

A photograph of a mangrove forest with dense green foliage and prominent prop roots extending into a body of water. The scene is reflected in the calm water. In the top left corner, there is a black rounded rectangle containing the text 'LaRutaDelClima' in white.

LaRutaDelClima

LIFE AMID
LOSS AND DAMAGE:
Central American Narratives

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Life amid Loss and Damage: Central American Narratives; by the Asociación Ruta del Clima with technical and financial support from Oxfam.



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Asociación La Ruta del Clima. San José, Costa Rica.

Dedication

To James Goodman (1949-2022), father of our colleague and friend, Sam Goodman, a writer for justice and a friend who believed in our work.

Acronyms

ACMA	Intercommunity Association for the Development and Sustainable Management of the El Aguacate Micro-basin..
ECLAC	Economic Commission for Latin America.
UNFCCC	United Nations Framework Convention on Climate Change.
CADC	Central American Dry Corridor.
ENSO	El Niño–Southern Oscillation.
INE	National Institute of Statistics of Honduras.
SISAN	Information System for Surveillance, Monitoring, and Evaluation of Food and Nutritional Security.
GDP	Gross Domestic Product.

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Before beginning: notes on the research and some concepts

In 1998, Hurricane Mitch was rated the most destructive tropical storm in the Caribbean region in 200 years. For two weeks throughout Central America, Mitch caused approximately 20,000 deaths, destroyed more than two hundred bridges and more than one thousand kilometers of main roads, left hundreds of thousands of victims and millions of people affected, as well as resulted in the massive destruction of homes and plantations. In Honduras alone, it left 20% of the population homeless and destroyed 70% of the crop fields. The Economic Commission for Latin America (ECLAC) estimated the cost of reconstruction to be USD\$7 billion (Lavell 2005, 13; Sanchez 2018).

Twenty-four years later, the region has not stopped accumulating losses and damages due to increasingly frequent and intense extreme hydro-meteorological events. This affects territories already afflicted by extractivism, historical inequalities, and social and environmental unfairness.

This research was conducted within the framework of the project "A Focus on Damage and Losses: Perspectives from the Climate Justice of the Central American Civil Society," by La Ruta del Clima, with the technical and financial support of Oxfam. This report seeks to demonstrate the communal implications of losses and damages in the context of Central America from a Climate Justice perspective.

How is this report organized?

- First, a brief profile of the countries studied is included.
- A presentation of the experiences of people in the communities that were visited as part of the research project regarding losses and damages due to the effects of climatic events.
- At the same time, boxes highlight three of the most complex and relevant interactions between loss and damage: gender, human mobility, and food security.

- The document also offers some historical overviews with clues to understand the current situation of the countries being studied.
- Finally, we take note of the challenges that communities will face in the future in the context of the climate crisis and offer the reflections of the research team.

Narratives, experiences, and human experiences often ignored by statistics and global indicators are highlighted. The voice of the people from the most affected communities suggests the multiple paths to follow.

Conceptual considerations

The concept of **loss and damage** has no formal definition within the UNFCCC. However, it is commonly referred to as **those impacts people cannot resist or adapt to that cause irreparable damage or irreversible losses**. Damage is considered "reversible through risk reduction, repair or restoration initiatives", and losses are considered "irreversible, in the sense that they cannot be restored or repaired." These impacts may manifest themselves as extreme weather events (hurricanes, floods, and others) or as slow-onset phenomena (sea level rise, ocean acidification, and others) (Warner et al. 2012, 20).

This concept is closely related to **adaptation**, which is a **process of adjustment to actual or projected climate and its effects** that aims to reduce potential damages and/or take advantage of opportunities that may arise (IPCC 2014, 180; Martínez 2021, 13). Adaptation to the impacts of climate change has its limits, at which point adaptation actions are no longer viable, and at this point, damages and losses are generated (Martínez 2021, 13; Warner et al. 2012).

Adaptation limits are classified as: a) Hard limit: It is a situation where it is impossible to take action to avoid the intolerable risk. b) Soft limit: Viable adaptation actions to avoid intolerable risk are unavailable now. Consequently, when this residual risk is not managed

through adaptation measures due to the limits mentioned earlier, our communities generate and suffer damages and losses (IPCC 2018, 74; Martínez 2021, 13).

It is important to note that losses and damages have economic and non-economic aspects. Non-economic aspects may include culture, traditions, languages, etc. Losses and damages have a significant impact on the human rights of individuals and their communities (Serdeczny 2019; Martínez et al. 2022; Martínez 2021; Albar et al. 2020).

This burden is faced daily by vulnerable communities in Central America. Moreover, losses and damages are an important part of the economic reality of our countries and a serious injury to our intangible assets. It is the result of the negative externalities of the carbon-intensive economies of the Global North. This is why it is necessary to break the silence in light of the losses and damages experienced by our communities. It is to exercise the right to a healthy environment (Martínez 2022).

The concept of **Climate Justice** is also derived from this, which is understood here from the principle of common but differentiated responsibilities (United Nations Framework Convention on Climate Change 1992, 18). This implies that large historical carbon emitters must assume responsibility for the adverse impacts generated (Martínez 2021, 13). Therefore, for the international community to assume responsibility for damages and losses is to exercise the right to demand Climate Justice (Gutiérrez and Martínez 2020, 90).

Finally, climate justice is also a political movement that promotes addressing the climate crisis from a rights and obligations approach. This is why the project makes visible the experiences and complaints of the people affected by losses and damages.

In summary, remediation of transboundary environmental damage and structural response to address loss and damage by the global north is a demand based on justice. The United Nations

Framework Convention on Climate Change (UNFCCC) has been negligent and ommissive in addressing Loss and Damage. It has also failed to ensure appropriate funding and blocked remediation and justice discussion. For Central American communities, this means paying for losses and damages themselves. This means that they are prevented from fully exercising their human rights.

How was this research conducted?

Central America is one of the regions most affected by climate impacts but with lesser participation in global climate discussions. Furthermore, civil society organizations, in general, lack training on this issue and its interconnection with climate justice. For this reason, La Ruta del Clima has been promoting efforts to generate research from within the region.

The communities and key actors that were part of this research met a series of criteria regarding their characteristics and logistical considerations that allowed the research team to conduct the visits in person with the support of Oxfam and its partners. A diversity of identities was considered (Indigenous peoples, peasants/fishers, rural, urban, peri-urban), who have experienced damages and losses due to climate impacts in the last 10 years. A variety of ecosystems, lifestyles, and socio-productive activities were addressed. Likewise, age and gender diversity, particularly women and young people, as well as historically excluded groups, were also addressed.

It is worth mentioning that each visit was supported by a local organization that has received support from Oxfam as a partner in its efforts to fight inequality to eliminate poverty and inequity.

Between March and May 2022, seven departments and eight municipalities of the three countries Oxfam operates in Central America visited: Guatemala, Honduras, and El Salvador. A total of seven local organizations were involved, as well as several community-based groups. Seven focus groups, four

meetings with institutional, political, and academic stakeholders, and three in-depth interviews with community leaders were conducted. In addition, eight field trips (transects) were done with local analysts, plot owners, and small farmers.

As a topic, loss and damage are usually addressed from a risk management perspective, when they are not limited to statistical and quantitative treatment. This paper uses this approach to contextualize.

However, the main purpose of the research is to value qualitative data, considering the different subjectivities and their relationship with the socio-environmental context (Flick 2007, 20). Ethnographic techniques were used to explore further the experience, perception, and categorization of the observable and symbolic environment of the subjects. Therefore, the semi-structured interview, participant observation, the focus group (with social mapping and popular education techniques) and transects were selected.



Participatory elaboration of a timeline in a focus group. Jocotán, Guatemala.
Photo: José Carlos Rivera

From the coast to the mountains and along the Dry Corridor: a glance at the studied locations



Deforested and eroded mountains in Jocotán, Chiquimula. Horizontal lines are made as attempts to retain moisture. Photo: José Carlos Rivera

This section presents general data on the countries, and the communities visited. All of them have the peculiarity of being located in the Central American Dry Corridor (CADC), a group of ecosystems that combine in the ecoregion of the dry tropical forest of Central America, which begins in Chiapas, Mexico; and in a range, covers the lowlands of the Pacific slope and a large part of the central premontane region of Guatemala, El Salvador, Honduras, Nicaragua, and part of Guanacaste, in Costa Rica; in Honduras, it also includes areas that are close to the Caribbean coast (van der Zee et al. 2012, 8).



Illustration 1: Guatemala, Honduras and El Salvador are highlighted in purple. Visited locations marked in blue. In yellow is the Central American Dry Corridor. Own elaboration available at <https://bit.ly/3bvUMdV>

Highlighting that these communities are located in the CADC is relevant because:

- Out of the 57 livelihood zones in Central America, 47 are located in the Dry Corridor range.
- This area is cyclically affected by droughts related to the El Niño Southern Oscillation (ENSO), which causes significant social, environmental, and productive damages and losses.
- Small-scale basic grain producers in the CADC are vulnerable: 80% are below the poverty line, and 30% are in extreme poverty (van der Zee et al. 2012:8–13).
- 86% of the CADC families live in food and nutrition insecurity (Consortium of Humanitarian Organizations 2021, 12)

Guatemala

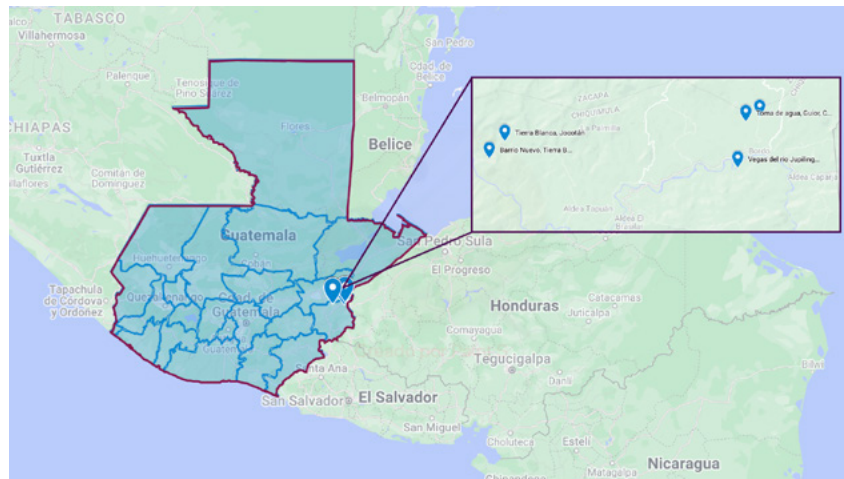


Illustration 2: Guatemala and visited places. Own elaboration available at <https://bit.ly/3bvUMdV>

Visited Communities

Department	Municipality	Villages or hamlets
Chiquimula	Jocotán	Barrio Nuevo, Tierra Blanca
Chiquimula	Camotán	Shupa (Vegas del río Jupilingo)
Chiquimula	Camotán	Toma de Agua, Guior

Extension: 108, 889 km². It is bordered to the west and north by Mexico, to the east by Belize and the Gulf of Honduras, to the southeast by Honduras and El Salvador, and to the south by the Pacific Ocean (United Nations System in Guatemala n.d.).

Population: About 17 million inhabitants, of whom 43.8% of the population is Indigenous, and about 56% live below the poverty line. **The rural population is 52 %, where 67 % are producers of basic grains, and 61 % of these are Indigenous people from the highlands (van der Zee et al. 2012, 10).**

Socio-environmental context:

- Guatemala is located on the Central American isthmus with coasts on the Pacific Ocean and the Atlantic Ocean, which belong to the Caribbean Basin. The country is affected by droughts, storms, and the El Niño-Southern Oscillation (ENSO) phenomenon.
- Since the beginning of the century, Guatemala has identified significant climate hazards and vulnerabilities associated with the constant presence of hurricanes from the Caribbean and the presence of phenomena such as La Niña and El Niño. The Fifth State of the Region Report (Román 2015) reported the following damages and losses between 1990-2011, in the case of Guatemala:

Table 1: Total damage and losses from extreme events, 1990-2011.

Country	Deaths	Affected People	Destroyed Houses	Damaged Houses
Guatemala	1.299	5.373.745	12.073	124.380

Own elaboration based on (Román 2015).

- In areas such as the Polochic river basin, a high threat of landslides and floods have been detected (Buch and Turcios 2003, 12). In the Western Highlands of Guatemala, departments such as Totonicapán, Quiché, and Quetzaltenango have been categorized as highly threatened due to droughts. In contrast, the departments of Huehuetenango and Quiché have been categorized as highly threatened by floods (Biota and The Nature Conservancy 2014, 33). At a general level, the exposure of vulnerable terrains (high slopes, ravines, water bodies' shores, locations near volcanoes, seismic locations, or in places below sea level) has caused human casualties and material losses that have been caused by extreme hydro-meteorological phenomena (UNDRR and CEPREDENAC, Coordination Center for the Prevention of Disasters in Central America and the Dominican Republic, for its Spanish acronym, 2014).
- Guatemala is among the 20 countries in the world with the highest exposure or vulnerability to external climate events, according to the Global Climate Risk Index ranking calculated for the period between 2000-2019. Moreover, in 2019, it experienced its driest year in a decade (rainfall levels dropped from 2,000 millimeters of cumulative to as little as 223.4 millimeters of cumulative annual rainfall). Likewise, between the decade 1921 - 1930 and the decade 2011-2020, there was an increase in temperature from 1°C to 1.5°C. (State of the Nation Program 2021, 81).
- The country ranks as one of the five highest-risk countries in the world regarding the vulnerability of its Gross Domestic Product (GDP) to three or more hazards, with 83.3% of GDP generated in areas at risk (State of the Nation Program 2021, 81). During 1902-2005, 62 disasters occurred in Guatemala, affecting approximately 6 million people (Government of Guatemala 2010, 4). The 1976 and 2012 earthquakes are the events

with the greatest socio-economic impact on the country, resulting in significant economic losses and human casualties. However, hydro-meteorological events also result in economic losses, with tropical storms and floods being the most frequent events in recent years (UNDRR and CEPREDENAC 2014, 20).

- At the political level, Guatemala has developed the National Disaster Risk Management Plan 2018-2022, elaborated under the Sendai Framework and the 2030 Agenda. The objective of this Plan is to strengthen sustainable development and sectoral and territorial planning through the introduction and implementation

of prospective, corrective, and reactive criteria in territorial planning and public and private investment, to avoid new risks, ensure the implementation of measures to reduce existing risks and to prepare to handle the impact of disasters. Its most relevant topics are land use planning, climate change adaptation, disaster risk management, environmental management, ecosystem management, and intersectionality (CONRED, National Coordination for Disaster Reduction, for its Spanish acronym, 2018).

Honduras

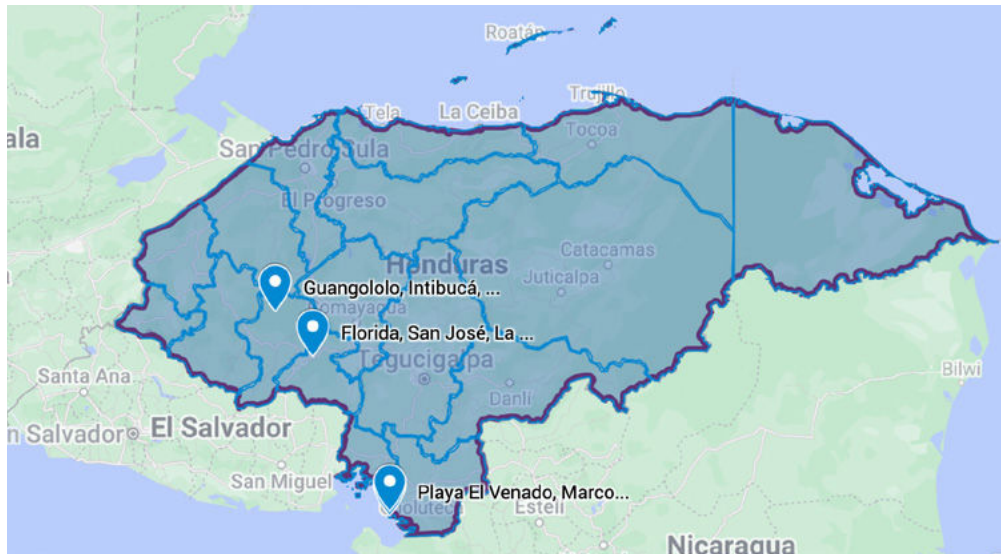


Ilustración 3: Honduras y sitios visitados. Elaboración propia disponible en <https://bit.ly/3bvUMdV>

Comunidades visitadas

Departamento	Municipio	Aldeas o caseríos
Choluteca	Marcovia	Playa El Venado; Cedeño
La Paz	San José	Florida
Intibucá	Intibuca	Guangololo

Extension: 112,492 km². It borders Guatemala and El Salvador to the west and Nicaragua to the south and east. The Caribbean Sea delimits its northern coast, while the Pacific Ocean delimits its southern coast (Ministry of Foreign Affairs 2022).

Population: approximately 10 million inhabitants. It is one of the poorest and most unequal countries in the Western Hemisphere, and the country's human development results are among the lowest in Latin America and the Caribbean. In 2020, 25.2% of the Honduran population lived in extreme poverty, and almost half (4.4 million people) lived in poverty (World Bank 2022).

The rural population represents 52 %, of which 54 % are producers of basic grains (van der Zee et al. 2012, 10).

Socio-environmental context

- A weak government capacity concerning human rights has been identified, which is reflected in the actions of civil society in environmental matters, such as executions and threats to journalists, human rights defenders, environmentalists, and lawyers (UNDP 2022, 228).
- Honduras was the second most impacted country by hurricanes in the last decade and is among the ten most vulnerable to climate change in the world, according to Germanwatch's Global Climate Risk Index (GRI), as cited in the latest Honduras Human Development Report (UNDP 2022, 117).
- In November 2020, hurricanes Eta and Iota impacted Honduras only two weeks apart. According to the UNDP, the ECLAC and the IDB evaluation showed that 437,000 people were affected, with 95 reported dead and 92,646 houses damaged. Damage and losses amounted to USD 2.13 billion (UNDP 2022, 117).

Table 2: Climate Impacts in Honduras

Industry	Recorded impacts
Food and agriculture sector and food sovereignty	<p>During the 2014 drought, crop losses occurred in 64 municipalities and 10 departments of Honduras, with losses in corn and bean crops that affected more than 72,000 families.</p> <p>1,350,000 people were affected by the drought associated with El Niño, 2015-2016. About 461,000 were severely and moderately food insecure. In 2015, crop losses were more than 60% for corn and 80% for beans.</p> <p>About 100,000 people were left unemployed, 68% of whom went into debt to buy food.</p>
Human health	<p>Rising temperatures increased the geographic range of vector-borne diseases such as Zika and chikungunya.</p>
Infrastructure and socio-economic development	<p>Electricity rationing was common during the low energy supply caused by the 2016 drought, which affected hydroelectric power production by drastically lowering dam levels below 50% of their capacity. Water price increase.</p>
Biodiversity and ecosystem services	<p>During the 2015 dry season, an aggressive advance of plagues was reported, affecting more than 20 hectares per day.</p> <p>The bleaching of Honduran corals was also reported.</p>

Source: Own elaboration based on MiAmbiente+, 2018.

- With the increase in average annual temperature and the increase in the intensity of extreme weather events, these sectors are expected to remain affected, causing continued negative impacts associated with crop losses and food insecurity, increased diseases associated with extreme heat, child malnutrition, reduced water levels in dams, reduced water availability, increased susceptibility to forest fires, species migration, among others (MiAmbiente+ and DNCC 2018, 15-18).
- At the political level, Honduras has a National Climate Change Adaptation Plan, the National Drought Risk Reduction Plan 2020-2038, the Master Plan for Water, Forests, and Soil, the Technological Adaptation Plan, and the State Policy for Integrated Risk Management in Honduras. It also has political instruments linked to international agreements

such as the 2030 National Agenda, the Third National Communication, and the first Nationally Determined Contribution of Honduras 2021. These policy instruments are being articulated through national planning so that the country is committed to outlining a line of actions to reduce the vulnerability of the most vulnerable population groups (MiAmbiente+ and DNCC 2018, 47).

- In the case of Honduras, efforts to adapt and mitigate climate change have focused on vulnerabilities and sectors with the greatest impact; action in most policy instruments is defined by the axes of agriculture and food sovereignty, human health, biodiversity, and ecosystem services, and water resources. (MiAmbiente+ and DNCC 2018, 32).

El Salvador

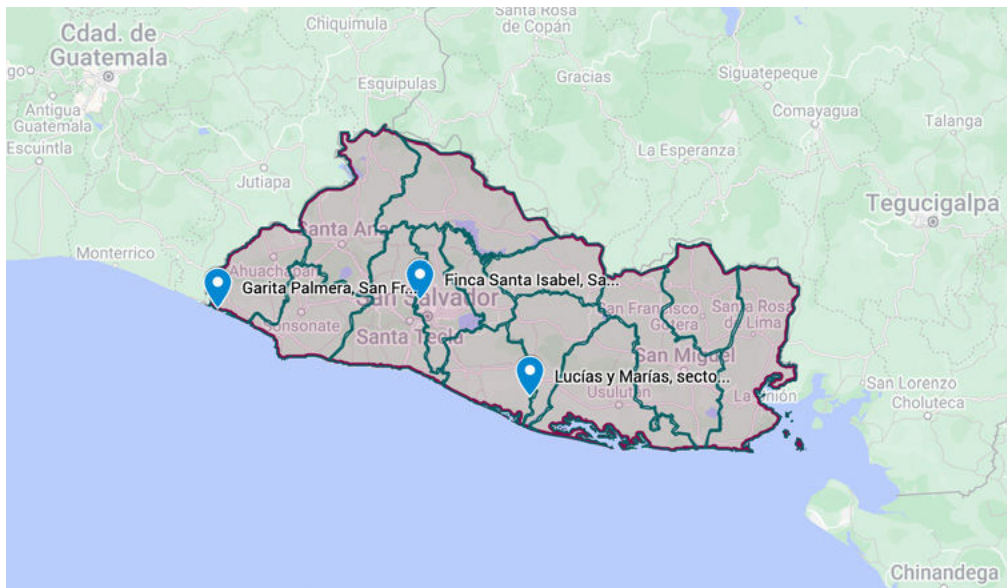


Illustration 4: El Salvador and visited locations. Own elaboration available at <https://bit.ly/3bvUMdV>

Visited Communities

Department	Municipality	Villages or hamlets
Ahuachapán	San Francisco Menéndez	Garita Palmera
La Paz	Zacatecoluca	Lucías y Marias, Sector Los Marranitos
San Salvador	Nejapa	San Jerónimo Los Planes, Finca Santa Isabel

Extension: 21. 040 km². It is bordered to the west by Guatemala, north and east by Honduras, south by the Pacific Ocean, and southeast by the Gulf of Fonseca, which separates it from Nicaragua (Ministry of Foreign Affairs 2022).

Population: Approximately 6.187.000 inhabitants. It has the highest population density in Central America, with 316 inhabitants per square kilometer (Ministry of Foreign Affairs 2022). **The percentage of the rural population is 38 %, of which 54 % are producers of basic grains (van der Zee et al. 2012, 10).**

Socio-environmental context

- According to the State of the Region Report, in El Salvador, between 1921 and 1930 and 2011 and 2020, there was an increase in temperature of 0.9°C (State of the Nation Program 2021, 81). Likewise, according to the 2017 National Report on the State of Risks and Vulnerabilities produced by the Ministry of Environment and Natural Resources, 88.7% of the territory (in which 95.4% of the population is settled) is considered to be in a high-risk zone (Ayales et al. 2019, 33).
- Events such as Tropical Storm Agatha (May 2010) and Tropical Depression 12E (October 2011) confirmed that climate variability is a growing threat to El Salvador. The low-pressure E96, associated with Ida in November 2009, caused a landslide in the department of San Vicente, river overflows, destruction of bridges, significant damage to agriculture, the death of 199 people, and 15.000 refugees (MARN, Ministry of Environment and Natural Resources, for its acronym in Spanish, 2017, 69).

- Ten percent of the Salvadorian territory is susceptible to flooding, which corresponds to an estimated area of 2,000 square kilometers; of this total, 80% is located in the coastal zone, where terrain elevations are lower than 10 meters above sea level (MARN 2017, 70).
- Droughts have also been a threat to El Salvador. More than 85% of Salvadoran agriculture depends on rain from May to October. The reduction in these, associated with ENSO, can cause, in many cases, water shortage in crops, which reduces their production and, consequently, the profitability levels for producers. From 2014 to 2015, losses in agriculture due to low rainfall amounted to more than USD 140 million (MARN 2017, 72).
- These threats cause significant social and economic vulnerability for the country. More than 60% of the national territory is dedicated to agriculture. About 36% of the country's total territory is arable soil. Considering that 35.2% of all Salvadorean households are poor, more than 50% of rural households are multidimensionally poor and, as such, are more vulnerable to the effects of climate change (Salvador et al. 2019, 10).
- At a political level, the country has a National Disaster Risk Management Plan (2017) to reduce the vulnerability of the populations most exposed to disasters. The country also has a National Plan for Adaptation to Climate Change, which is the initial and unifying step to achieving the challenge of adaptation in El Salvador (Salvador et al. 2019, 31).

Life amid loss and damage

This section describes the most notable climate impacts based on personal accounts and field observations. To facilitate their understanding, they have been grouped into four categories:

1. Drought, water deficit, desertification, and high temperatures.
2. Anomalies in rainfall, storms, and hurricanes.
3. Sea level rise and storm surges.
4. Gradual, non-economic loss and damage.

As in the rest of Central America, there are several conflicts in these communities with the extractive industries (maquilas, monoculture plantations, shrimp farms, timber companies, etc.), as well as with natural or legal persons who own large extensions of agricultural land. As such, it is worth noting that unequal access to resources and the unfair distribution of the impacts of environmental degradation persist.

Moreover, all three countries are considered high risk for land and environmental defenders. In 2020, there were seventeen murders in Honduras, making it the second most dangerous country per capita 2020 after Nicaragua (Global Witness 2021, 10–11).

A little history: Three centuries of transformations

To sustain the colonial economy and the extractive activities of the Spanish and English empires, people cut the forests to export their timber, provide open land for agriculture and cattle ranching, and obtain natural coal. Agriculture was developed with European methods and techniques, which encouraged monoculture and the use of tools that eroded the soil. The processing of indigo and other dye woods contaminated water supplies, causing imbalances in aquatic ecosystems. Urban centers and towns emerged, increasingly demanding more and more environmental resources and services. At different rates,

landscapes began to fragment, leading to biodiversity loss and ecosystem fragility (Goebel-Mc Dermott and Montero 2021, 6).

Discrimination, socio-economic inequality, gender violence, and racism, as well as the resistance of populations such as the Nahua, Lenca, Maya, mestizo, and Afro-descendant groups, have their roots in the colonial era (1502-1821).

Drought, water deficit, desertification, and high temperatures

From the fieldwork conducted in the three countries, it was evident that the communities along the CSC experience recurring periods of low precipitation, possibly due to abnormal rainfall distribution, the ENSO phenomenon, and other factors such as deforestation. When this occurs, crops cannot grow as expected, and families are forced to buy basic grains for both consumption and cultivation at very high prices due to current demand, further aggravating their financial situation.

"I think it's been 6 or 7 years now that it has been changing a lot—ever since the start of the el Niño phenomenon. Where we work, we peasant women have suffered so much from climate change. The first time, it didn't rain almost all winter (...) everything dried up, corn dried up; that was a year of shortage (...) It was terrible for everyone; that year, almost everyone bought corn; we bought everything, and since then the climate has changed a lot" (Focus group participant, Intibuca, personal communication, May 6, 2022)

In Chiquimula, Guatemala, the main impact is the prolonged, recurring drought, which adds to existing water access difficulties. Farmers in Jocotán explain that the drought has affected them since the 1970s (Focus group participants, personal communication, Barrio Nuevo, Tierra Blanca, Jocotán, March 15, 2022). The drought has caused the springs, creeks, and wells to dry up, resulting in a water shortage for crops and household consumption (Focus group participants, personal communication, Toma de Agua, Camotán, March 16, 2022).

The communities visited in Guatemala do not have ideal water supply systems. Water consumption depends on rainwater collection, natural springs, or store-bought water. In the case of El Salvador, there are rainwater collection systems for consumption managed by large landowners (colonos or tenant farmers). They also tend to purchase water in plastic bags—with the associated waste—and use well water. In Honduras, some communities had a water supply at home but stated that there were problems with pipelines or shortages and restrictions on drinking water. They also use well or spring water. In all cases, the water sources mentioned above are limited during a drought, leading to a higher incidence of disease and risk for these families and a significant financial impact, as they find themselves forced to generate additional resources to obtain water.

"Well, you can always get a bit for consumption, but not for the crops; there is nothing you can do because only those with irrigation systems and even that almost doesn't work because if it doesn't rain, the water sources dry up" (Focus group participant, Barrio Nuevo, Tierra Blanca, Jocotán, personal communication, March 15, 2022)

In Intibuca, Honduras, the Lencan women interviewed commented on how the drought has affected them financially, including low crop yield, increased crop vulnerability to disease, and a higher incidence of pests. They explained that the pests started about three years ago and that in 2021, they lost 100% of their production. These situations impact their food security and income, which depend on agriculture.

Additionally, they remarked that pests, disease, and low yield force them to incur more expenses (such as agrochemicals) to ensure their next production. However, it is important to emphasize that this specific group opts to use agroecological fertilizers and pesticides to reduce costs and contamination.

"Last year there was a plague that affected our vegetable crops ... the plants looked good, but at harvest time, it was a disaster ... we spent so much and produced nothing. There have been a lot of pests with climate change (...) This year; fertilizer is very expensive; here, if you don't use fertilizer, you don't produce

anything ... as farmers, we are living a very difficult situation" (Focus group participant, Intibuca, personal communication, May 6, 2022)

In terms of sowing practices, as a result of the drought, many families have had to stop practicing traditional techniques. For example, El Salvador and Guatemala producers state that their grandparents knew the exact dates on which they needed to sow and planted twice a year. However, due to changes in rainfall and the drought, they can no longer rely on ancestral knowledge and now only sow once a year, having "faith" that there will be no drought or storms (Focus group participant, personal communication, Zacatecoluca, May 19, 2022).

"When I came from Morazán 22 years ago on the border between El Salvador and Honduras (...) here we took advantage of the infamous 'humidity'—after the last storms had passed (...) you planted maize, sorghum, cucumber, squash ... using pure humidity; you didn't need water. But like my colleague there said, today winter has no respect; during winter, there is summer; and during summer, it rains (...) so, a humidity-based melon farmer plants and a storm comes, the humidity is lost, and the humidity is lost the crop dies. Those who used to plant watermelon or melon using humidity today do so with fear" (Focus group participant, Zacatecoluca, personal communication, May 19, 2022).

The decline in productivity and loss of crops especially affects subsistence crops (beans and corn). The families of Guatemala, Honduras, and El Salvador agree that based on cultural practices, they sow at the beginning of the rainy season, but in recent years, the rain has stopped, preventing the fruit from developing properly or from developing at all after flowering. To adapt to this situation, in Guatemala, they have implemented practices such as terrace farming, covering the soil with stubble (organic matter from pruning), or planting species such as Madre cacao (*Gliricidia sepium*) in an agroforestry system to maintain moisture and utilize the firewood.

"Since the earth is so dry, we dug ditches to retain some of the moisture; when they filled with water, they retained some of the moisture ... you plant corn, and as the rain falls, they start to sprout, but the summer ends, and it no longer produces. The land is very dry; we lay down stubble so that the land can retain some of the moisture" (Guatemalan farmer, personal communication, March 16, 2022)



Hillside cultivation using the traditional Ch'orti' agroforestry system (Kuxur Rum or "wet land"). Photo: Larissa Soto.

However, these adaptation practices have not been enough. In 2016-17, the "dog days of summer" (drought) lasted 56 days, causing total crop loss in Chiquimula. In 2021, drought again led to the loss of 90% of crops in the lower parts of the communities and almost 40% in the higher areas (ASEDECHI representative, personal communication, March 14, 2022).

Since these communities produce for family consumption, losing production poses a greater risk of malnutrition. The perpetuation of this condition has even resulted in the loss of human life. In Chiquimula, in 2002, there was a surge in malnutrition and a hunger alert linked to low food production. Because of this, the area is said to practice "infra-subsistence" agriculture, as production does not fully cover the community needs (ASEDECHI

representative, personal communication, March 14, 2022). In 2021, Guatemala experienced a 100% increase in deaths from acute malnutrition among children under five years of age compared to 2020 (EFE Agency 2021).

Moreover, in El Salvador and southern Honduras, there is a higher incidence of kidney diseases due to constant sun exposure and limited access to drinking water (Focus group participant, personal communication, Zacatecoluca, May 19, 2022). In fact, since the 1990s, the medical literature has documented a rise in the prevalence of chronic kidney disease in Central America, mainly in farm workers subjected to high temperatures, which led to its designation as "Mesoamerican nephropathy" (Marin et al. 2020).

One Guatemalan farmer said they can only work the field until 9:00 a.m. After that, it is too hot, making it difficult for them to improve their farms and, of course, affecting their productivity (Guatemalan farmer, personal communication, March 16, 2022).

"If there is a lot of sun, also sunburns (...) the skin, the face, becomes covered in spots ..." (Focus group participant, La Paz, personal communication, May 5, 2022).

On the other hand, the uncertainty that exists in terms of crop loss due to low precipitation generates a constant state of concern and anxiety, in that if farmers lose production, they will not have enough food and income to cover both their own and their families' basic dietary needs, leading families to seek alternatives. In Honduras, for example, families practice "shifting cultivation," in which farmers look for new, higher plots of land, expanding the agricultural frontier and, consequently greater pressure on natural resources and deforestation.

"You already don't know what the crop cycle will be. By now, the plots should be planted, but they are predicting that the 'dog days' will be longer (...) if you plant now, you'll lose the entire crop, which means that you'll have to move on to another plot. This is important because shifting cultivation (...) forces you to look for another plot because the temperatures are rising" (Focus group participant, La Paz, personal communication, May 5, 2022).

A little history: Raw material for a foreign industrial revolution

In the decades following independence (1870-1930), and while industrialization processes were taking place in the world, Central American countries carried out a series of liberal reforms to deepen their role as agro-exporting economies, consolidate themselves as national states, and establish new terms in social relations. New subaltern classes were established: a small class of urban artisans and laborers and a large class of workers in extraction companies, such as in bananas and mining (Acuña 1993, 255-58).

The fundamental purpose of the liberals was assimilation and ladinization, scientifically legitimizing colonial stereotypes and reinforcing the discourse of subordination of the Indigenous (Díaz Arias 2014, 194-95; Garrard-Burnett 2013, 91-92).

Some ideas from the post-independence period (1870-1930) still permeate the relationship that States have with women, peasants, Afro-descendants, and Indigenous groups.

In coastal areas, global warming has led to the disappearance of different species due to the rising temperature of mangrove waters. These species include mangrove cockles (*Anadara tuberculosa*), mussels (*Modiolus capax*), and clams (*Anadara grandis*). In both El Salvador and Honduras, different individuals say that between March and April—when it is at its hottest—the salinity of the water increases, and the acidity of the mangrove varies, causing many species to die out or their population to decrease. This is particularly serious if they are sources of income and livelihood (Honduran fisherman, personal communication, May 4, 2022; Focus group participants, Garita Palmera, May 18, 2022).

"The plants dry out; the fruit doesn't grow, the plants don't produce ... In the extreme heat, the water gets very hot, and people become ill with fever, flu, cough, headaches. The hens get flu and avian pox, and their faces become filled with lesions. If you don't give them medicine, they die because of the heat and the weather" (Focus group participant Garita Palmera, personal communication, May 18, 2022)



*Agroecological cultivation of mangrove cockles (*Anadara tuberculosa*) in Honduras. Photo: José Carlos Rivera.*

Gender dimension: Effects on women's quality of life

People living in poverty, especially agricultural producers, depend more on environmental conditions and natural resources and are disproportionately affected by climate change. Their adaptation capacities are limited due to restrictions on their economic and social assets.

Women are more impacted by climate change because a significant proportion of them live in extreme poverty, and to this is added gender inequalities, as they are usually responsible for ensuring the survival of families and providing access to water, food, clothing, and fuel (Stock 2012, 9).

Impact over time

When a drought occurs, women have to dedicate more time and effort to obtain water, either by traveling to water sources to carry water or by using hand pumps to obtain water from wells, which implies greater physical effort and exhaustion.

As mentioned in Camotán, Chiquimula, the extended absence of rainfall reduces the flow of springs, wells, streams, and rivers, which means that women spend more time searching for and collecting water. That time investment is considered waste (focus group attendees, personal communication, Toma de Agua, Camotán, March 16, 2022).

"We used to bring water from a well, which tires you the most. Waiting (...) and carrying water to the house is very exhausting, and water is never plentiful in the house; one keeps carrying water almost five times a day, plus it takes all day because you have to wait for water (...). As a woman at home, the truth is that one has a lot to do. What one does is not considered, and one does not get paid, but the truth is that as a woman, one always lives that way" (Focus group assistant, personal communication, Toma de Agua, Camotán, March 16, 2022).

Water, being such a fundamental resource, prevents them from performing basic activities such as washing clothes, cleaning, cooking, and personal hygiene. In Intibucá, Honduras, interviewed women report that they can spend nearly eight days without access to water.

"Here, the springs have dried up. There is no water. Everything accumulates for one who has cipotes [children] ... When the water comes, sometimes until seven o'clock at night, it is washing, one wants to wash even the unnecessary things. It isn't very easy. It affects us, women. You want to go to work, but since the water came, you have to do the washing, and then you can't go out" (Focus group attendee, Intibucá, personal communication, May 6, 2022).

"In the summers, we have to look for water in the rivers. There is no water to wash clothes, to drink, for anything. You have to walk long, looking for clean water to drink and washing (...). Since you have to walk around looking for water, time..., you have to leave some free time to do things and before you didn't because the water wasn't scarce" (Assistant to focus group, Intibucá, personal communication, May 6, 2022).

Gender labor burden

Women indicate that they have a heavier workload when floods, be it due to storms, hurricanes, or rising seas. In addition, they are burdened with household cleaning and childcare tasks, especially when they cannot go to school and are at risk of accidents due to the conditions of the environment.

They also stated that they must take care of the health of the household members to prevent the appearance of fungus on the skin of their feet, and to prevent them from getting sick from contact with contaminated water. Furthermore, they report that it is difficult for them to cook because their stoves get wet, and they have to wash the house after the floods.

"You have to clean more because the water comes into the house. You have to cook. The kitchen gets wet. You have to watch out for the children because they are walking around... also, when the house gets flooded, you get feet of fungus. There's no other choice but to walk on water..." (Focus group attendee, personal communication, Garita Palmera, May 18, 2022)

Effects on productive labor

Women's anguish is evident when their production is lost or declines due to drought, disease, or plagues. Especially those who are single mothers, when they have to see how to meet the nutritional needs of their children.

"Farm work is not easy (...), and here most women are sometimes single mothers. So sometimes, if you have children, and as you know, the fieldwork is difficult, the child does not know if there is anything to eat, but they want to eat. They expect you to provide. They ask, but they do not know if you have something or not..." (Focus group assistant, Intibucá, personal communication, May 6, 2022).

"Since you don't have a stove to cook, you have to look for firewood, and if your husband doesn't give you firewood, you have to go out all muddy and barefoot to look for firewood. It always affects us because if we don't have our clothes, we have to dry them inside because of the water... In many things, my friend, it affects us" (Focus group attendee, La Paz, personal communication, May 5, 2022)

Gender roles and the additional burdens assigned to women cause them to have fewer possibilities of generating income constantly. Women, having a greater burden of reproductive work, cannot go to work when faced with the scenarios described above, causing them to lose income and support for their families.

"Women here don't stay at home. They don't stay here to care for their children, but we go out to work and, most of the time, take our children wherever we go. The work here is to go to curilear, [collect mollusks], and that's where the family goes. I take my children with me on days when they don't go to school. We all collect mollusks... We can't go out when there are storms because we have to take care of the children..." (Honduran fisherwoman, personal communication, May 4, 2022)

"The truth is that you have a lot to do as a woman in the house. What we do is not measured, and we don't get paid, but as a woman, you always live like this because you are responsible for the house; you do the work, but you don't see it because it's in the kitchen." (Focus group attendee, personal communication, Toma de Agua, Camotán, March 16, 2022).|

One of the other losses and damages identified by the visited communities, which have a more significant impact on women, is related to family disintegration. In Intibucá, for example, the participants noted that a nearby community is almost entirely made up of single women. This leads to greater pressure to provide, care for, and feed in contexts where agriculture is not proving enough, and the absence of the Government is evident. Several women interviewed in the different communities expressed concern, sadness, anxiety, depression, and, in general, problems related to their mental health and the unpredictable context in which they find themselves daily.

"It is the issue of family disintegration... If women have a companion, as we were saying, when there is no coffee season, men have to migrate to another place to look for work. Women are left alone, and then what does that mean? That she has to manage the few available resources (...). It causes other situations such as illness, depression, and uncertainty, because, let's say, if the harvest is less, the woman is in charge of the food distribution in the household. If there is no more food, then she has to see what else she can do" (Focus group attendee, La Paz, personal communication, May 5, 2022)

Fieldwork revealed that most organized groups are made up of women, which shows the important role they play in the development and adaptation of their communities. This burden is added to reproductive duties (such as caregiving, housework, feeding, etc.) and productive responsibilities (such as farming, working outside the home, etc.). Hence, when losses and damages are experienced due to climatic events, women are affected not only by unpaid work in the household but also at the community level.

Anomalies in rainfall, storms, and hurricanes

Changes in precipitation have had the most effect on Central America, which are reflected in different ways in the experiences of the individuals interviewed in the field, based on their observations over recent years:

- Most rainfall is concentrated over a shorter period than expected and for what is common for a given area.
- Anomalies in rainfall distribution, i.e., the start, end, and resumption of rainfall and quantities, are difficult to forecast.
- In some cases, heavy rains are enough to cause loss or damage, even if they are not part of atypical or extreme weather events.

- The presence of tropical storms or hurricanes that cause strong winds, flooding, storm surges, landslides, and other impacts.

While there have been several tropical storms and hurricanes before the impact of Eta and Iota in 2020, all three countries agree that Hurricane Mitch was the most similar antecedent. Older individuals remember Hurricane Fifi (later known as Hurricane Orlene) in 1974 (Focus group participants, personal communication, Barrio Nuevo, Tierra Blanca, Jocotán, March 15, 2022; Zacatecoluca, May 19, 2022; Intibuca, personal communication, May 6, 2022).

Table 3: Some recent hydrometeorological events

Date	Event	Example of impact
October 2005	Hurricane Stan	With a loss of 3.4% of Guatemala's GDP, 474,821 people were affected, and 669 people died (Government of Guatemala 2010, 4).
May 2010	Tropical storm Agatha	In Guatemala, 104,052 people affected, 159,882 evacuated, 110 missing, 92 wounded, and 193 dead; 74,214 people in shelters. A total of 338,343 people were affected, of whom 36% were women between the ages of 30 and 39 (Government of Guatemala 2010, 10)
October 2011	Tropical storm 12E	8800 mm in precipitation in 11 days affecting 2.5 million people (van der Zee et al. 2012, 10)
June 2020	Tropical storm Amanda and Cristobal	In El Salvador: 29,968 families were affected, 8,119 people in 239 shelters in 14 departments, 2,581 reports of damage to infrastructure and basic services, 392 schools damaged, 3,000 houses destroyed or damaged, 679 landslides, and 19 roads closed. More than 3,000 ha of crops were damaged or lost, 92% of which were maize (UNICEF 2020).
November 2020	Hurricanes Eta and Iota	In Honduras, losses of over USD 52 billion, 96,000 people living in 1,000 formal shelters in 78 municipalities, and 95 people dead. Additionally, 5% of the country's housing stock was affected (IDB and ECLAC 2021, 22–23)

Source: Self-prepared based on Government of Guatemala 2010; van der Zee et al. 2012; UNICEF 2020; IDB and ECLAC 2021, 22–23.



Remains of a bridge over Jupilingo River in Guatemala, destroyed by Eta and Iota in 2020. Photo: José Carlos Rivera.

Between 2009 and 2012, Chiquimula saw a high concentration of rainfall within just a few days. The individuals interviewed commented that they have seen 400 mm of rainfall in just one or two storms. Storm Agata in 2010 caused significant damage to food production, housing, and human settlements (ASEDECHI representatives, personal communication, March 14, 2022). There were similar experiences in other countries with different storms.

"We had a lot of trouble with 12E when it rained for 12 days straight in each sector without letting up. During that time, many cattle, or pigs and birds, died because they didn't eat. When it rains, the cattle are out there, get weak, they don't eat, so yes, 12E caused significant loss" (Focus group participant, Zacatecoluca, personal communication, May 19, 2022).

The loss and damage from these events most reported in these communities have to do with agriculture and fish production. This was the experience of one farmer with 10 *tareas*¹ who recently experienced the loss of 40% of his production,

which was also for family consumption (Guatemalan farmer, personal communication, March 14, 2022); or of fishermen in the Gulf of Fonseca who experience financial hardship during heavy rains.

"It affects us completely because you can't fish, you can't go. You've already lost because how can you go fishing when it's raining and with the wind? You can't; you have to store your boat. So, you go hungry that day because you don't have enough to save" (Honduran fisherman, personal communication, May 4, 2022).

"(...) Before, our grandparents said: "The sowing is good in May," and everyone was ready to sow; now you don't know if that will be the case. There are times when it rains before; sometimes it rains after; the climate has changed a lot in these areas, and that has affected us, farmers, a lot because we aren't guaranteed a crop (...) When it doesn't rain, it's a disaster for us because everything is lost; who picks us up again? We have to figure out where to get money again. If people work on loans, they're out of luck, and sometimes people lose their homes" (Focus group participant, Intibuca, personal communication, May 6, 2022).

¹ In El Salvador, Honduras y Guatemala, "tarea" is a common unit of land measurement. A tarea [which means job, task or assignment in English] is a relative measure of the approximate amount of land that one person can work in one day, so it varies, based on locality and the most common crops, between 450 m² and 800 m². In Intibuca, Honduras, for example, 1 manzana = 10 tareas, while 1 manzana = 7500 m².

The floods in 2020 caused crop losses across the grasslands along the Jupilingo River. For example, in the village of Shupá, in Camotán, a Ch'orti' indigenous producer suffered damage to the fences surrounding his farm, impacts to his plot from debris, and damage to an engine and irrigation pipes. He also reported the loss of at least 7,000 m² of land cultivated with cucumber (equal to 32,200 kg), 322 kg of fertilizer, one cellar that he had not yet rebuilt at the date of the interview, all the maize he planted, and financial losses from having to purchase grass and concentrate for the animals. He commented that removing the debris to replant cost them three weeks of work, a task that was still ongoing at the interview date (Guatemalan farmer, personal communication, March 17, 2022).

"During [Hurricane] Mitch, I lost everything (...) it took all my animals, but this time I defended them. I learned from Mitch that I shouldn't have them here because otherwise, I'd lose again, and losing is sad because it's hard to get back up" (Guatemalan farmer, personal communication, March 17, 2022).

"Recovering from the loss ... you can't recover. [Person's nickname] didn't come, did he? Perhaps he told you that he sowed three times and lost. Legally, recovering those losses is difficult... What you do is ... agonize, in my words, right ... agonize and continue working" (Guatemalan farmer, personal communication, March 17, 2022).

Another important impact is the damage caused by the rainfall to specific points of the road infrastructure, especially the roads and bridges. The interviewees mentioned that these damages have only been repaired provisionally—not rebuilt—and that the debris has not even been removed.

The consequences of the infrastructure damage are complex. At times, entire villages are cut off. In the experience of people living in the mountainous areas of Jocotán and Camotán, Guatemala, and Intibuca, Honduras, this situation:

- Makes it difficult or impossible for vehicles carrying agricultural production to enter or leave, causing financial losses and hindering the arrival of food other than what is produced in the community's plots, leading to shortages and price speculation;
- Makes it difficult or impossible to travel to larger centers to access various services or go shopping, as in the case of the communities living in the mountainous areas of Jocotán, Guatemala (Focus group participants, Intibuca, personal communication, May 6, 2022; Barrio Nuevo, Tierra Blanca, Jocotán, March 15, 2022; Toma de Agua, Camotán, March 16, 2022).
- Makes it difficult or impossible for teachers to arrive at the schools, causing the community's children to go weeks without receiving lessons;

Pressure on human mobility

Following what was described in the section on sea level rise, it is possible to illustrate how a one-time event forces people to seek immediate (and possibly temporary) refuge in other departments or other countries where emergency response is better. In El Salvador, in 2015, the phenomenon known as "ground swell" occurred: strong swells caused by a low-pressure storm that affected the entire Pacific Ring of Fire (Deutsche Welle 2015). In Ahuachapán, residents of Garita Palmera report that houses, domestic animals, and businesses were lost and that the water was stagnant for two or three weeks in some areas.

"It started at about eight o'clock in the morning when the first rumble started; at about one o'clock, it was already too overwhelming. We couldn't get anything out. Everything was trapped suddenly. We got out of there and went to Guatemala (...). The motorboats could access the area; they took us out, but we couldn't get anything out. All house, all stores, all gone (...). All the beach shore, about 40 houses. (...) Since people have no other land to live on, we went back to the houses right there... not right where they were, but further down (...). After eight months, we went back" (Focus group attendee, personal communication, Garita Palmera, May 18, 2022).

On the other hand, some factors pressure territory over time, such as slow-onset climatic phenomena, such as rising temperatures, sea levels, droughts, and desertification. As they are more persistent, they are more intricately linked to permanent mobility (Gutiérrez and Martínez 2020, 64).

Forced migration is one of the region's most serious humanitarian crises, so greater attention has been paid in recent years to the complexity of the drivers of human mobility in Central America (Gutiérrez and Martínez 2020). The insecurity crisis is only one part of the context. As has been argued, existing socio-economic vulnerabilities are exacerbated by the effects of climate change, especially in rural areas, where high percentages of poverty prevail (49% in El Salvador, 77% in Guatemala, and 82% in Honduras) (Wolf 2020).

"My neighbor recently left and returned because he was attacked. You have no idea how that man came back, without clothes, without shoes, even barefoot. He went looking for a living, and sometimes they often lost it. (...) He traveled trying to go to the United States, and he couldn't because they caught him and kicked him out" (Focus group attendee, La Paz, personal communication, May 5, 2022).

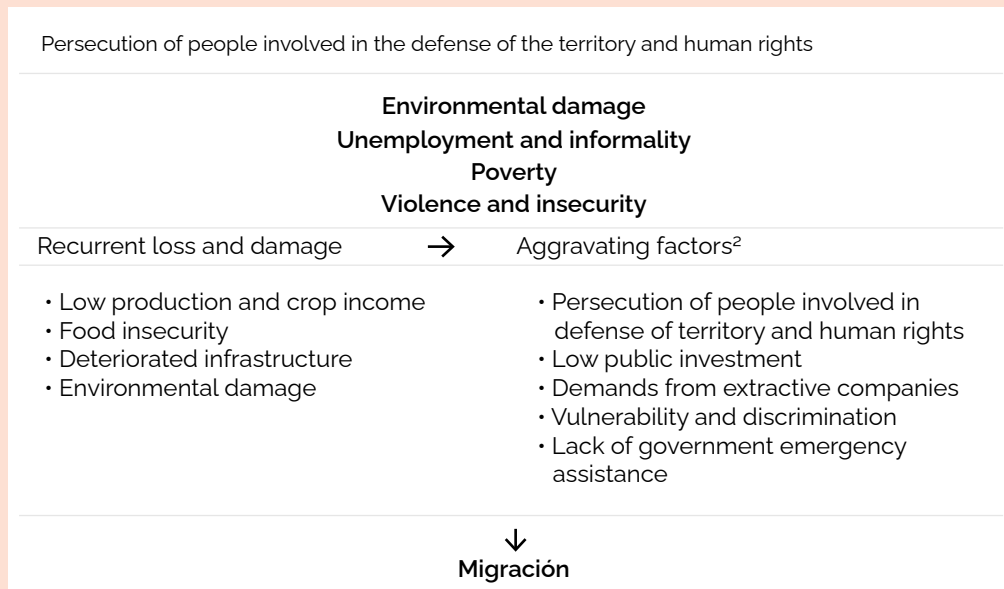
According to the IPCC's 2022 report, climate change plays a role in humanitarian crises where climate hazards interact with high vulnerability contexts, with meteorological events leading to an increased displacement of populations. In Central America, one element that pushes people out of the region is that severe food insecurity and malnutrition related to droughts and floods have increased. The report notes that, while non-climatic factors are the drivers of violent conditions in states, extreme weather and climate events have had an adverse impact on their duration and severity, exacerbating the need for populations to migrate (IPCC 2022, 13).

The interviewees emphasized that they live at constant risk of being struck by storms, hurricanes, droughts, diseases, and plagues. They have been observing a decline in agricultural production and that the situation is not improving, in addition to having to face constant losses of livestock, chickens, and production supplies, which forces them to look for more sustainable survival options.

In addition, numerous cases indicate that they have suffered total destruction of their homes or crops, leaving them vulnerable, impoverished, and at risk of malnutrition.

Rural and peri-urban territories, such as those visited for this research, are highly dependent on agriculture and experience recurrent losses and damages due to climatic phenomena. However, other non-climatic contributing factors that increase migration were also identified in the field.

Table 3: Correlation of loss and damage with other drivers of human mobility identified in the field



Source: Own elaboration.

²Aggravating factors represent the recurrent elements in the data collected in the field. They are specific to the communities studied, and it is important to note that other elements influence human mobility at the macro, mezzzo, and micro levels..



*CRural roads damaged by storms in Chiquimula, Guatemala.
Photo: Larissa Soto.*

A territorial and cross-border perspective is necessary to measure the loss and damage caused by climate phenomena.

"I am personally affected by what is happening with climate change, the floods, so much pollution ... All the pollution that is generated in the country practically comes right to us, since the mouths of the rivers are in this area of the municipality of Marcovia. So, every time there is a flood in Tegucigalpa, Choluteca ... we receive the trash; we're the ones affected by both the problem and the aftermath" (Focus group participant, Playa Venado, personal communication, May 4, 2022)

The discussion also centered on the impact of rainfall on homes or domestic infrastructure, in general, such as water supply pipelines that are damaged by excessive rains and that are not provided by any state or municipal institution, as in the case with many villages in Chiquimula (Guatemalan farmer, personal communication, March 16, 2022). Water intrusion in homes in Intibuca was also a factor (Focus group participants, personal communication, May 6, 2022).

The landslides in Nejapa, San Salvador, are an example of one of the most serious cases. On October 29, 2020, after tropical storms Amanda and Cristobal, in an area that was not considered susceptible to landslides, the mountainside collapsed, destroying the villages of Angelitos 1 and Angelitos 2 (Pro Vida meeting participant, personal communication, Nejapa, May 17, 2022). The event caused the following loss and damage:

- The death of ten people;
- Loss of coffee production; death of livestock and domestic animals; and
- The surrounding communities were affected regarding school infrastructure, crops, merchandise, and equipment.

The situation led the community and municipality to form community brigades for risk management (Transect of community members, personal communication, Nejapa, May 17, 2022).

In addition to the heavy rains that caused the landslide, flooding is considered an increasingly common event across the municipality.

"(...) In these last phases, the [San Antonio] river has completely overflowed, causing the loss of homes and all the material goods of the population located in the city; before it affected the people who were on the river bank in the rural areas, but now the whole issue of climate change is affecting urban areas as well (...) Today, periodically, every time there is a strong storm, the San Antonio River overflows" (Pro Vida representative, Nejapa, personal communication, May 17, 2022).

A little history: Foreign intervention and ecologically unequal exchange

In the second half of the 19th century and the first half of the 20th century, countries focused on establishing the agricultural and civil infrastructure necessary to export coffee, bananas, and precious metals. Because they did so based on debts and concessions to U.S.-owned companies, they were left with limited political and economic independence against intervention by the United States (Fonseca 2013, 140, 196).

These were decades of an intense forest extractive phase, which altered the climate of the different logging areas in Central American countries (Goebel-Mc Dermott 2019, 26).

Aside from sustaining poor working conditions, U.S. companies fostered ethnic tensions and racism in their enclaves. Confronted with the reaction of the workers, the States showed a systematically repressive response, at the same time that the benefits of agro-export accumulation were invested in the urban world (Acuña 1993).

In short, around 1850-1950, erosion intensified, forests were fragmented, much of the natural capital of the Central American Pacific was squandered, and the ecologically unequal exchange between Central America and resource-importing countries was consolidated (Goebel-Mc Dermott 2019, 28-29).

Sea level rise and storm surges

The fieldwork consisted of visiting communities along the Pacific coast, Garita Palmera in El Salvador (at the border with Guatemala) and Playa Venado and Cedeño in Honduras (Gulf of Fonseca). These communities are located in regions dependent on the trade of fish products, shrimp farming, melon crops, sugarcane, and, to a lesser degree, local tourism. They have limited access to basic services such as drinking water, waste management, public transportation, and decent jobs.

According to El Salvador's Information System for the Surveillance, Monitoring, and Evaluation of Food and Nutrition Security (SISAN, for its acronym in Spanish), in 2019, 34.33% of the population of the department of Ahuachapán (in which Garita Palmera is located) lived in poverty and 9.76% in extreme poverty (National Observatory for Food and Nutrition Security, n.d.) In the case of Honduras, 76% of the population in rural communities such as those visited live in poverty, and 66% in extreme poverty, according to data from the National Institute of Statistics of Honduras (INE 2021, 8).

The above scenario is exacerbated by the fact that over the last 40 years, coastal communities have begun to notice how sea levels have risen and storm surges are becoming more and more common. These events have caused significant material losses and limited economic development opportunities in these communities. In Cedeño, Honduras, one interviewee recalls how an entire community disappeared due to the rising sea level, resulting in the loss of homes, hotels, shrimp laboratories, schools, and soccer fields.

"The beach was much farther from here (...) In 1962, the sea was more than 400 meters away; over the years, it has risen four blocks; we aren't moving toward the sea, the sea is coming toward us; the sea is entering our homes" (Focus group participant, Playa Venado, personal communication, May 4, 2022)

"The colony of Los Cocos disappeared; it was situated along the beachline (...) We had a hotel called El Coco, but the space no longer exists, the sea carried it away; this has been happening since 1980" (Honduran fisherman, personal communication, May 4, 2022).

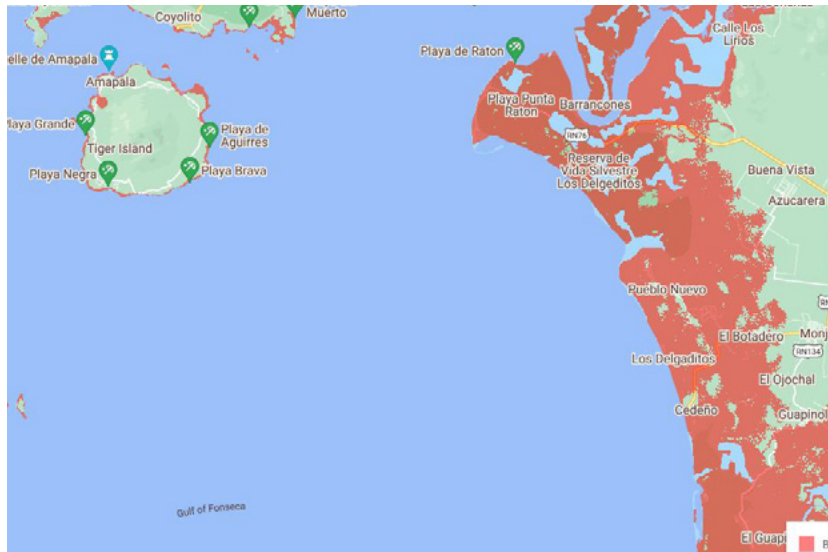


Illustration 5: The area projected to be below the annual flood level in 2030 for a sector of the Honduran coast is indicated in red. Source: <https://coastal.climatecentral.org/>



Illustration 6: The area projected to be below the annual flood level in 2030 for a sector of the Salvadoran coast is indicated in red. Source: <https://coastal.climatecentral.org/>

Playa Venado is located not far from Cedeño, where we interviewed representatives of the Association for the Protection of the Olive Ridley Sea Turtle of El Venado (ASPROTOGOLVE, for its acronym in Spanish), who emphasized that when Honduras was affected by Hurricanes Eta and Iota in 2020, the beach expanded inland, causing the disappearance of the estuary and impacts to the mangrove. As a result, the Conservation Center can no longer offer tours and educational visits to the mangrove.

"This was not always like this—there used to be at least 100 meters of the estuary (...) We offer tours around the mangroves, but now it is so dry that we can only go out at high tide" (Focus group participant, Playa Venado, personal communication, May 4, 2022)

In Playa Venado, community members commented that the sea carried away several *ramadas*—picnic shelter-like structures used by tourists to rest and carry out educational and volunteer activities. They say one *ramada* can cost USD 2,500 and is part of the livelihood of families in the area.

"We used to have a ramada [picnic shelter] here similar to that one, but we could only stand by and watch as the tides destroyed it; in just three hours, it was destroyed" (Focus group participant, Playa Venado, personal communication, May 4, 2022)

During the 2015 storm surges in Honduras, a fisherwoman recalls how she and her family lost their home and fishing boat. Since they had not yet paid off the boat, they were forced to sell the fishing equipment they were able to recover from the surge to pay off part of the debt. Today she is dependent on the community, which is lending her a house to live in with her husband and children.

The lack of financial compensation for affected families perpetuates and reproduces the cycle of poverty and vulnerability, as they do not have the minimum resources they need to succeed.

"2015 changed our lives; we lost everything. Since 2015, we've been housesitting, as they say, renting without paying. We were loaned a house, and that's where we've been. A storm surge entered Cedeño, and everyone along the shoreline lost their things. All of Cedeño was in shock" (Honduran fisherwoman, personal communication, May 4, 2022).

In Garita Palmera, El Salvador, in 2015, a storm surge destroyed all beachfront homes. In addition to the houses, other losses included animals for consumption and sale, fishing equipment, and products for trade. The residents say the sea and river merged into one for about four weeks. The affected families were forced to move to shelters, some even choosing to leave for neighboring Guatemala, which offered greater emergency assistance. The sea did not return to its original level, and many families rebuilt their houses in the same place—a few meters further from the sea—almost eight months after the event.



*Remains of a house destroyed by a storm surge along the Salvadoran coast.
Photo: José Carlos Rivera.*

Sea level rise has also impacted important ecosystems, such as the mangrove. Members of the Inter-Community Association for the Development and Sustainable Management of the El Aguacate Microbasin (ACMA, for its acronym in Spanish) in El Salvador commented that due to storm surges, the river mouth is blocked by large amounts of sand, preventing the flow of fresh and salt waters, the adequate balance of which is necessary for the health of the ecosystem (Focus group participant, personal communication, Garita Palmera, May 18, 2022).

It should be noted that this phenomenon has been aggravated by single-crop sugarcane companies in the upper basin that is intervening in the river channel, resulting in serious impacts to the Natural Protected Area and different mangrove, bird, mollusk, fish, and other species (Focus group participant, personal communication, Garita Palmera, May 18, 2022). A similar situation is occurring in Playa Cedeño, Honduras

"We've found the grouper dead (...) They live in caverns, but when there's a blockage from the sea pushing the sand into the estuary when it's high tide—we call it 'repunta' because it's the most violent tide—the sand gets into any hole. The grouper makes holes in the ravine, but

the sea pushes sand into the hollow and, when they can't find a way in, they get agitated" (Honduran fisherman, personal communication, May 4, 2022)

Moreover, the encroaching tides have resulted in the loss of arable land and have salinized drinking water sources, forcing families to buy bagged water for consumption and personal hygiene due to water shortages from the lack of rain.

There are also other non-economic damages, such as the fear and concern about the possibility that rising sea levels and storm surges will destroy homes, families, animals, and even the community.

"We're afraid the ocean will destroy the cemetery where our deceased lie" (Focus group participant Garita Palmera, personal communication, May 18, 2022)

The people in the coastal communities visited recognize their local government's lack of action and response. The organizations affirm that there are no formal records or data from the municipal governments regarding the loss and damage communities are experiencing yearly. Non-governmental organizations are usually responsible for recording events and providing emergency assistance.

The invasion of progress during the Cold War

In the context of the Cold War and the post-war economy, it was important for the United States to maintain political control over the hemisphere and stop the advance of reformism, leftist tendencies, or improvements for marginalized sectors, which is why it invaded Guatemala through Honduras to remove Jacobo Arbenz in 1954. It also funded countries' military corps with counterinsurgency programs (Pérez Brignoli 1989, 133-37; Fonseca 2013, 228-38, 254-55).

The U.S. demand for beef pushed through the "Alliance for Progress" to convert land use to extensive cattle ranching, which increased from 4.5 million hectares in 1950 to 8 million in 1970. Additionally, monocultures (coffee, bananas, cotton, and sugar cane) expanded. This resulted in land monopolization and dispossession of the peasants, the precariousness of living conditions in the countryside, and the drastic reduction of forest cover (Fonseca, 2013, 211-20).

Between 1940 and 1990, it has been estimated that two-thirds of Central American forests disappeared: destruction greater than that of the previous five hundred years (Goebel-Mc Dermott 2019, 40; Pérez Brignoli 1989, 134-35).

Gradual, non-economic loss and damage

While gradual loss and damage are much more complex to identify, people expressed a number of impacts that could be considered to be of gradual manifestation. In addition to those already mentioned, particularly those relating to economic aspects, we identified three categories of more gradual, non-economic loss and damage:

Cultural loss and damage

A good example of this is the harvest celebrations that used to take place in the department of Intibuca, according to the women interviewed in Guangololo, who miss a time when they would go from house to house sharing produce and prepared meals and offering festive drinks like *chicha*. They also report that the practice of “*mano vuelta*,” which consists of rotating community collaboration in activities such as sowing, cooking, construction, and others, is becoming less and less common (Focus group participants, Intibuca, personal communication, May 6, 2022).

Similarly, people from Nejapa, San Salvador, regret the loss of the use of the Nahuatl language due to the constant migration of the population to the capital in response to the difficulties of producing in the countryside (Teacher, personal communication, Nejapa, May 17, 2022).

Moreover, in all communities, people identify the loss of typical dishes because the animals or fruits used are no longer available.

“Ajalines [a type of crab] only come out with the first rains and thunder; but today, since it only rained once, they didn’t come out; they come out once a year. Twenty-three years ago, there were blue crabs—people didn’t want ajalines; now they don’t come out, and crabs are disappearing ... They are made in a tomato and alguashte broth [a dish made of ground pumpkin seed].”

“You used to catch them to eat and to sell; now there isn’t even enough to eat” (Focus group participant Garita Palmera, personal communication, May 18, 2022).

Impacts on biodiversity

This category refers to declining plant and animal species that have completely disappeared from ecosystems, affecting the landscape, tourism, and food.

It also relates to progressive impacts on biodiversity, such as the decrease or disappearance of plants and wildlife served as supplementary foods. As described above, this also marks a cultural loss (see more in the section on Food and Nutrition Security). At other times, the simple absence of these species within the ecosystems, including birds, deer, monkeys, and others, is most notable.

The rising temperatures and salinity affect various ecosystems and the associated species.

“Back then [1962] there was any number of animal species here—so many crabs there wasn’t room for more, clams; the tide came up, and the fish came out ... There was an abundance of animals” (Focus group participant, Playa Venado, personal communication, May 4, 2022).

The cumulative impact of damages and losses on Food and Nutritional Security

Availability

Agricultural failure is one of the most reported consequences. Crop damage and losses (due to flooding, excessive rainfall, or droughts) reduce the amount of food available to families. Availability is also affected by changing conditions such as humidity or general damage to the agroecosystem, as more pests such as "blight" (*Sclerotium rolfsii* Sacc. ; *Xanthomonas axonopodis*) "mosaic" (Bean golden yellow mosaic virus) and "frost beard" (*Thanatephorus cucumeris*; *Rhizoctonia solani*) (Guatemalan farmer, personal communication, March 14, 2022; Barrio Nuevo, Tierra Blanca, Jocotán, March 15, 2022). This is the activity most affected in communities whose main income is fishing. Due to the increase in water temperature, salinization, or change in weather patterns, some species are no longer available for consumption.

"For example, I plant about five apples, sometimes some corn, and the rest maicillo [sorghum] (...). Of those five apples, let's say 1/4 of them are lost" (Focus group attendee, personal communication, Zacatecoluca, May 19, 2022)

Access

Since the main income of the communities comes from agriculture or fishing, when there is no excess for sale, there is no cash available to buy basic grains or complementary products as part of the diet. Lower production yields are generally observed, compromising family income (Guatemalan farmer, personal communication, March 14, 2022). Or when specific events affect the harvest, they are first destined for family self-consumption before being marketed.

"All the second planting rotted. It was useless, and now we want... Thank God it is raining, and we want to continue because we don't have enough to sell. But we do have enough to eat" (Focus group participant, Intibucá, personal communication, May 6, 2022).

"It's harder to survive. Suppose there is no employment, and there are no more ways of getting food as there used to be. In that case, we either don't eat well or spend all of our money on food and no longer have access to other services" (Focus group attendee, La Paz, personal communication, May 5, 2022)

Consumption

There are also changes in the variety of the diet people consume, including traditional products or alternatives. In many cases, the gradual loss of creole seed is reported, for example, the arriquín variety from Guatemala (ASEDECHI representative, personal communication, March 14, 2022). On the other hand, commercial seeds "produce well in a good year." In contrast, creole seeds may have lower returns but are more resistant and freer (Focus group attendees, personal communication, Barrio Nuevo, Tierra Blanca, Jocotán, March 15, 2022).

The lack of rainfall reduces the production of basic cultural grains, such as corn and beans, but it also affects commonly found foods dispersed in or around the farms. Furthermore, the cumulative effect of the different climatic impacts affects the availability of species and, consequently, weakens the associated medicinal and

gastronomic knowledge. They have commonly been excluded from Food Safety reviews or loss and damage reports. Some that came up in the discussions were:

- Spineless Yucca (*Yucca elephantipes*).
- The Jocote (*Spondias purpurea*).
- The Chinapopo (large bean, in lenca - *Phaseolus coccineus*).
- The Chipilín (*Crotalaria longirostrata*).
- The Redroot Pigweed (*Amaranthus retroflexus*).
- Mushrooms are known as choros or suns (*Amanita caesarea*).
- The badú (*Xanthosoma sagittifolium*).
- Vegetables such as spinach.
- Wild fruits such as Psidium.
- Hives.
- River fish in general.
- Jutes (river snails that were given to people especially if they had anemia or malnutrition - *Pachychilus largilleiti*)
- Ajalines (*Gecarcinus quadratus*), blue crab (*Cardisoma crassum*).
- The mango.

In Chiquimula, Guatemala, and La Paz, Honduras, they have noted that the quality and quantity of the latter have decreased compared to the fruits they remembered consuming years ago, which were important for children's diets (Focus group attendee, personal communication, Toma de Agua, Camotán, March 16, 2022; Barrio Nuevo, Tierra Blanca, Jocotán, March 15, 2022; Intibucá, personal communication, May 6, 2022).

"In May, my mother used to go to the river because the tilapias would always appear in May, in May and November, but now no longer, neither in May nor in November, other fish appear, but I have never seen tilapias again (...), at least in this river they no longer appear" (Focus group attendee, personal communication, Zacatecoluca, May 19, 2022).

"Fruits are disappearing. For example, in my house, there were a lot of mango trees, [I said] 'Don't them down because that's what children eat...' Now the mango trees no longer produce fruits, but when they do, they fall, and if there are any left, they are not high-quality" (Assistant to focus group, La Paz, personal communication, May 5, 2022).

"Twenty-three years ago, there were pints [buckets] of blue crabs and ajalines. People didn't even want them... Go and take a look now... there are tons of people.

They are only found one by one" (Focus group attendee, personal communication, Garita Palmera, May 18, 2022.

Biological use

The scarce availability of sufficient quality and quantity of water, vector-borne diseases, and high temperatures cause health problems that prevent adequate food consumption, especially among children and the elderly.

Stability

Many interviewees expressed concern and annoyance because they were born, grew up in their villages, and dedicated themselves to agriculture as a family tradition. Despite this, they have gradually lost the certainty of when or how much it will rain. If the rains begin, they plant, thinking that they will continue, but it does not happen as expected, so the plants do not grow and, as a result, die. In Camotán, for example, people report that the heat wave in July and August ruined the harvest (Focus group participants, personal communication, Toma de Agua, Camotán, March 16, 2022).

"I would tell my siblings that the weather is hard to understand now because it looks like it is going to rain. It looks like it is raining a little bit, but then it stops raining... And crops had already been planted... Then, winter is gone, and crops no longer grow, or everything grows uneven" (Focus group attendee, personal communication, Zacatecoluca, May 19, 2022)

Damage to health

On some occasions, the interviewees noted that the climate changes create conditions for the proliferation of mosquitoes and a higher incidence of mosquito-borne diseases, such as dengue, Zika, and chikungunya.

"There have been a ton of mosquitoes ... Mosquitoes transmit dengue and Zika the most; this year there are more mosquitoes than other years" (Focus group participant Garita Palmera, personal communication, May 18, 2022)

While they are more prevalent during extreme weather events for obvious reasons, there has been a higher incidence of progressive health effects, including mental health and the psychological impact of dealing with past loss and damage, in addition to the concern and distress over future events.

"All of our health is deteriorating because all these factors are against us, even our blood pressure; we're having breathing problems, blood pressure problems ... in addition to stress and poverty. How am I going to survive tomorrow? I can't go fishing if that sea gets choppy, and the family needs food?" (Honduran fisherman, personal communication, May 4, 2022)

"We don't know how we're going to survive one day to the next. Will things stay the same, or will they get worse? I'm not sure they'll improve because there will be less and less on which to survive (...) because up to now, things will only get worse (...) financially too, as well as with the climate. After all, we don't know what this year will be like " (Focus group participant, Toma de Agua, Camotán, personal communication, March 16, 2022).

The experiences gathered in the communities highlight the need to consider the impact of loss and damage on mental health. This is especially true as it is not unusual for communities to barely be able to deal with the consequences of one event before being impacted by another. The 2022 IPCC report notes that as global warming continues, the population's mental health will decrease, and anxiety and stress will increase, especially in children, young people, older adults, and people with other health issues (IPCC 2022, 17).

"We had just gone through a lockdown, so there was already psychological damage (...). It was one tragedy after another. The damage is irreversible because we're talking about deep psychological damage (...), and I think we're going backward because a lot of people don't ... some weren't able to sow, others' seeds were damaged, others who used to use organic fertilizers ... they don't have the financial capacity to use chemicals, so everything is negative in that sense and you do what you can" (Focus group participant, La Paz, personal communication, May 5, 2022)

A little history: Memories of youth and the peace that has not yet come

By the end of the 20th century, the agro-export model and the oligarchic and authoritarian states were wearing out and could not contain popular discontent. Civil wars broke out in El Salvador (1979-1992) and Guatemala (1960-1996). Meanwhile, Honduras worked as a political-military platform at the service of U.S. interests in Central America (Fonseca 2013, 262-72). The internal movement of the population created "misery rings" in the cities, and the migration of approximately 1 million people to nearby countries followed (Fonseca 2013, 292-95).

Armed conflicts once again hit rural populations. In 1980, the Armed Forces of El Salvador, with the support of the Salvadorian Air Force, carried out civilian massacres in El Mozote hamlet, La Joya canton, Ranchería, Los Toriles, and Jocote Amarillo hamlets, as well as in Cerro Pando canton, and a cave in Cerro Ortiz (Inter-American Court of Human Rights 2018).

In nearly four decades of armed conflicts, the Guatemalan State was responsible for 90% of the deaths and executed 626 massacres that left hundreds of thousands of dead, exiled, or traumatized (Garrard-Burnett 2013, 4-5). The United States actively supported the Guatemalan army through military assistance and covert training (Garrard-Burnett 2013, 38-39). In the Mayan-Ixil genocide, eleven towns and ninety-one villages were reduced to about eight

"model settlements," leading to overexploitation of available land, erosion, and continued deforestation, further reducing agricultural production, and hastening environmental deterioration (Schimmer 2006, 2-3).

The 1980s in Central America are known as "the lost decade." This was the youth context of many adults who participated in the research.

Following the signing of the peace treaties, groups with influence, political power, and coercive capacity have shaped an institutional design characterized by the extractive dynamics of the State's resources and little interest in solving the problems of the vast majority (Hernández 2020, 164). In these countries, the transition to democracy has not necessarily meant creating and consolidating institutions for equitable distribution of common goods.

Comments on vulnerability and adaptation limits

It is worth noting that these are considered cumulative when referring to loss and damage. Beyond the means to address or rectify them are lacking, the social and economic impact persists on the population. Moreover, the frequency and intensity of the loss and damage that has occurred have not allowed the community to complete recovery, but rather the continuation or subsistence of the social, environmental, and economic system in the face of climate events that generate loss and damage. The system persists and with it the effects of past events.

International institutions and governments know that threats do not materialize in isolation. After extreme and slow-onset events caused by climate variability and change, full recovery and reconstruction are not achieved. This intensifies the accumulated effect with each new phenomenon. Moreover, it is not surprising that these phenomena occur simultaneously. It is recognized that this exacerbates the loss and damage and makes reconstruction and recovery all the more costly for governments and individuals (Government of Guatemala 2010, xvi; IDB and ECLAC 2021, 7).

Opportunities

As is evident through time capsules and context notes, Central America has experienced a historical lag in human rights due to socioeconomic, educational, and environmental exclusion by the State, especially of indigenous peoples and Afro-descendants, which explains how communities are at a disadvantage in terms of crises or disasters. However, ethnic, age, and gender diversity represent an opportunity for policy development and service delivery with cultural relevance and context-aware adaptation.

The fieldwork shows that endogenous organization is key. Technical support, non-reimbursable funds, project financing, capacity building, and agroecological systems yield good results. Provided that all work is based on the local culture, the communities' resilience and food security can be significantly improved.

This was evidenced by the case of a young farmer from Camotán, who for several years now has implemented the traditional Ch'orti' agroforestry system (*Kuxur Rum* or "wetland"), in addition to stone structures to retain water (Guatemalan farmer, personal communication, March 16, 2022); or that of a farmer in Jocotán, whose plot at the time of the visit was one of only a few in the village with shade and green crops, due to access to irrigation and crop diversification and Association (Guatemalan farmer, personal communication, March 15, 2022).

Community participation

At each meeting and interview, people expressed the degree to which the communities have reached their adaptation limits. However, the stories reflected in this research assume an important precondition: participating in the research was part of their daily activities to improve their communities, i.e., one more day of active participation.

For these people, telling their stories was not an isolated event. Afterward, they addressed other matters in the local school; they stayed in the area for research and took advantage of resuming their meetings or talked about the projects they had in progress: signposting areas of risk in Nejapa, planting mangroves in Garita Palmera, and solving water supply issues in Zacatecoluca. People will continue to be active subjects and participants in transforming their communities to deal with climate change's impacts.

Final reflections

In recent years, Central America and especially the countries visited have experienced a continuous cycle of extreme weather events that have affected the living conditions of those whose livelihoods depend on the climate, most notably farmers and fishermen. In this context, we have demonstrated that from a Climate Justice perspective, there are significant community implications regarding loss and damage.

For the people interviewed, it is clear that climate change does not occur in a vacuum. Testimony reflected that climate change interacts with other elements of daily life, such as extractive dynamics and human decisions. All the communities visited mentioned other stress factors exacerbated by climate change. In other words, there is a rich territorial perspective and a very careful and detailed understanding of their communities.

Even so, certain unsustainable adaptation measures may be adopted. Families invest more and more to meet their basic needs, which often intensifies their socioeconomic and environmental vulnerability.

Extreme weather events have generated losses and damage over the past 25 years. These climate phenomena repeatedly affect those unable to recover from the previous event fully. Loss, both economic and non-economic, is continuous and perpetuates vulnerability and inequality.

The research process highlighted the low level of participation of the States or their complete absence while evidencing the preponderance of humanitarian agencies and local organizations. Daily, they respond to emergencies and develop adaptation capacities in the communities while addressing urgent needs for food, decent housing, and a healthy environment.

Moreover, we identified the closure of democratic spaces in all three countries and the occurrence of economic conflicts between communities and extractive companies that exacerbate vulnerability to the impacts of climate change. These

conflicts endanger the lives of environmental human rights activists across Central America and make it even more pressing to take comprehensive measures to guarantee Climate Justice and Human Rights.

Internationally, the inability of Global North diplomats to understand the urgency and scale of the negative effects of climate change on people's lives is evident, culminating in decision-making processes that do not address the needs, dignity, and right to justice of the affected individuals. This is an expression of the continuity of the logic of extractivism and colonialism, which are reproduced by structural injustice, racism, and discrimination on the part of carbon-intensive economies (Martinez 2022).

Inequality persists even with Central American communities' agency, participation, and a deep sense of resilience. Loss and damage from weather events are paid for by vulnerable communities daily, affecting mainly women, girls, and minority populations. Their experiences must be heard and resonate in all decision-making spaces, ensuring their dignity and a fair future prevail.

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