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ARTICLE

Design of a Socially Inclusive Climate Risk Transfer Mechanism: A Case Study in La Guajira, Colombia

Cristian Camilo Fernández Lopera[1] · José Manuel Mendes[2] · Eduardo Jorge Barata[3]

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Abstract
The primary aim of this study was to develop a model of a socially inclusive climate risk insurance (CRI) mechanism based on the differential risk transfer approach. This study focused on the department of La Guajira, Colombia, as a case study. La Guajira is the department in Colombia that, due to its critical disaster risk conditions, presents the adequate configuration for implementing a climate risk transfer mechanism. The article starts by analyzing risk conditions by using secondary data. Based on fieldwork, this research explored the perspectives of the most vulnerable sectors in La Guajira Department on the socioeconomic impacts and needs they experience regarding climate-related hazards, their adaptive measures for risk reduction, and their willingness to adopt CRI. This represents the fundamental input for the formulation of the CRI model. Consequently, this research proposed an operational structure as input for future implementations of the model. The results indicate that national and local disaster risk management public policies align with the sectors' needs and priorities. Strengthening sectoral associations can enhance representation in CRI projects. In-kind indemnization is preferred for women entrepreneurs and the indigenous community. The CRI model includes a risk pool through the family compensation fund of La Guajira as a sectoral agglomerator, with contingent credit and traditional/parametric insurance. The methodology developed in this study can be applied in different contexts worldwide as a guidance for informing national and international climate risk finance initiatives.

Keywords Colombia · Disaster risk financing · Disaster risk management · La Guajira · Climate risk insurance · Socioeconomic vulnerability

1 Introduction

In the Caribbean region, the most pressing impacts of climate change (CC) are heatwaves, droughts, altered precipitation patterns, and more severe tropical cyclones and storms (Reyer et al. 2017). According to Chand et al. (2022), the Caribbean region presents an increase in the intensity of tropical cyclones in the last 50 years, despite formation rates decreasing by approximately 9% and 18% during the twentieth century compared to the pre-industrial era.

In the Caribbean region of Colombia, various climate-related hazards affect areas with poor social and economic conditions, a history of armed conflicts, displacement, and corruption. These conditions exacerbate vulnerabilities to disasters (Tavares et al. 2018). Moreover, this region is home to many ethnic groups, including indigenous and Afro-descendants. According to Chisty et al. (2021), these groups are the most vulnerable to suffering from climate change.

This study focused on the La Guajira Department in the Caribbean region of Colombia, which was selected based on a prioritization methodology developed by Fernández et al. (2023b). La Guajira was identified as the most suitable department for implementing a climate risk insurance (CRI) mechanism with a gender and ethnic approach. Climate risk insurance refers to a financial risk management tool used to shift economic losses resulting from climate-related hazards from individuals or organizations to insurers or other risk

✉ Cristian Camilo Fernández Lopera
camilofernandez@ces.uc.pt

[1] Centre for Social Studies, Institute for Interdisciplinary Research, University of Coimbra, 3000-995 Coimbra, Portugal

[2] Faculty of Economics, Centre for Social Studies, University of Coimbra, 3000-995 Coimbra, Portugal

[3] Faculty of Economics, CeBER, University of Coimbra, 3004-512 Coimbra, Portugal

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pooling entities (Kreft and Kohler 2019). The prioritization process used a multicriteria decision-making analysis based on the differential risk transfer (DRT) approach (Fernández et al. 2022). The DRT is defined as the process of transferring the financial consequences of risk from the affected party to the insurer, considering the characteristics of gender and ethnicity of an individual or community, thus enabling access of vulnerable groups to social or financial benefits.

Given that La Guajira is identified as the most suitable territorial unit for implementing a socially inclusive CRI in Colombia, this study aimed to develop a CRI model based on the DRT, targeting the most vulnerable sectors. To accomplish this, this research began by providing an overview of the risk conditions of the study area, using secondary data. Subsequently, the analysis delved into the current state of risk insurance regulation in Colombia, acknowledging it as one of the primary limitations to the implementation of CRI in the country (Le-Quesne et al. 2017), and as crucial input for potential model implementation in the future.

Including the local perspectives of the most vulnerable sectors in the design of CRI mechanisms is the only way to ensure sustainable and impactful results (Fernández et al. 2024). According to Gaillard et al. (2019), the lack of involvement of local actors in disaster risk management (DRM) projects diminishes the autonomy of territories to manage their risks in alignment with culturally accepted practices known to the communities.

Consequently, following fieldwork and primary data collection, with emphasis on intersectionality (Chisty et al. 2021), this research identified the target population, exploring their socioeconomic impacts and needs resulting from climate-related hazards, their adaptive measures, and their willingness to adopt CRI. The primary data shaped the design of a socially inclusive CRI model, drawing on global examples like the WFP (2020), where pastoralists from Ethiopia benefit from a livestock CRI in drought-prone areas; the WFP (2021) case study where indigenous women in Guatemala were insured against climate-related hazards; the WFP's CRI, which provided financial aid to improve food security for farmers in the Kyrgyz Republic (Camargo et al. 2023); and the CRI for low-income microentrepreneurs in Colombia presented by Cuadros and Vaca (2023).

1.1 Disaster Risk Conditions in La Guajira Department

La Guajira Department was prioritized as the most suitable case study by Fernández et al. (2023b), considering components such as gender, ethnicity, poverty, exposure to hazards, and governance. La Guajira is one of the 32 Colombian departments and is located in the Caribbean region of Colombia, comprising a total of 15 municipalities. It shares borders to the north and west with the Caribbean Sea, to the east with Venezuela, and to the south with the departments of Cesar and Magdalena (Fig. 1). It spans an area of 20,844 km^2 (1.8% of the Colombian territory) and has a total population of 1,002,394 (2% of the Colombian population). Of this population, 51% are female and 49% are male, with 47.5% residing in urban areas and 52.5% in rural areas (DANE 2024).

Notably, 38% (380,460) of the total population identifies as indigenous Wayuu. Other indigenous communities include the Wiwa and Kogui, comprising 3.3% and 1.7% of the total population respectively. Additionally, 14.8% of the population identifies as Afro–Colombian. Of the remaining population, 42.2% self-identifies as non-ethnic, including people of diverse origins (a mix of indigenous, white, and black). The number of Wayuu people has increased by 40.7% in the last 15 years, primarily due to high levels of fertility and immigration from Venezuela (DANE 2024).

Venezuela has faced a humanitarian crisis, leading to a massive emergency. Since 2014, over six million Venezuelans have fled the country. Colombia, despite its limited experience with recent immigration, has taken in over three million displaced Venezuelans. La Guajira, the department most heavily affected by the migrant influx, is deeply impacted due to its proximity; consequently, Venezuelan migrants play a significant role in exacerbating the risk conditions in La Guajira Department (Restrepo and Jaramillo 2018).

According to DANE (2024), La Guajira ranks second in the top 10 of departmental monetary poverty (with 53.7 points versus 27 of the national median) and extreme monetary poverty (with 16.0 points versus 7.2 of the national median) in Colombia. Similarly, the multidimensional poverty index calculated by DANE (2024) places La Guajira in the fourth position (51.4% out of 19% of the national mean). Additionally, it has the highest gender wage gap (30% out of 12% of the national mean). The income inequality (Gini coefficient) was 0.552 in 2018, while the national average is 0.517 (DANE 2024). The most significant economic activities include: (1) commerce, hotels, and restaurants; (2) communal/social/personal services; (3) manufacturing industry; (4) real estate; and (5) transportation (DANE 2024).

Tropical cyclones significantly contribute to the occurrences of floods, coastal erosion, and infrastructure damage (UNGRD 2018). La Guajira is categorized with high vulnerability to water scarcity (UNGRD 2018) and its prioritized hazards are floods and droughts (UNGRD 2018). In addition to the hazards and socioeconomic vulnerability conditions mentioned above, 80% of the municipalities have DRM capacities below the national average that increase disaster risk (DNP 2019). La Guajira ranks with the highest levels of risk (position 31 out of 32) in Colombia (UNGRD 2018). This ranking highlights the three prioritized

Fig. 1 The study area La Guajira Department in the regional and national context

municipalities—Maicao, Manaure, and Uribia—as experiencing the highest socioeconomic impact from climate-related hazards. In La Guajira, 14% of the population is exposed and vulnerable (UNGRD 2018).

1.2 Current State of Climate Risk Insurance Regulation in Colombia and Disaster Risk Management Plans Including Climate Risk Insurance

As of mid-December 2023, Colombia did not have specific regulations for CRI outside the agricultural sector. The government aims to expand risk transfer regulation beyond agriculture. Decree 034/2015 allows insurance companies to use bank correspondents for product delivery, while Decree 2123/2015 facilitates marketing operations for CRI. These efforts align with the National Development Plan 2022–2026 (Congreso de Colombia 2023), which advocates for integrating parametric insurance into the Financial System's Organic Statute (Congreso de Colombia 2003).

As of December 2021, 23 out of 43 insurers in Colombia offered inclusive-CRI, indicating a conducive environment for its adoption. Parametric insurance options for droughts and excessive rainfall are available through companies like SBS-Seguros, MiCRO, and Bancamía (UNDP 2023). Climate risk insurance demonstrates promise in Colombia, as seen in initiatives like the insurance for the Manizales Municipality (Marulanda et al. 2014), which operated within existing regulations.

The departmental plan for DRM includes three disaster risk finance (DRF) projects focusing on insurance policies within productive sectors and private goods. At the municipal level, 10 projects concentrate on risk transfer, with eight specifically addressing CRI for droughts, floods, and cyclones (Alcaldía de Maicao 2012; Alcaldía de Manaure 2012; Alcaldía de Uribia 2015). All DRM plans incorporate CRI, with a notable project aimed at organizing sectoral and community stakeholders into cooperatives, which could facilitate CRI development. Aheeyar et al. (2019) stressed the importance of associations for CRI implementation, noting that their absence can hinder initiatives, especially in La Guajira due to limited organizational capacities and diverse community objectives. Hence, the CRI model can be informed by (sub)national DRM

strategies, the national plan for DRM, and the national strategy for DRF (UNGRD 2015; Fernández et al. 2023a).

2 Materials and Methods

This research used secondary and primary data to comprehend the local context of DRF and insurance in La Guajira. Secondary data analysis involved reviewing programs and projects at the national and local levels. Primary data collection comprised semistructured interviews to gauge the needs and capacities of local stakeholders regarding CRI as input for the design of a socially inclusive CRI model for the study area. Figure 2 presents the components for designing a socially inclusive CRI in La Guajira. It depicts the methodological sequence of the research, based on recommendations emerging from experiences in poor settlements in South America, as presented by Sarmiento and Torres-Muñoz (2020).

2.1 Selection of Population Groups through an Intersectional Lens

This research considered findings by Fernández et al. (2024), where participants stressed the importance of studying the most vulnerable sectors to disasters as actors of the CRI model. Recommendations from two DRM officials from La Guajira, each with over 15 years of experience in risk reduction, were also incorporated. Both the study and DRM officials agreed that the sample target population for benefiting from a CRI should be:

(1) Entrepreneurial women-head households: a foundation of entrepreneurial women that aims to promote handicraft sales, and supports 32 beneficiaries, including 22 indigenous individuals from the Wayuu group and 10 Venezuelan migrants.
(2) Agricultural Producers Association: a merchant association specializing in fishing and pastoral products, with over 20 years of activity in the territory.
(3) Indigenous community: a Wayuu women leader with over 10 years of experience working with indigenous Wayuu.
(4) Terrestrial transport company: It is highly relevant for daily activities in the region, particularly for the dispersed ethnic population (Campos et al. 2012).

Fig. 2 Components for designing a socially inclusive climate risk insurance (CRI) mechanism in La Guajira

Consequently, the activities outlined in Sect. 2.2 were applied to the four target groups mentioned above, following the methodological sequence presented in Fig. 2. Interviewees were selected intentionally based on their key roles and experience, with efforts made to ensure a gender-balanced sample. A total of seven interviewees were chosen, with each participant undergoing an average 60 min interview guided by a set of predetermined questions. The interview method of research is particularly suitable for studies involving key actors within a multisectoral group and individuals with time constraints. It serves as a valuable tool for collecting insights based on participants' perspectives on CRI (Bernard 2006).

The selection of seven interviewees aimed to capture representatives from the most vulnerable sectors who were available for interviews. The small sample size was due to the absence of productive associations. However, these individuals were widely recognized as representatives of their sectors and possessed extensive experience within the territory.

Participants were approached using the snowball methodology (OSU 2023). Interviews were conducted in Spanish, the participants' native language, and were carried out in person in the municipalities of Riohacha, Manaure, Maicao, and Uribia in the department of La Guajira. The interviews were conducted between November and December 2023. The interviewee group consisted of three females and four males, with an average age of 48 years, a median of 45.5 years, a mode of 39 years, and a standard deviation of 8.9. All seven interviewees held professional academic degrees.

2.2 Data Collection and Analysis

The questions were designed to address the main challenges of each type of actor regarding CRI, covering various aspects such as gender-based violence and jobs' impacts following a hazard, sectoral needs for response and recovery, willingness to participate in a CRI mechanism, and financial support for recovery. The questions of the interviews contributed to understanding their needs, vulnerability, and organizational capacities as inputs for the design of the CRI model.

The interviews were transcribed in Spanish using the "F4transkript" software. Kelle and Kluge (2010) established categories to characterize empirical phenomena (abduction) derived from interview-generated data. The analysis involved coding information, grouping codes into categories, and employing a phenomenological reduction process, which included: (1) coding based on information; (2) identifying pertinent statements; (3) forming significance units through aggregation; (4) providing a textural description; and (5) offering a structural description (Moustakas 1999). This analytical process culminated in integrating results to inform the design of the CRI model. Using the designated code system, interviews were input into MAXQDA, a specialized software for data analysis. The pre-established categories were further subdivided into codes, systematically applied, and identified within each interview.

2.3 Ethical Standards and Procedures

The research adhered to ethical guidelines outlined in the informed consent, which were specifically tailored for this study. The questions and consent forms underwent validation by the ethical commission of the Centre for Social Studies (CES), University of Coimbra. A data storage policy was implemented to ensure the confidentiality of interviewees. Audio recordings and interview transcriptions were stored without any indication of the interviewees' names or roles, using reference codes instead. Prior to each interview, participants were asked for permission to record the session. Names were omitted from the transcriptions.

3 Results

This section explores the socioeconomic impacts of climate-related hazards; identifies needs for prevention, preparedness, and response, and assesses the feasibility of implementing CRI. This informs the design of the CRI model presented below.

The collected data were categorized into 16 codes and grouped into five categories, prioritized by relevance (Table 1). The "type of actor" category identifies representatives from the four stakeholder types analyzed. "Socioeconomic impacts" detail the effects of major hazards, closely linked to "needs for recovery," highlighting differential vulnerabilities. Finally, "adaptive measures" encompass DRM artefacts and activities (Herazo and Lizarralde 2023) and their potential integration with CRI, leading to the analysis of "willingness to implement CRI."

Data triangulation mainly used information from semi-structured interviews. A notable limitation is potential biases or incomplete information from interviewees. The small number of interviews makes the study exploratory in nature and should be understood as representing the perspectives of the interviewees rather than a generalization of all sectors in La Guajira Department. The quantitative analysis underscored consistent emphasis on words like community, risk, insurance, and Wayuu (Fig. 3).

3.1 Socioeconomic Impacts of Climate-Related Hazards

The absence of detailed information on seasonal variations and economic costs of business interruption in the study area hinders the quantification and evaluation of losses associated to climate-related hazards such as tropical cyclones, droughts, or floods, which directly or indirectly affect income.

3.1.1 Entrepreneurial Women-Head Households

The hazards prioritized by entrepreneurial women-head households are floods, caused by both tropical cyclones and prolonged rains during the rainy season (September–December). During floods, entrepreneurial women face a complete loss of income, as they rely entirely on handicraft products. The interviewees agreed that women in La Guajira are disproportionately affected by climate-related hazards compared to men, as they often need to displace themselves to sell their handicrafts in local markets. A 54-year-old entrepreneurial woman household head from the municipality of Maicao commented that "The workload for women increases significantly due to many Wayuu still cook with firewood, which becomes wet during the rains. Everything in their lives becomes more complicated during this period." This is not a unique situation for La Guajira but also a global issue experienced by women in India (Shukla 2023) and Bangladesh (Akter et al. 2016).

3.1.2 Agricultural Producers Association

Floods affect the goat farming sector by leading to conditions favoring some diseases and exacerbating food scarcity. They also disrupt transportation to local markets and reduce the chances of selling animals. Crops are generally not significantly impacted by floods. Tropical cyclones primarily damage agricultural infrastructure. Climate-related hazards within the agricultural sector, as it is male-dominated, disproportionately affect men compared to women.

Conversely, droughts are typically more detrimental to most crops. Droughts significantly impact local farmers' economies, as they can persist for four to six months, leading to longer recovery periods compared to floods. The interviewees attributed the cause of droughts to the negative impacts of climate change. They noted an increase in the magnitude and frequency of droughts, along with an expansion in areas affected by desertification over the past decade.

Table 1 Description of categories and codes for the analysis of the interviews

Categories	Codes	Description
Type of actor	Entrepreneurial women-head households (association)	It includes entrepreneurial women and a representative from the Wayuu community
	Indigenous community	It includes representatives from the Wayuu community
	Agricultural producers	It involves fishers' and farmers' associations
	Private sector	It includes representatives from commercial and a transport association
Socioeconomic impacts of climate-related hazards	Product's high and low seasons	It correlates seasons with the occurrence of hazards
	Hazards by gender	It identifies intersectionality as part of gender-based vulnerability to disasters
	Prioritized risks	It identifies the main risks of the stakeholders
	Cost of business interruption	Refers to the cost of one week of business interruption for each sector
Needs for recovery from climate-related impacts	Needs for response and recovery	It refers to the recovery needs of the local sectors
	Trusted institutions	It identifies the most trusted institutions with influence in La Guajira
	Gender-based violence (GBV)	It assesses whether GBV is experienced, observed, or heard in the communities following a disaster
Adaptive measures to climate change	Actions for disaster risk management (DRM)	Refers to the actions implemented by sectors to prevent, prepare for, respond to, and recover from disasters
	Organizations involved in DRM	It identifies the organizations involved in DRM
	Financial support: prevention and recovery	It aims to identify economic support to stakeholders for DRM
Willingness to implement climate risk insurance (CRI)	Awareness of CRI	It identifies awareness of CRI and practices
	Willingness to know and implement CRI	It explores the willingness to implement CRI
	Existing insurance products	It identifies the insurance products used and known by interviewees

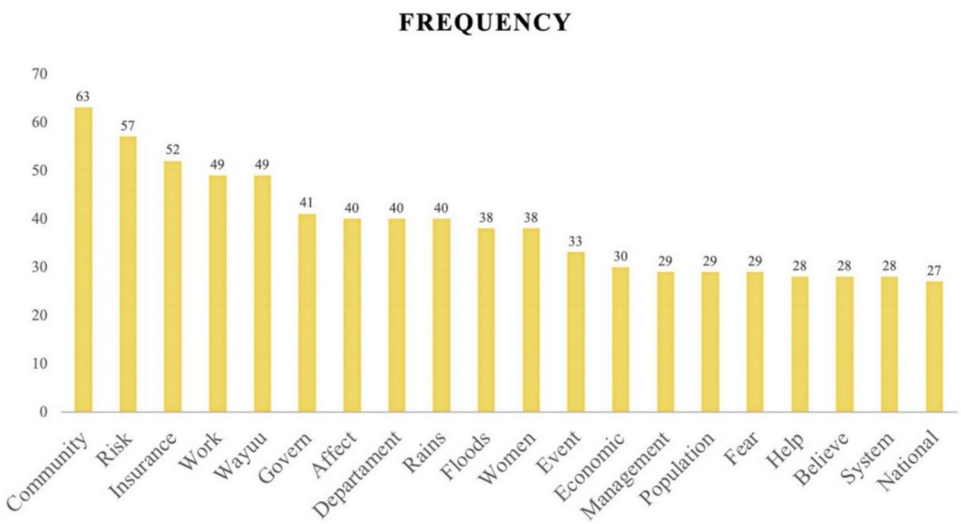

Fig. 3 Word frequency in the seven semistructured interviews

The interviewees did not view fishing as a critically affected sector by climate change. Interestingly, their perceptions differ from the government's official reports on climate change impacts for Colombia (IDEAM 2015), which emphasize significant negative effects on this sector, and especially for the Caribbean region.

3.1.3 Indigenous Community

Floods and droughts are the primary hazards affecting the Wayuu's development. These hazards interrupt production and trading processes, affecting the entire business chain. While the Wayuu, mainly living in arid regions, have developed centuries-old adaptation practices for coping with droughts, they have fewer strategies to cope with floods.

The rainy season, coinciding with the tropical cyclone season, can be significantly intensified by the La Niña phenomenon (UNGRD 2018), as observed in 2018. The interviewees recalled that this year was one of the most severe disaster years in the past 50 years. This severity was attributed to both tropical cyclones and the arrival of Venezuelan migrants to La Guajira (Restrepo and Jaramillo 2018). A 67-year-old Wayuu women from Uribia commented that "In 2018, we, the indigenous people, were mixed in shelters with Venezuelans. When the capacities of the shelters were exceeded, the national government started paying local families to host the affected people in their homes. This represented an economic alternative for urban families, but it also created conflicts because our cultures are completely different. We had no capacities to cope with the crisis."

According to the interviewees, the migration wave caused insecurity, diseases, and xenophobia. Xenophobia from Wayuu communities against Venezuelan migrants emerged as a consequence of the massive media attention and economic resources directed towards migrants by international cooperation agencies and the national government, leaving behind indigenous communities that faced similar problems derived from floods during 2018. This was identified as ethnic-based violence by the interviewees, which brings forth the discussion on intersectionality (Álvarez-Díaz 2020).

According to the interviewees, within the Wayuu community, floods disproportionately affect women compared to men. Similar situations are noted in various regions worldwide, such as Guatemala (WFP 2021) and Bangladesh (Chisty et al. 2021), where the economic burden on women is significantly higher during and after floods compared to men. In the case of Wayuu women, the matriarchal system imposes a heavier load of unpaid labor. During floods, they are tasked not only with producing and selling handmade crafts but also with managing family finances and advocating to local authorities for assistance.

3.1.4 Terrestrial Transportation Company

The primary risk prioritized for this sector is floods. The vehicles are significantly impacted by the poor conditions of roads that turn into swamps when heavy rain strikes. The interviewees mentioned that the most problematic timespan is September to November. According to them, both men and women are equally affected in this sector. The interruption of transport operations significantly impacts low-income service providers such as mechanics, car workshops, cleaners, roadside restaurants, and so on.

3.2 Needs for Recovery from Climate-Related Impacts

The most frequently mentioned topics by the interviewees in this category were needs for response and recovery. Gender/ethnic violence during disasters and trusted institutions were equally discussed. The insights from this category can guide the design of the CRI model concerning resource allocation and the most appropriate type of compensation following disasters.

3.2.1 Entrepreneurial Women-Head Households

Gender-based violence (GBV) encompasses any harmful act committed against an individual's will, rooted in socially constructed differences between females and males (UNICEF 2017). The interviewees noted that due to the matriarchal culture of La Guajira, there is a clear trend of disasters not triggering GBV for either men or women. However, GBV manifests through prejudice and discrimination. Afro and indigenous women suffer the most from the consequences of machismo (ReliefWeb 2023). Gender discrimination surfaces post disasters when entrepreneurial women face more barriers accessing credits and government subsidies compared to other entrepreneurs. This situation is particularly challenging for entrepreneurial women heading households from indigenous or Afro ethnic backgrounds.

The interviewees stressed the importance of having supplies and materials in advance to continue making their products during floods when roads and markets are closed. They argued that these actions should be accompanied by economic subsidies in urban areas or food distribution in dispersed rural areas to reduce the need for daily trading of handmade products for sustenance. The interviewees did not mention any aspect related to the "trusted institutions" code.

3.2.2 Agricultural Producers Association

The needs for response and recovery are based on the necessity of creating productive clusters. The interviewees

mentioned the need for improving road conditions to make them less susceptible to closure by floods. Pastoralists and fishers recurrently mentioned the need for improving productive associations for the design and implementation of initiatives through these associations. The interviewees did not mention any aspect related to the "trusted institutions" code.

3.2.3 Indigenous Community

The interviewees from the indigenous Wayuu community expressed a fundamental need to critically examine issues related to ethnic-based violence after disasters. They argued that numerous racism problems have arisen after governmental actions for response and recovery were implemented in their territories. Cash transfers or in-kind aid have led to conflicts between indigenous people and non-ethnic populations, as well as between both groups and Venezuelan migrants.

The interviewees emphasized the need for caution in cash aid distribution. During the 2018 humanitarian crisis, the national and departmental governments, through their DRM offices, began supporting indigenous Wayuu communities with cash assistance. The interviewees argued that this led to a surge in crime within Wayuu communities because the benefit was attributed to only a select group, and the criteria for this decision were not adequately communicated to the entire Wayuu community in a timely manner. The most trusted institutions are the National Unit for Disaster Risk Management (UNGRD) and international cooperation agencies such as the United States Agency for International Development (USAID), the German Agency for International Cooperation (GIZ), and International Organization for Migration (IOM).

The interviewees highlighted that the food box content provided by the national government—UNGRD—and local DRM authorities is not part of the Wayuu diet. Wayuu families often sell or reject most of the food provided by governmental aid. The interviewees unanimously agreed that the most useful emergency aid for them includes hammocks, bed sheets, mosquito nets, kitchen utensils, and medicines. Construction materials are also deemed relevant, with emphasis placed on the need for raw materials to rebuild their houses. A 46-year-old Wayuu women from Uribia commented that "As Wayuu, we always emphasize that food boxes must be more adapted to the culture of our people. On the other hand, the materials provided by the government such as zinc roof tiles, increase the temperature inside the houses. This is because we insist on creating a center of raw local materials." Cash indemnities are not considered a feasible alternative for the Wayuu communities, due to the high dispersion of the population, low financial inclusion rates, and poor financial infrastructure of delivery channels. References for in-kind indemnity are presented by Churchill and Matul (2012).

3.2.4 Terrestrial Transport Company

The interviewees highlighted significant ethnic-based discrimination against La Guajira's private sector compared to other departments of Colombia. They argued that it is more challenging for them to obtain flexible loans from financial institutions. Consequently, there arises a need for the private sector to appeal to the national government to mediate with financial institutions and insurance companies to provide more flexible products adapted to their capacities. The most trusted institutions are the UNGRD and departmental DRM agency.

In terms of priorities, this sector requires closer communication and coordination with DRM authorities to inform and prevent road closures. Their primary focus is on preventing road closures to keep their vehicles operational and avoid losing contracts due to travel restrictions.

3.3 Adaptive Measures to Climate Variability and Climate Change

The most mentioned topics by the interviewees for the category "adaptive measures" were actions for DRM and financial support.

3.3.1 Entrepreneurial Women-Head Households

The interviewees mentioned that as an entrepreneurial women-head household association, they do not receive any economic support from the government. Only a small share of financial support from local companies is provided. The organizations involved in DRM that have supported them are the UNGRD, departmental DRM authorities, and international cooperation agencies such as the United Nations Development Programme (UNDP) and the Norwegian Refugee Council (NRC).

The interviewees mentioned various actions for prevention and preparedness, including reinforcing roofs with plastic ties to prevent them from being blown off during tropical cyclones and installing flood barriers. Additionally, as an association, they have insurance to protect their productive infrastructure against strong winds and heavy rainfall. They highlighted CRI as an interesting mechanism to attract more women entrepreneurs to their association.

3.3.2 Agricultural Producers Association

The interviewees highlighted that the poor progress of the agricultural sector in La Guajira is due to a lack of financial support from financial institutions. This limits capacity building in terms of infrastructure and technology.

The sector has not received any kind of financial support for implementing DRM actions. Additionally, the code "organizations involved in DRM" was not mentioned by the interviewees.

Regarding the "actions for DRM" code, the interviewees highlighted that DRM has been diminished in favor of more "topical" activities, such as energy transition and decarbonized production. They mentioned that the radical introduction of the energy transition has increased their vulnerability to disasters in the short and medium term. This is because all their efforts and resources are aimed at achieving "green goals," neglecting DRM.

3.3.3 Indigenous Community

The interviewees identified organizations involved in prevention and response activities, including national and departmental DRM authorities, the Ministry of Environment and Sustainable Development, the Colombian Agriculture Institute, the family compensation fund (COMFAGUAJIRA), and the Regional Autonomous Corporation (CORPOGUAJIRA). These institutions can collaborate on long-term disaster risk financing (DRF) projects. Moreover, the interviewees acknowledged the community's capacity to lead and implement DRM projects and be involved in designing CRI mechanisms. Indigenous communities can participate in DRM and CRI through representatives from their associations, engaging in activities such as risk communication and awareness raising, early warning, and nature-based DRM for floods. A 46-year-old Wayuu woman from Manaure commented that "We should be included in the implementation team. Our community holds ancestral memories and possesses all the historical information about the territory."

The Wayuu representatives pointed out that as a community, they do not take preventive actions or organize themselves to respond to and recover from disasters. Some individual actions are taken. Response actions include using plastic ties on roofs to protect against strong winds and installing flood barriers. Before dry periods, they collect water in natural wells and plastic tanks.

3.3.4 Terrestrial Transport Company

The interviewees from the transport sector argued that as companies, they do not receive any financial support for prevention and response. Economic resources are drawn from a spontaneous emergency fund during floods, but they consistently find their resources limited and insufficient to properly address emergency or disaster situations. The interviewees highlighted their lack of access to credit from the public sector or financial institutions to reduce their risk, primarily due to distrust in companies from La Guajira. Additionally, they had not implemented any adaptive measures to climate-related hazards.

3.4 Willingness to Implement a Climate Risk Insurance Mechanism

The most mentioned topic by the interviewees for the category "willingness to implement CRI" was willingness to know and implement CRI. The codes "awareness of CRI" and "existing insurance products" were equally discussed.

3.4.1 Entrepreneurial Women-Head Households

The interviewees mentioned that they recognize the role of CRI in reducing economic impacts of hazards. A 42-year-old entrepreneurial women from the municipality of Uribia commented that "I think for other women members of the association, this would be an excellent option to alleviate the economic burden we face every year due to climate impacts." They have insurance for their working infrastructure, especially for protecting family hotels, hostels, and craft stores. The insurance covers losses and damages resulting from strong winds, heavy rainfall, and floods. They mentioned that the implementation of CRI can only be possible with technical guidance and economic support, as they lack the financial capacity to cover 100% of the premium costs.

3.4.2 Agricultural Producers Association

The interviewees expressed their interest in learning more about CRI. They emphasized that the success of a socially inclusive CRI mechanism for Riohacha, Maicao, Manaure, and Uribia depends on how insurance is conceptualized and subsidized. The interviewees argued that paternalism from national or international organizations could lead to maladaptation in the long term, as it may remove producers' responsibility for reducing their own risk and preventing future disasters. They believed that if the CRI project is integrated with other DRM actions, better and more sustainable results can be expected. The interviewees acknowledged that the Ministry of Agriculture provides CRI for agricultural producers in Colombia. However, they mentioned that they have not benefited from any form of insurance.

During the conversation with the interviewees, an interesting topic emerged: the notion of the family compensation fund of La Guajira serving as an aggregator for various agricultural producers and associations from across the department. In La Guajira, the family compensation fund is COMFAGUAJIRA, a private nonprofit organization that gathers financial resources from affiliated companies. It is tasked with organizing employees under the Family Subsidy System to offer them benefits and services through cash, kind, and service subsidies (COMFAGUAJIRA 2024).

COMFAGUAJIRA could serve as a key stakeholder in consolidating a risk pool. As of December 2023, COMFAGUAJIRA had 25,000 members, including farmers, fishers, and pastoralists. This can be an alternative since they already possess a solid administrative structure, a good reputation, and experience in interacting and aggregating companies.

3.4.3 Indigenous Community

The indigenous representatives mentioned that there have not been CRI mechanisms in their community and agreed that a CRI can reduce the community's vulnerability to disasters. They emphasized that before taking any action, a communication and dissemination strategy should be implemented to inform about the criteria for excluding segments of the population, which could be resource intensive.

The fact that a CRI cannot cover the entire Wayuu community raises concerns. These concerns can be addressed by considering recommendations outlined by Prabhakar et al. (2015), focusing on making CRI easily scalable to other communities and managing expectations regarding payouts. Insights from practical experiences documented in case studies such as those implemented by Carter et al. (2023) in Kenya, inclusive insurance in rural areas of Colombia (Cuadros and Vaca 2023), and insurance for indigenous women in Nicaragua (Gonçalves et al. 2023) can also provide valuable guidance.

3.4.4 Terrestrial Transport Company

The interviewees expressed their willingness to learn more about CRI and its potential to reduce the economic impacts on their businesses. They argued that their lack of exploration into CRI is primarily due to a lack of information. They also highlighted concerns about the prices being too high for their capacities and proposed coordination with departmental and national authorities to access economic resources that would allow them to co-finance the premiums. The interviewees mentioned that they use car and life insurance, as these are official legal requirements necessary for operating their vehicles. These insurance types are not directly related to CRI.

3.5 Model of the Socially Inclusive Climate Risk Insurance of La Guajira

This section outlines a socially inclusive CRI model designed for future use in La Guajira and as a global reference. It is grounded in interviews with the most vulnerable sectors and aligns with existing DRF programs and projects. The model, illustrated in Fig. 4, includes guidelines for its implementation, and elaborates on the basis of the interviewees' perspectives regarding the socioeconomic impacts of hazards and their needs for recovery, their adaptive measures to climate change, and their willingness to implement CRI. The CRI model also amplifies the voices of La Guajira's

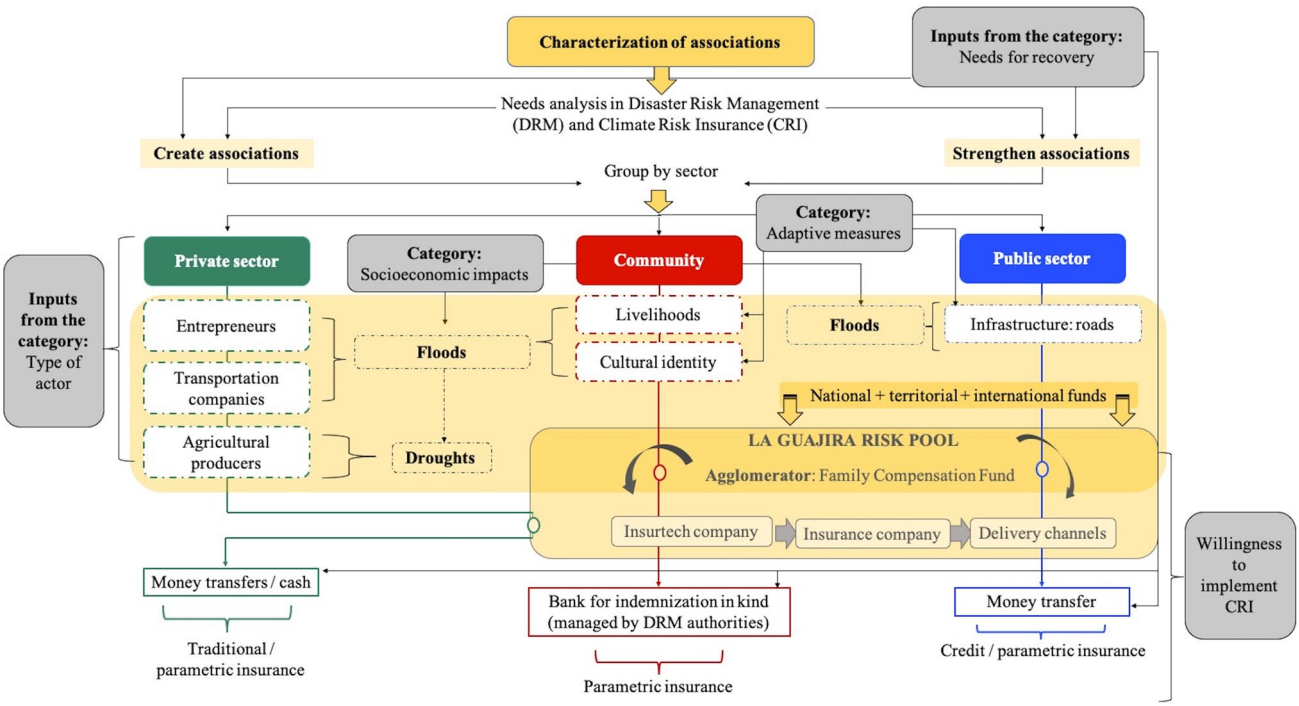

Fig. 4 Components of the socially inclusive climate risk insurance (CRI) model of the department of La Guajira, Colombia

most vulnerable sectors to disasters, urging their needs to be incorporated into international and (sub)national sustainable development agendas.

In the development, monitoring, and evaluation of the CRI mechanism, it is essential to involve community stakeholders to ensure empowerment and participation. To achieve this, it is relevant to consider the guidelines provided by the Colombia's Action Plan of the National Policy on Inclusion Financial Education, which aims to integrate financial services into local stakeholders' daily activities (DNP 2020). The CRI model is not merely a private sector endeavor; it is a mechanism for aligning stakeholders' objectives to improve the quality of life in La Guajira.

As discussed earlier, effective implementation of DRF instruments requires close coordination with risk knowledge, risk reduction, and disaster management efforts. To ensure long-term sustainability, the CRI model will involve national, departmental, and local public and private actors. Local stakeholders will lead the implementation and monitoring, supported by technical assistance from the national government and the insurance-related companies mentioned below.

Reducing institutional and organizational vulnerability is key to enhancing social capacities for disaster risk reduction (Gaillard et al. 2019). The model presented in Fig. 4 is based on interviews and takes as input the five categories analyzed (depicted in gray). These inputs are transformed into outputs through specific activities that guide the development of the CRI; thus, participants' voices are expressed in the CRI model.

The CRI model highlights current productive associations involving both private and community stakeholders, represented by green and red colors in Fig. 4, respectively. In sectors lacking associations (for example, goat farming), efforts should focus on establishing such organizations. For existing associations, an organizational analysis should be conducted to pinpoint gaps and needs, aiding in capacity building.

Considering the category "needs for recovery," clustering associations by type of stakeholder becomes imperative. Based on the category "socioeconomic impacts," this activity ensures that the model identifies the appropriate type of DRF instrument for each sector accordingly with its prioritized type of hazards. As depicted in Fig. 4, the private sector (highlighted in green) encompasses various stakeholders, including women entrepreneurs, transportation companies (susceptible to floods), and the Agricultural Producers Association (vulnerable to droughts).

Based on the category "needs for recovery," the community sector (highlighted in red) encompasses the indigenous Wayuu and their organization, with the objective of mitigating the impacts of floods on their livelihoods and managing droughts in alignment with their cultural identity. Conversely, the public sector (highlighted in blue), which includes governmental (sub)national DRM and infrastructure authorities, is treated as an independent sector, particularly susceptible to floods.

Despite the varying needs across sectors, they are interconnected, and the collapse of one can significantly impact the balance of others. Chain effects become evident in scenarios such as a tropical cyclone bringing heavy rainfall to the Colombia's Caribbean region. This can lead to floods, resulting in road closures, which in turn trigger socioeconomic crises (systemic risks).

To effectively address systemic risks, an interconnected DRF environment that actively engages the private sector within an established administrative platform is necessary. Therefore, this model suggests, following the consolidation of sectoral associations (and based on the outputs of the category "willingness to implement CRI), the establishment of a risk pool, using the family compensation fund (COMFAGUAJIRA) as an aggregator. This approach will significantly reduce the administrative and financial burden associated with creating a new organization. This option can effectively operate at a household level only if individuals are members of a community-based organization. These organizations would act as representatives of the community sector within the La Guajira risk pool.

UNESCAP (2024) highlights that family compensation funds oversee diverse forms of assistance, including financial aid, in-kind support, and service subsidies. References to the establishment of risk pools are noted in Indonesia (GSFF 2023), the Caribbean region (CCRIF 2021), and the Pacific (Tarazona 2020). The La Guajira risk pool will provide support to departmental and local institutions through a multilayered DRF strategy. This strategy includes offering credits for prevention measures (ex ante) and providing indemnity insurance (traditional/parametric) for public and private assets (ex post).

The financial and technical resources for implementation and operation are sourced from three main avenues: (1) National funds, including the UNGRD, the National Fund for DRM (UNGRD 2015), the Ministry of Finance and Public Credit, the Ministry of Commerce, Industry and Tourism, the Bank of Opportunities (BdO in Spanish) and the Federation of Colombian Insurers (FASECOLDA); (2) Territorial funds, encompassing departmental and municipal funds for DRM; and (3) International funds, which involve multi-donor funds such as the Global Shield (BMZ 2023), international cooperation agencies, and multilateral DRF projects like the World Bank's CAT-DDO III (World Bank 2022).

As proposed by the interviewees from the Agricultural Producers Association regarding the "willingness to implement CRI" category, risk pools will act as a platform for all stakeholders to interact and engage with the technical

aspects of operationalizing the CRI model. To enable this, the involvement of an insurtech company is crucial for defining technical parameters to establish insurance triggers. Collaborating with the insurance company, the insurtech company will manage and offer the insurance product. Indemnification will then be delivered to beneficiaries through predefined channels.

Based on the findings from the categories "needs for recovery" and "willingness to implement CRI," indemnification for the private sector will mainly involve cash transfers and direct deposits to bank accounts. The DRF instrument may take the form of both traditional and parametric (hybrid) insurance for transportation associations, while entrepreneurs and agricultural producers may be covered by parametric insurance. The coverage of parametric CRI for agricultural producers is justified by three main advantages that address their dispersed locations: (1) Causation is not required; (2) It prioritizes future hazards over past occurrences, making it adaptable to climate change conditions; and (3) It operates on contractual terms rather than adversarial principles (Horton 2018).

According to outputs from the category "needs for recovery" of the indigenous representative, a parametric insurance will trigger in-kind indemnization. This assistance will be administered by the local DRM authorities in collaboration with community-based organizations, guaranteeing prompt, sufficient, and culturally appropriate support. For dispersed beneficiaries, cash payments will not be provided. Instead, they will receive redeemable vouchers directly from their local agro-dealer and logistics center to obtain an input package. This in-kind compensation method has been previously tested and yielded positive results by Biffis et al. (2022) in Tanzania.

A notable case study is the My Safe Sowing initiative (Mi Siembra Segura in Spanish) (UNDP 2023). Developed by UNDP in collaboration with MiCRO and operated by SBS-Seguros, it targets Afro–Colombian and indigenous organizations. MiCRO acts as the insurtech company, while SBS-Seguros (both operating in Colombia) serves as the insurance company (Fig. 4).

4 Conclusion

Implementers face a significant challenge as cash indemnification is not viable in two out of four sectors. Therefore, implementing a CRI in La Guajira requires addressing two key questions: What are the expectations, and how can indemnization be delivered to beneficiaries? This logistical hurdle can be overcome by coordinating with other DRM projects, as suggested by Fernández et al. (2024), outlined in the municipal DRM plans of Uribia, Maicao, and Manaure. These projects involve conducting financial protection campaigns considering cultural barriers of the indigenous population, implementing collective insurance policies for homes, and training and establishing community-based organizations for DRM.

The insights gathered from the interviews offer innovative perspectives for designing context-specific CRI mechanisms through a tailor-made indemnization. Hazard impacts helped to identify interviewees' operational, technical, and financial needs for response and recovery. The participative CRI model enhances the proactive approach of DRM, moving away from the reactive stance often favored by governments.

The national and local DRM public policy frameworks align with the needs of the interviewees and prioritize the same sectors as the most vulnerable. The departmental plan for DRM in force includes three financial protection projects aimed at promoting insurance policies within productive sectors and for private goods (Gobernación de La Guajira 2015). The current local public policies in La Guajira aim to organize stakeholders into cooperatives, which is also one of the most cited needs. Addressing gender-based violence, particularly affecting indigenous and Afro women, is crucial. Ensuring women's financial inclusion and rebuilding trust in economic sectors are essential steps for reducing vulnerability to disasters.

In-kind indemnization is preferred by the interviewed women entrepreneurs and the indigenous Wayuu. Strengthening sectoral associations can enhance representation in CRI projects. Road improvements are vital to prevent flood-related closures and economic disruptions. Financial literacy and understanding of DRF and CRI are necessary, while a strong cultural identity is seen as a valuable asset, with community-based organizations holding significant potential. The case of the Caribbean Catastrophe Risk Insurance Facility (CCRIF 2021) as a regional risk pool can guide the consolidation of La Guajira's risk pool.

The limitations of this study stem from the fact that the analysis is based solely on qualitative primary data and existing literature. Considering the small number of stakeholders engaged in this study, the data collected through the interviews represent the perspective of representatives from each sector and cannot be generalized to all stakeholders in La Guajira. To draw broader conclusions and implications, additional research is necessary.

This study can serve as a framework to guide future research endeavors and as a blueprint for the entire department and other vulnerable areas and sectors in Caribbean countries. The proposed model incorporates the needs of local stakeholders, amplifying their voices to contribute to more inclusive DRM and DRF actions.

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