions having monetary or non-monetary value to individuals or society at large. These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance, (2) provisioning services such as food, fiber or fish, (3) regulating services such as climate regulation or carbon sequestration and (4) cultural services such as tourism or spiritual and aesthetic appreciation (WGII, III)

Resilience- The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation (WGII, III)

Restoration- Can be used narrowly as a literal interpretation of "restoring" to an original baseline condition or can be defined broadly to include more refined words such as rehabilitation and reclamation

Vulnerability- The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (WGII)

4. Methodology

4.1. Data sources and frequency

Detailed Damage Assessments (DDA) in impacted communities will be used to assess agriculture and infrastructure damages. Assessments will be divided into villages or settlements where applicable. In order to assess damages to agricultural crops, the DDA requires information regarding the age of the crop and planted acreage. The value of the crop damage is based on the average monthly market price of the crop prior to natural disaster impacts. Due to price variations across the country, the average market price is used to standardize prices and calculate cost of damage to crops. Once the age, area and value of the crop is assessed for each farmer, total damage values are tallied and summarized for each village/settlement.

 The survey will be conducted at the inception of the project, during and after the project. If the catchment experiences flooding events during the project period, the detailed damage assessment form will be used to assess the financial value of infrastructure and agricultural crops lost to the flooding event. An additional key informant interview will be conducted before or after the project period to ascertain if project activities/interventions have improved community resilience to flooding events in the Tuva Catchment.

4.2 Data measurements/collection

The initial evaluation includes a review of all documents related to the previous detailed damage assessment of communities within the Tuva catchment, including the background literature, project documents, agreements, and technical reports. During these site visits, Key Informant Interviews are conducted with community leaders, the head of the community disaster management committee (or equivalent) or village headman and those who are focal points or supervisors for any key disaster related work in each village. The key informants were selected to ensure participation from both men and women with different degrees of participation. Interviews will also be conducted with women's group representation (Soqosoqo Vakamarama), youth and representatives of the natural resource management support team (Yaubula Management Support Team-YMST).

The baseline assessment will be conducted at the household level in each of the villages at risk from disaster related hazards. Men, women, and youth will be targeted for baseline assessment questionnaires. If preferred, focus group discussions will also be undertaken in some of the communities. These meetings will help triangulate information collected at the household level survey and through key people interviews.

4.2. Data analysis

1. *Detailed Damage Assessment Form*

The detailed damage assessment form is divided into two parts. The first part covers the detailed damage assessment for agricultural crops based on interviews with community members and farmers. It assesses the area of farm damaged/impacted in hectares, estimated crop production impacted in metric tons and estimated damage value of crop in Fijian dollars. The second part of the detailed damage assessment form assesses the impact of the disaster on community infrastructure, particularly dwellings. The two criteria for assessment of dwellings are whether they are partially or completely destroyed and their value in Fijian dollars. This form is used to assess impacts of natural disasters on an area and forms the basis government interventions.

Information requested in the DDA for dwellings is divided into four main categories (see Annex): details for each household, household employment status, dwelling house, and health and sanitation. Household details are further broken down into adult, child (7-16yrs), and infant (0-6yrs). Household employment status is broken down to permanent employment, casual or not working. Dwelling house is further divided into type of dwelling (B-Bure, C-concrete, T-timber, LT-lean to), extent of damage (partial, complete) and size of the house (square meters). Health and sanitation are divided into toilet, water, light, and kitchen. This is further divided into whether each category is damaged or not. Once this information is gathered and entered, the total value of the damage is determined.

Disaster risk reduction *Baseline Assessment*

In addition to the damage assessment, some questions can be asked about community preparedness to disasters. For the baseline assessment questionnaire there are questions to assess the perception of key informants on community resilience to shocks and stresses that can be used to complement the information assessed through the DDA form as it providse information on perceived disaster risk reduction related to project interventions (see Annex). The questionnaire is also designed to gauge information on household awareness and behavior, community leadership and organizational capacity.
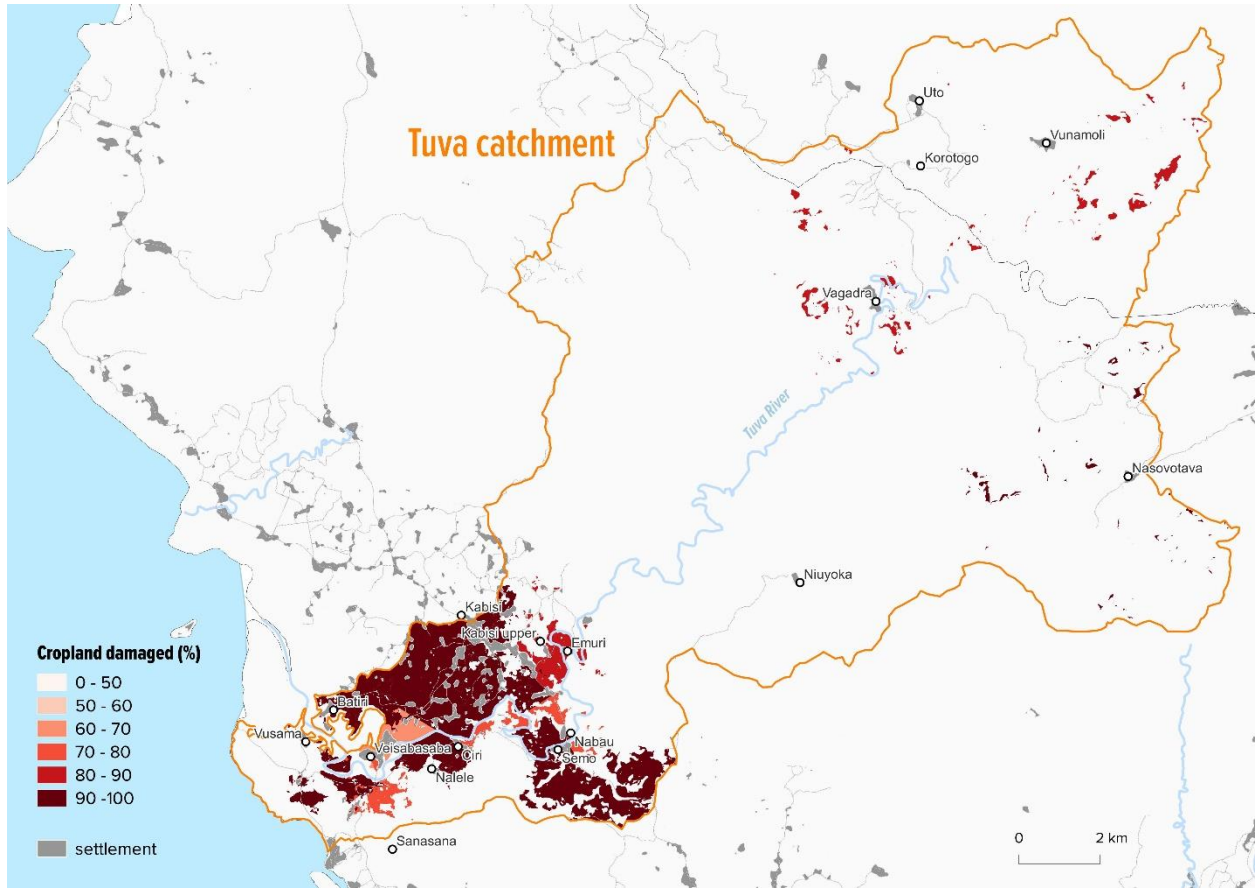
Figure 1: Percentages of croplands damaged in each village or settlements by the tropical cyclone Harold in April 2020 (data from the Disaster Damage Assessment by Fiji Government). The cyclone did not cause any infrastructural damage. This information will be used as a baseline and compared with future measurements to track the impact of project activities on disaster risk reduction.

4.3. Interpreting your results

When all field interventions and contingency plans are implemented, and target areas restored, DDA values are expected to gradually decrease over time. We expect the percentage of cropland damages to decrease in a given area, as well as for the total size of the area with high percentages of cropland damage to decrease. Currently, up to 90%-100% of crops have been damaged in areas. However, nature-based solution activities, such as restoration of water catchments, riparian zones, and barren slopes are not expected to deliver positive outcomes over short periods as natives trees take time to become established and their benefits realized. Anecdotal reports from previous restoration work in other catchments by CI indicates that impacts begin to be realized around year 10.   For this reason, crop damages are not expected to decrease considerably in the short to medium term. However, we do expect to see both the percentage of cropland damages in a given area and the total size of the area with high percentages of cropland damage to decrease after 10 years of project implementation (which could be expressed in a percent reduction compared to baseline, e.g. 20%)

4.4. Data reporting, quality and limitations

Before data is collected from the field, training of data collectors is essential to ensure that the correct data is collected and sensitivity towards communities is used when asking questions. Once data is collected from the field, supervisors check that the enumerator's data sheets are filled correctly. Enumerators must ensure that the number of households in each village/settlement are filled correctly, including names. Any discrepancies identified can be corrected whilst out in the field and data verified. Once the forms are verified and discrepancies corrected, the forms are taken to the office to be entered into an excel spreadsheet. A random check of entered data against the filled form is then conducted to ensure that the data is transcribed correctly from the forms to the excel spreadsheet.

There are some limitations to using the DDA forms when conducting assessments. The value of crops may not be accurate as it is based on the average market value of the crop prior to the natural disaster. Likewise, acreage of areas impacted is only an estimate and does not represent exact areas impacted. For dwellings assessments, the estimation of damage caused by disaster is completed by enumerators who may not be as skilled as carpenters or valuers. In addition, under dwellings, it is attempted to put a dollar value on traditional constructed houses (bure) although most of the materials are sourced freely from the forest.

4.5. Data repository and management

Once forms are entered into the excel spreadsheet and verified, the spreadsheet is saved onto a secure server as well as backup cloud storage if possible. To ensure backup of primary data (forms) if possible, all forms are to be scanned and saved in server or cloud storage. The Excel spreadsheet should be separated according to villages and settlements and consolidated into one file for ease of references.

5. Literature

GoF. 2018. Republic of Fiji National Adaptation Plan. Government of Fiji, Suva, Fiji Islands.

GoF. 2017. National Biodiversity Strategy and Action Plan for Fiji 2017–2024. Government of Fiji, Suva, Fiji Islands.

GoF. 2014. A Greengrowth Framework for Fiji. Government of Fiji, Suva. Fiji Islands.

GoF. 2012. Republic of Fiji National Climate Change Policy. Government of Fiji, Suva, Fiji Islands.

Ministry of Disaster Manager and Meteorological Service. 2018. The Republic of Fiji National Disaster Risk Reduction Policy 2018-2030. Government Fiji, Suva, Islands

6. Annex

AGRICULTURE DAMAGE ASSESSMENT FORM

VILLAGE: **DISTRICT:**   **PROVINCE:**
DATE: **ENUMERATOR:**

Crops (fruit tree, vegetable, crop)	Village	No.of H/hold	No.of Farmers	Area planted by Stage of Growth (ha)			total Area Planted (sum of ha)	Damaged Area (ha)			Total Area (sum of ha)	Est. Prodn (mt) (tot planted *coeff)	% of Damage (area planted/area damaged *100)	Est. Damaged Value ($)
				1-4 months	5-10 months	>10 months		1-4 months	5-10 months	>10 months				

INFRASTRCUTURE DAMAGE ASSESSMENT FORM

VILLAGE: **DISTRICT:**   **PROVINCE:**

DATE: **ENUMERATOR:**

#	Village/Settlement	Name Of Head Of Household	Structure Damage (Estimated $)						Est Damage Value ($)	Remarks
			Completely destroyed structure			Partially destroyed structure				
			Wooden	Concrete	Corrugated	Wooden	Concrete	Corrugated		

DISASTER RISK REDUCTION BASELINE ASSESSMENT FORM

VILLAGE: DISTRICT: PROVINCE:

DATE: ENUMERATOR:

1.   In the past 5 years, has your family been affected by a disaster?
❍ yes ❍ no

2. If yes, which types of disasters have affected you?
❍ Floods ❍Tropical Cyclone❍ Fire ❍ drought ❍ Other❍ don't know
a. If yes: did you consider you were adequately prepared?
❍ yes ❍ no ❍ don't know

3. Who in the community has provided you with information about disasters in the last year?
❍ Community leader
❍ Trained community member (e.g. CDRT, trained by Civil Protection)
❍ Red Cross volunteer
❍ Family member / Neighbour / friend
❍ Messages through schools
❍ other
❍ no one
4. Have you received any other information about disasters from outside the community
over the last year? Where from?

❍ Radio / television / internet
❍ Newspaper
❍ Flyers or educational messaging from Civil Protection / Government in the community
❍ NGOs and other institutions
❍ no one / no other information

5. In the past 12 months, has there been a change in your understanding of disasters?
❍ significant improvement ❍ some improvement ❍ little or no improvement ❍don't know

6. Does your community have any of the following:
a. A system to alert you in the event of an emergency (siren, flags, whistles):
❍ yes ❍ no ❍ don't know
- **If yes: what do you do when it is activated?**
❍ Clear response
❍ Unclear response (not sure what to do)
b. **A disaster coordination committee:** ❍ yes ❍ no ❍ don't know
- **If yes: what do they do?**
❍ Clear response
❍ Unclear response (not sure what they do)
c. **A response team for emergencies**: ❍ yes ❍ no ❍ don't know
- **If yes: what does it do?**
❍ Clear response
❍ Unclear response (not sure what they do)
d. **Evacuation routes marked:** ❍ yes ❍ no ❍ don't know
- **If yes: where is it?**
❍ Clear response
❍ Unclear response (not sure where it is)
e. **Meeting point / safe area identified as such:** ❍ yes ❍ no ❍ don't know

- If yes: where is it?

❍ Clear response

❍ Unclear response (not sure where it is)

f. A shelter for emergencies: ❍ yes ❍ no ❍ don't know

- If yes: where is it?

❍ Clear response

❍ Unclear response (not sure where it is)

- If yes: who has the key?

❍ Clear response

❍ Unclear response (not sure who has the key)

7. In the past 12 months, has anyone from your household participated in any of the following activities:

a. First Aid training: ❍ yes ❍ no ❍ don't know

b. Disaster simulation drill OR Evacuation exercise: ❍ yes ❍ no ❍ don't know

c. Disaster preparedness meeting: ❍ yes ❍ no ❍ don't know

d. Community event focused on disaster preparedness: ❍ yes ❍ no ❍ don't know

e. Household visit of a volunteer on disaster preparedness: ❍ yes ❍ no ❍ don't Know

8. How many households do you know in your community who are prepared for disasters?

❍ 0 (no one) / don't know

❍ 1-5 households

❍ 6-10 households

❍ more than 10 households

8. Do you have a family plan for emergencies?

❍ yes ❍ no ❍ do not know

- If yes:

8.1. What does it include? (family plan for emergencies)

❍ Planned meeting place for family members (including place to stay or shelter)

❍ Who to call and which numbers to call

❍ Activities to strengthen the home or reduce damage to your property

❍ Emergency supplies or a planned list of items to take in case the family leaves home

❍ Evacuation plan / How to get out of the house

❍ Where to turn off gas, water and electricity

❍ None of the above / no response

❍ other

9. Have you identified a safe location in the house in the event of an emergency?

❍ yes ❍ no ❍ do not know

9.1. If yes: where is it?

❍ Clear response

❍ Unclear response (not clear where it is)

10. Have you identified how to get out of the house in the event of an emergency?

❍ yes ❍ no ❍ do not know

14.1. If yes: have you tested this route?

❍ yes ❍ no

11. Have you identified a meeting point outside of your home in the event of an emergency?

❍ yes ❍ no ❍ do not know

11.1. If yes, where is it?

❍ Clear response

❍ Unclear response (not clear where it is)

12. If your home is damaged or destroyed in a disaster, where would you go to?

❍ Clear response

❍ Unclear response / does not know

13. Who is most likely to provide you with assistance in the event of a disaster?

❍ Family / friends ❍ Neighbors

❍ Community committee / community response team

❍ Government agencies ❍ Private sector / businesses

❍ Religious groups ❍ NGOs

❍ The Red Cross

❍ no one

14. Is the house located in an area exposed to hurricane / severe storms / flooding?

❍ yes ❍ no ❍ do not know

14.1. If yes: have you taken measures to reduce the risk of being affected?

❍ no measures needed (well-built home)

❍ Extensive preparedness (hurricane straps on roof, hurricane shutters, neighboring trees trimmed, vulnerable items away from floodable area, etc.)

❍ Partial preparedness / house still vulnerable

❍ no measures taken / unsafe house in the event of this hazard

❍ do not know