The language of risk and the risk of language: Mismatches in risk response in Cuban coastal villages

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A B S T R A C T

Like other Caribbean countries, Cuba has adopted policies to relocate populations and prohibit (re)building in coastal zones at risk of climate change effects. Yet residents do not uniformly see such measures as welfare promoting and risk reducing, and may resist relocation, even in places where disaster planning is respected and effective. In such instances, vernacular narratives reveal local understandings of threats, vulnerabilities, and the measures taken by the state. Drawing on the case of Carahatas, a coastal community in Cuba, this study contrasts local residents' understanding of risks with those apparent in public policy. Results from this extensive case study (2016–2020) reveal how citizens resist relocation and struggle for continuity in a context of marginalization. Most residents are less afraid of sea level rise than relocation and prefer to maintain their livelihoods and traditions. Local voices reflect a focus on the risks of daily life. Public policies—based on the adaptation-resilience framework—prioritize instead a longer-term approach, emphasizing safety and best use of state resources over maintenance of existing livelihoods, settlements, and social networks. Understanding vernacular explanations of risk and disasters is crucial to develop risk reduction policy that respond to people's needs and expectations.

1. Introduction

For decades, coastal communities in Cuba have been affected by meteorological hazards. Residents have learned to face risk and avoid destruction [1]; they know their territory, and how to protect their belongings, and how to evacuate. Cuban authorities' alarm at climate change and variability (CCV) is prompting plans for the relocation of people residing in risk-prone coastal areas. But residents in these villages have a different priority. For them, concerns about sea level rise, heat waves, or changes in precipitation are secondary to what they deem more immediate ones such as how to send their children to school or purchase an indispensable good. The differences in priorities reflect different perspectives on the nature of risk. They also guide us to challenge the relevance of resilience approaches used by scholars and disaster experts, and the adequacy of recent policies.

We start with a descriptive question that guides our study: How do vernacular narratives used to explain CCV-related risks in Cuba differ from those used by decision makers and academics? To answer this question, we explore the case of Carahatas, a coastal community in northern Cuba. We seek to explore current climate change strategies, as well as to expose local perspectives regarding risk and CCV. We reveal that when it comes to risks associated with CCV, there is a disconnect between: (a) the narratives adopted by mainstream academics, international consultants, and most decision makers in Cuba, and (b) the beliefs, needs and expectations expressed in local residents' narratives. We ultimately argue that to make better decisions in the face of global warming, we must balance the need for change with citizen's need for continuity.

The first section of this article summarizes relevant approaches to disaster risk reduction (DRR) in the context of climate change. The narratives of resilience and adaptation in the dominant literature become the foil against which the empirical evidence of local understandings is analyzed. In the methods section, we explain the empirical approach adopted in Carahatas, which focused on ethnographic work and narrative analysis, but also included direct observation, interviews and community meetings. In the results section, we

highlight the community's priorities and compare them with government adaptation strategies and policies. In the discussion section, we explain the gaps between local understandings of risk in Carahatas and the frameworks of resilience adopted in mainstream academic discourse and government approaches to CCV. Finally, we conclude that there is a need to understand vernacular discourses in the face of climate change and to include them as the basis for disaster-risk reduction policy in the Caribbean.

2. The hazards of mainstreaming or mainstreaming the hazards

Several authors have recently claimed that terms and concepts stemming from Western scholarship dominate disaster-related research and practice in the Global South [2–4]. Abstract concepts such as "vulnerability," "resilience," "informality," and "adaptation" are prevalent in disaster studies [5]. Mainstreamed, standardized and internationalized, they are increasingly used as the basis for policies and programs in the Global South [6]. However, these abstract concepts often fail to describe phenomena found "on the ground" and, consequently, to solve local problems [7,8].

Some authors have claimed that CCV-related studies increasingly rely on depoliticized ideas [9,10]. One example is the frequently adopted definition of vulnerability as the "sensitivity or susceptibility to harm and lack of capacity to cope and adapt" [11]. This definition fails to capture the political stance that characterized early writings on vulnerability—see for instance, Hewitt [12]—and the neo-Marxist approach adopted by some of the proponents of the vulnerability theory [13]. In the Pressure and Release (PAR) model, and in more politicized definitions of the term, vulnerability is seen as the consequence of socio-political decisions, and as a characteristic that evolves over time from "root causes" to "unsafe conditions" [14]. Another example is adaptation. The 2014 glossary of the Intergovernmental Panel on Climate Change (IPCC) defines adaptation as "the process of adjustment to actual or expected climate and its effects." Specifically, in human systems, adaptation seeks to "moderate or avoid harm or exploit beneficial opportunities" while in natural systems, human intervention may facilitate "adjustment to expected climate and its effects" [11]. These definitions fail to recognize issues of distributive justice, inequalities, segregation, racism, and other social conditions that must be redressed to truly avoid disasters.

Despite (or perhaps, because of) this lack of political engagement, the integration of mitigation and adaptation strategies in the face of CCV is seen by most authorities, urban consultants, and scholars as an action that is unavoidable [15] and the backbone of resilience implementation [16–18]. And yet, since the creation of the PAR model, most social scientists agree that marginalization, segregation, colonialism, racism, and neglect are often the real causes of vulnerability [14]. Several proponents of the vulnerability theory during the 1990s adopted a clear political stance in their analysis of risk [19], where vulnerability is seen as the consequence of socio-economic inequalities, typically exacerbated by neoliberal practices and savage capitalism [13].

Current definitions adopted in CCV policy do not always reflect such political dimension of risk. In fact, critics deplore that several terms associated with resilience (such as adaptation, adaptive capacities, redundancy, and panarchy) do not fully address or explain the underlying political tensions [8] and real phenomena that shape risk [20]. Others argue that resilience has been hijacked by authorities and political elites [21], and that certain uses of "vulnerability" fail to provide a proper framework to grasp social injustices [22].

Some authors argue that economic and political elites have used the resilience discourse to advance neoliberal agendas in both developed and developing nations [23]. Others note that adaptation policies and interventions often have perverse effects, "directly increasing vulnerability for the targeted and/or external actor(s)" or "eroding pre-conditions for sustainable development by indirectly increasing society's vulnerability" [24]. These contrary outcomes are often

considered examples of "maladaptation" [24]. Finally, other scholars have claimed that decision makers and scholars typically fail to distinguish between individuals who are adapting to new risks and those who are simply surviving [25].

Given such critiques of the mainstream ideas underpinning academic and policy discourse, some authors have claimed that it is difficult to address CCV-related risk reduction in the Global South without a thorough understanding of the specific politics, stories and problems of communities at risk [26]. Brown [27] for instance, provides a comprehensive criticism of resilience. Discussing the use of resilient frameworks and conceptualizations in development policy, Brown argues that "they adopt new a new lexicon and some new concepts, but still do not address fundamental causes—of poverty, inequality, global change or vulnerability" (p. 54). However, Brown refuses to abandon the notion of resilience. Instead, she proposes revisiting it from a perspective of political ecology, and a bottom-up, localized and culture-sensitive approach. She argues that resilience must be based on three pillars: (a) rootedness, seen as attachment to place and meanings of local action; (b) resistance, seen as socio-political reaction to power systems; and (c) resourcefulness, or the capacity to mobilize resources and skills. Other authors have focused on a more radical approach to decolonizing disaster risk narratives and scholarship [3], and argue that the understanding and communication of local narratives is fundamental to balance the influence of Western academic rhetoric [28]. Our research contributes to such debates by putting forward structured research into local discourse around what constitutes risks, what they signify for different people, and how they are addressed.

3. Four decades of disaster risk reduction without resilience

In 1963, only a few years after the Cuban revolution brought Fidel Castro to power, the mighty Hurricane Flora hit Cuba. The hurricane prompted awareness about the need for an organized system to protect Cubans from natural events. Thirteen years later, after years of exploring different disaster-risk reduction approaches, the Cuban government consolidated a comprehensive system locally known as "Civil Defense." This system was meant to protect the population and national economy against destruction caused by military interventions or triggered by man-made disasters or natural events. It was based on defensive measures that were to be deployed both in peacetime and during exceptional situations (such as a war or natural events). Over time, this system achieved considerable success, managing to reduce deaths and injuries caused by meteorological hazards [29–31].

The Cuban model of protection against danger relies on a dispersed network of information and institutions at the national, regional, municipal and neighborhood levels, supported by the government and the army [30,32–34]. Here the state is responsible for protecting citizens, industries, buildings and settlements. Its response to natural hazards borrows from principles of defense against a military attack, including the creation of decentralized centers of response and decision-making [35]. Organizations led by women and residents play a crucial role in this decentralized model; the Women's Federation and the local Revolutionary Defense Committees are largely responsible for implementing risk reduction and disaster response measures [33]. The system provides for rapid response to major events, but also issues early alerts and deploys strategic risk reduction measures [36].

In Cuba, the Civil Defense model is considered a space for constant debate and analysis of past events, emerging risks, and better practices for the future. It includes periodic checks, drills, and training [35]. In Cuba, a country with a very high level of education, climate change policy is taken seriously and is driven by science [37]. Risk prevention is routinely taught in schools and universities. There are strong institutions devoted to risk management, including planning agencies and disaster management centers at the national, regional and municipal levels [23]. Information, risk communication, and early alert systems are accurate. Evacuations are implemented with authority, timeliness, and efficiency.

The health system is strong and available to everybody. Besides, the system is supported by strong institutions that provide housing solutions to low-income families, such as the "Community Architect" [33,38].

Due to the effectiveness of the Civil Defense system, tropical storms and hurricanes have resulted in very few casualties in Cuba—at least until five years ago. It must be noted that these same events routinely killed thousands in Haiti, the Dominican Republic, Puerto Rico, and other Caribbean islands, and caused millions of dollars in damages in the southern United States. Despite very limited financial resources and continued and cruel oppression by the United States government [39], over the past 40 years Cuba has developed strong social and institutional capital that makes it less susceptible to suffering from disasters [40]. But climate change effects and are demanding new and more extreme measures, and as the sea level rises, new approaches have come from abroad.

4. From "civil protection" to resilience

Concepts such as resilience, adaptation, and adaptive capacities were absent in Cuban policy before 2014. They were also absent from the 2015 Plan for Risk Reduction and Vulnerability written by the National Planning Institute (although a short preface to this plan written by the UNDP representative in Cuba, mentioned "urban resilience" seven times, and "capacity/ies" five times). The resilience framework was also not apparent in local scientific publications, even those specifically devoted to climate-change induced floods—see, for instance Ref. [41]. For almost forty years, Cuban risk reduction and prevention had been portrayed as a duty of state protection, never as a "resilience approach."

But the language used to describe risk and disasters in Cuba is changing rapidly. Today, many of the risk-related measures adopted in Cuba are presented or interpreted as resilience strategies, accompanied by a narrative of adaptation or of development of adaptive capacities. As the aforementioned preface to the 2015 Plan for Risk Reduction shows, international agencies are playing an important role in this change in discourse.

After Hurricane Sandy hit Cuba in 2012, the United Nations Development Program (UNDP) partnered with local institutions to create a reconstruction plan based on the notion of "resilient cities." Two years later, UNDP published the guidelines for the reconstruction of "resilient housing" in Santiago de Cuba. This trend towards the new "resilience" policy continued. In 2015, UN Habitat and UNDP partnered with the National Planning Institute (*Instituto de Planificación Física*) and the Civil Defense to conduct a project aimed at "enhancing urban resilience in Cuba." [42,43]. This work eventually led to the publication of the "Guide for Urban Resilience," which instructs municipalities on how to adopt the resilience framework [44]. Activities to share this approach with scholars and technocrats followed. In October 2018, UN-Habitat organized a debate on "urban resilience" [45]. An increasing number of projects funded by the United Nations agencies in Cuba (including a project supported by the Sustainable Development Goals Fund in Santiago de Cuba) now seek to reinforce local or urban resilience. Resilience has also been applied to other areas, such as energy, agriculture and forestry. In 2019, for instance, UNDP funded a project to install photo-voltaic panels in almost 1500 houses as part of an initiative to "increase resilience among communities in the face of extreme meteorological events through the use of energy renewals" [46]; p. 1). In 2020, UNDP launched the Coastal Resilience program, aimed at "developing natural solutions to adaptation to climate change" [47]. The same year, the *Agence française du développement*, the French foreign aid agency, issued a call for consultants to enhance resilience in the Cuban city of Cienfuegos.

Women have always played a crucial role in DRR in Cuba, but the recent change of language has been accompanied by an even greater emphasis on gender. In 2014, the UNDP guidelines for post-Sandy reconstruction argued that women during the disaster "increased their role and activated their potential and experience as mothers, wives,

daughters, partners, care-givers, communicators and guardians of family wellbeing." It claimed that women "supported men who were depressed and saw their traditional role of 'providers' threatened." The organization found there was a need to "share all roles, public and private, between men and women." It also encouraged including women in housing construction, an activity that, UNDP found, was traditionally conducted by men.

The influence of international consultants has slowly percolated into the discourse of local institutions. For instance, the 2016 National Environmental Strategy sought to "maintain, restore, and rehabilitate ecosystems to increase their resilience, and improve the provision of services that can contribute to climate change adaptation and mitigation" [48]; p. 27). The National Planning Institute argues that the 21st-century challenge for Cuban cities is to become "more resilient" [49]. The 2018 New Cuban Urban Agenda promoted by UN Habitat and the National Planning Institute seeks to increase the "resilience of human settlements and the response capacity against natural and human-made hazards, enhancing adaptation and mitigation to climate change" [50]; p. 40).

In 2017, the government approved the program *Tarea Vida* (Life Task), Cuba's strategic plan to fight climate change [51]. The program, which is based on multidisciplinary scientific knowledge and locally sensitive implementation [52], is a general framework to deal with housing, infrastructure, risk awareness, education, and climate-related technical support. It additionally acts as a "over-arching policy framework" to determine regulations for urban and regional planning. One of its main goals is to "ban construction of new houses in coastal settlements at risk of flooding" and to "reduce density in coastal areas." [53]. Another goal is to "preserve and recuperate the sand beaches of the Cuban archipelago, prioritizing those that have been built for tourism purposes and reducing the vulnerability of its built heritage." A particularly controversial measure is Law No. 212 of 2000, which sets guidelines for the Urban Planning Office's safeguarding of communities and management of risk in coastal zones. Law 212 prohibits construction and modification of permanent houses in coastal flood-prone zones and, crucially, states that all communities located in protected coastal areas must be relocated [54,55]. The law anticipates the "possibility of consultation with citizens," but determines that the final outcome (reducing density in flood-prone areas) is "unavoidable."

Controversy revolves around both the process and content of Law 212. Some residents believe that its development proceeded without substantial consultation with coastal villagers; that it significantly harms social and cultural networks, particularly among fishing communities; and that it is applied unevenly. Small coastal villages are expected to relocate, whereas in coastal areas that serve the tourism sector, construction of facilities and infrastructure is largely tolerated. Given that tourism is one of the main components of the local economy, hotels, resorts, theme parks, and other tourist attractions are sometimes protected through added infrastructure, rather than relocation.

Journalists have struggled to cover the news of resilience measures and to explain the new jargon [56]. The adoption of a resilience narrative has sometimes sparked debate and contributed to tensions in Cuba. A journalist reporting on a 2016 forum on urban resilience in Cuba, co-organized by the UNDP, explained that for many people, resilience is "a concept adopted from psychology to refer to individual adaptation to adverse situations," whereas for others, "it is a controversial concept about facing the negative consequences of the neoliberal economy" [57]. Such media observations echo the international critiques of resilience in DRR, discussed previously, as full of abstract, de-localized and de-politicized language that may produce policies that are irrelevant to local needs, or, worse yet, provoke mal-adaptation, compounding rather than reducing vulnerability. At the local level, in coastal communities in Cuba, the new narrative's influence is apparent in DRR policies regarding rebuilding and relocation. Our suspicion was that the new language of resilience and adaptation, and the associated policies, were not well-understood by coastal villagers and were

promoting policies at odds with their needs. The research, presented below, indeed found deepening differences between the way risk is explained and communicated by scholars and authorities, and the way risk is perceived and lived by residents in disaster-prone areas—notably those whose voices are less heard. The following sections dwell on these differences.

5. Methods: Listening to local voices

In order to identify—and eventually amplify—the unheard voices of people facing climate change impacts in Cuba, we conducted, from 2016 to 2020, an extensive case study in Carahatas, a village located in the central province of Villa Clara. This site was selected because Carahatas is one of the coastal villages now facing relocation under Law 212. Carahatas has a long tradition of varied responses to natural events. Moreover, its residents have been open to questions and research activities and researchers were granted the authorizations necessary to conduct research on site.

We adopted two complementary methodological approaches: ethnography and narrative analysis. As such, our study entailed analysis of discourse, and also "living" (or at least "experiencing") the meanings, representations and values conveyed by language. Ethnography helped us to understand risk and disasters as part of complex socio-political contexts [58], whereas narrative analysis allowed us to distil local explanations of that reality and compare it with other representations of it [59]. Following Hammersley's principles of ethnography, we both *did* ethnography and *used* ethnographic methods [60]. This was necessary to achieve what Atkinson [61] calls "textual constructions of reality" in Carahatas. In the first steps, participant observation was crucial during community meetings and activities; then we engaged on "explicit interpretation of the meanings and functions of human actions" [62]; p. 248). We focused on narratives as tools to understand both challenges in development [63] and explanations of hazards [64]. We conducted critical discourse analysis as suggested by Fairclough and Wodack [65]; in the sense that we recognized discourse as "ideological work," that is rooted in history and becomes the basis for social action.

According to Paschen and Ison (2014, p. 1083) narrative research offers "an innovative, holistic approach to a better understanding of socio-ecological systems and the improved, participatory design of local adaptation policies." Adopting the approach proposed by Moezzi et al. [66]; we used narratives as both tools and outputs to collect, analyse, and critique explanations of risk. Narratives are here the primary communication tool that people use to improve living conditions and reduce risk [63,67]. But we also recognize that language has a cultural and political connotation and tried to reflect these dimensions in the results explained here.

The empirical study was subject to an Ethics Committee review in both a local and external university. It included six sources of data:

1. Survey: we conducted a survey consisting of 18 questions that focused on local practices in response to CCV impacts. We received 86 responses to this survey from community members from both genders and with diverse roles in the community. Questions addressed local practices, housing conditions, risk perception, and perceptions of living conditions. They included: "What are the main risks that residents face in Carahatas?" "Do you like living in Carahatas?" and "Are you willing to participate in the relocation of Carahatas?" Survey results were analyzed by three local researchers who wrote research reports that were then compared to identify common patterns.

2. Interviews within the community: We interviewed 12 community members, including fishermen, schoolteachers, trainers, cooks, and housekeepers. Two leaders in the neighborhood and two leaders from associations, who often act as representatives of vulnerable groups, were also interviewed. The objective was to reveal detailed life stories and complement the information gathered in the survey.

We collected testimonies on recent events (including Hurricane Irma in 2017) and perceptions about them. We gave priority to residents who had undertaken construction activities in response to weather events. The interviews were conducted by local researchers in Spanish, and the transcripts were analyzed by two local researchers, who then worked together to identify the main categories of analysis.

3. Interviews outside the community: we interviewed 10 officers from the main public and private organizations in the region, including officials who participate in community-level actions, religious leaders, representatives of the fishing cooperative, and representatives of research and planning entities. These latter institutions included the Urban Planning Office, the Ministry of Science, Technology and Environment, the National Office for the Protection of Flora and Fauna, the Office of the Community Architect, the Municipal Civil Defense, and the Director of Finances for the municipal government.

4. Focus groups: Three semi-structured focus groups with about ten locals were conducted in 2016 and 2017. For these meetings, priority was given to residents whose voices are less heard, notably women who live alone with their children, elders, and residents with reduced mobility. The format facilitated open discussions and exchange of opinions about CCV adaptation practices. Here we recognized that local residents build or adopt narratives that are useful to them or the claims that they wish to advance, and leave aside those that are not [64]. We were therefore careful in contextualizing their explanations of risk and disasters within their social struggles and the existing governance structures.

5. Participant observation: Three researchers visited the site 15 times during the four years of research. Changes in the built environment were captured in photographs, plans and drawings. Researchers observed the social and natural context to reveal recurrent patterns and to understand the daily activities and routines of villagers. Two researchers stayed in the village for a period of time, recording in this way night activities and more profound practices and rituals (including those associated with fishing activities and the protection of goods and valuables). Observations were made before and after the effects of Hurricane Irma in 2017, which allowed researchers to understand the impact of a major event and to document the measures taken to mitigate its effects.

6. Review of documents and grey literature: More than 25 official documents about DRR and climate change responses were analyzed. They provided both quantitative and qualitative data to complement and validate information collected in the field. Here we conducted word counts in order to identify the recurrence of certain terms. After several iterations and discussions between researchers, we eventually paid particular attention to the Spanish equivalents of the following terms, that also became categories of analysis: resilience, adaptation, adaptive capacity/ies, defense, security, social change, vulnerability, poverty, exclusion, marginalization, and protection. We have been careful to recognize that some of these terms have particular connotations in Cuba. "Framing" therefore is a way of producing social change or maintaining the status quo. "Defense," "security," and "protection," for instance, are part of the language used to describe the government's mission and the responsibility of the Cuban revolution. As such, these terms are simultaneously applied to refer to control of criminal activities and to a response to natural hazards.

The transcripts of interviews and the reports of meetings and focus groups were subject to an analysis of subject categories and language (all in Cuban Spanish first, and in a more "international" Spanish later). One local leader and one representative of the local government were invited to two research sessions in order to validate and comment on the early results of the study. They corrected some interpretations and provided several nuances that are captured in this article. Then data were analyzed independently by two multidisciplinary groups of researchers

comprising architects, urban planners, geographers and other social scientists. Three members of the local group in Cuba are fluent in English and three members of the international group are bilingual. These two teams independently identified categories used in these narratives, and the categories were then compared. At this point, we exchanged researchers: one international researcher lived in Cuba for two months and a Cuban researcher worked in the overseas lab for four months. After several iterations of ideas an exchanges between the two teams, we agreed on two main narratives and four constructs that best represent the empirical outputs.

Given that the team includes researchers from Cuba, other Latin American countries and non-Spanish speaking regions, we paid particular attention to the translation of terms. It was important that local terms (those used for construction materials, for instance) were properly understood in standard Spanish and in English by externals. But, more importantly, it was crucial to explain the meaning of some local rituals and the relevance of certain values. For example, it is tempting to translate "*resistir*" (to resist) as a capacity. But in conversations with locals, we noticed that the term was referring not so much to a capacity, but to an *attitude*. In local narratives, women who resist a traumatic event, certainly have capacities to deal with destruction; but they also have a certain *attitude* to confront the event; this includes positivity, faith in a better future, and a determination to get over the event and "move to something else." How did we deal with all of this? Conversation proved to be our best tool, but art was useful too. For a few years, externals not only spent time in Cuba, but focused on reading Cuban poetry, watching Cuban films, and listening to Cuban music. Art became a tool to help us disclose hidden messages and to understand some nuances in local language. We also spent several hours of dialogue in Cuba with local residents and abroad between researchers. During the writing of this article, hours of WhatsApp conversations in Spanish with local researchers were used to validate terms, adjust arguments and find specific nuances.

Results were then brought together and discussed to identify common patterns. These patterns were then compared with previous studies to reach "analytical generalizations" [68]. This paper reports these patterns and conclusions, structuring them along the four main tensions we identified.

6. Results: A story of conflicting narratives

Carahatas is a village of 591 inhabitants (there were 664 residents in 2017) with a strong local architectural identity and a long history of fisherfolk traditions and cultural festivals [69]. The first row of houses is located along the seashore. The rest of the homes—single-story detached units mostly made of wood or concrete blocks—are located 250–300 m off the 2019 seashore. Most structures are located on both sides of a main street that runs parallel to the sea (see Fig. 1). Carahatas has two small halls for social gatherings, a store, a library, a pharmacy, a physician's office, and a primary school. Other basic services are located in the municipality of Quemado de Güines, about 17 km to the south [70].

The village is frequently affected by hurricanes and tropical storms [71]. It has faced multiple hurricanes including Cake in 1985, Michelle in 2001, and Irma in 2017. These meteorological events increase the risk of floods and the penetration of sea water into the settlement. In the medium term, the village is extremely vulnerable to sea level rise and seawater surges during tropical storms and hurricanes that are being exacerbated by climate change. Studies by the Cuban Meteorological Institute and the Urban Planning Institute [72] predict that at the current rate of atmospheric temperature increase, half the village's territory will be underwater by 2050 and it will be fully submerged by 2100 (see Fig. 2). Law 124 for the management of, and "adaptation to," changes in water sources is now based on such forecasts of sea level rise.

Residents in Carahatas recount their own ways of dealing with flooding, which are typically seen as "one more challenge" in the daily struggle of people living in remote, coastal communities in Cuba. As many as 82% of residents say they like living in the village [55]. Villagers (mostly fisherfolk) see climatological events as a regular part of their lives. They say they are used to dealing with water, which they depict as an integral and dynamic component of their lives and environment. "We have spent a lot of time on the sea," one senior fisherman says, "we know it. If you don't know the sea you should not be in it. If you are afraid of it you should not get in contact with it. I know how to navigate both during the day and at night" [73].

Roles are sometimes clearly defined according to gender. Men tend to work in fishing activities (the local fishing cooperative has 124 men and 14 women members), and therefore are sometimes absent from home for long stretches of time. Nearly a quarter of all residents are women who stay at home and take care of domestic chores, children, the elderly, and domestic animals. Women teach children at the school and
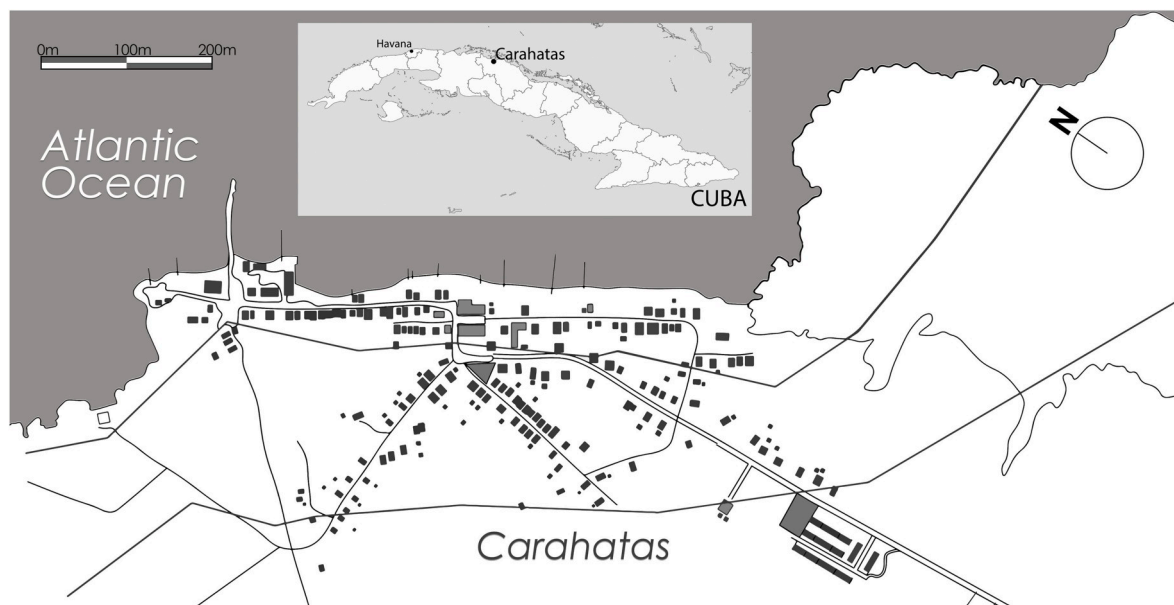

Fig. 1. Map of Carahatas, including the location of the village in the island.
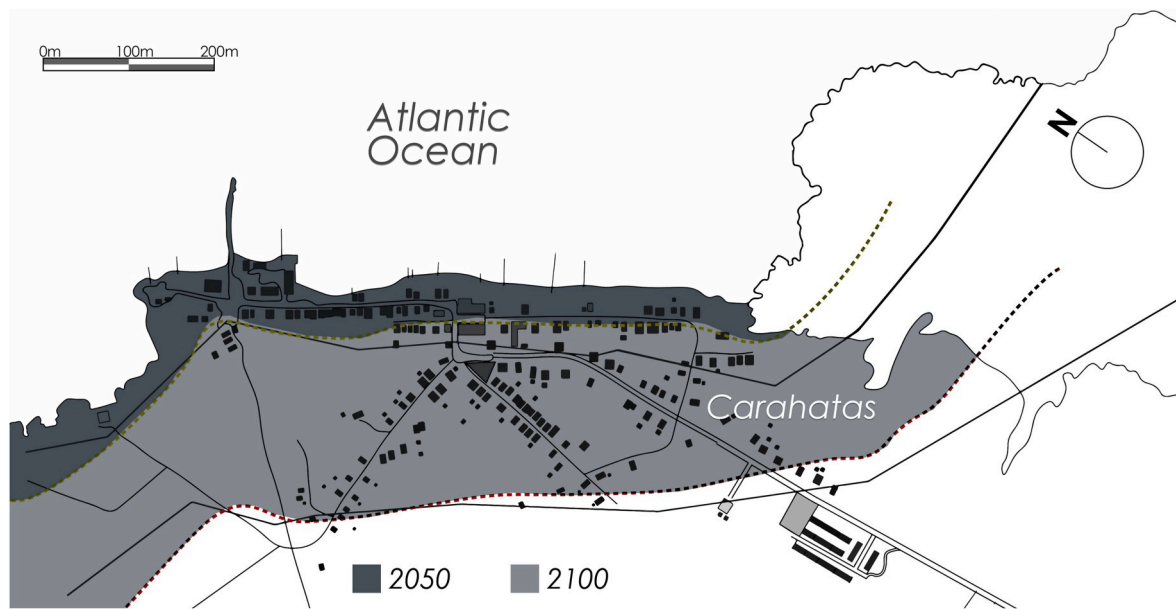
Fig. 2. Map of the village showing areas expected to be flooded in 2050 and 2100.

organize cultural and social activities, including the annual Sea Festival. Additionally, women sometimes help distribute the products of fishing activities. Finally, as we shall see below, women play a crucial role in risk management in Carahatas, a dynamic that is well known within and outside the community. Their interests are often represented by the Women's Federation.

Members of the community take care of the most vulnerable, such as children, women living alone, and elders. In case of emergency, "men and the representatives of the Civil Defense are the last group to evacuate the village" [70]; p. 57). However, CCV is having an especially strong effect on a series of activities that women are conventionally in charge of, such as water collection and management. With longer periods of draught, it is becoming more difficult for residents in general, and women in particular, to ensure that there is water available for domestic activities. Another example is food security, another aspect of domestic and collective life in which women have a crucial role. CCV is significantly affecting the availability of food, and it is becoming increasingly cumbersome for women to access meat, fruit, and vegetables.

Academic terms such as resilience, adaptation, mitigation and vulnerability (that is, their equivalents in Spanish), are seldom used by residents. Locals only use these terms when academics, technocrats, international consultants, and politicians bring them to the conversation. Instead, locals use a vernacular language that reflects and describes their daily practices. They refer to "protection," "solidarity," "collaboration," "care," and "continuity." In local narratives, water is perceived as a dynamic force that benefits the community and that is directly connected to people's identity and existence. "Water has never hurt me," says a local fisherman when asked about climate change risks; "only people have."

Storms and floods may be disruptive, but not in the ways conventionally seen by outside experts; villagers instead point to the local practices they adopt to protect themselves, to the potential opportunities for home improvements in the wake of disaster, and to the loss of key services that are due, not to storms, but to Law 212 measures purportedly aimed at protecting them. As we will show below, residents explain risk in Carahatas via two core narratives: the first focuses on the impacts of *living with natural events*; the second on the need for *continuity despite these natural events*.

6.1. Living with hazards: "Living with scars"

Carahateños (residents of Carahatas) live with risk, and do not claim to have developed resilience mechanisms (*mecanismos de resiliencia*). They do claim, however, that decision makers and academics often underestimate their knowledge and the value of their local practices to protect themselves.

Residents have specific risk-management knowledge acquired through local innovation and trial-and-error responses to past events. Houses in Carahatas and other costal villages used to be built of wood and on stilts, and roofs used to be covered in *guano* (leaves from palm trees). Wood and guano provided flexibility and allowed for proper ventilation within homes. Such structures were also easier and less expensive to repair than those made of bricks, cement sheets, and concrete blocks. But today, villagers prefer houses that combine wood and cinderblocks and use fiber-cement corrugated sheets for roofs. To be sure, they still build passages, storage spaces, and bathrooms on stilts, and they still use *guano* for secondary structures. Even though the use of "permanent" components such concrete and bricks in flood-prone areas is banned by Law 212, residents are increasingly using these materials to build their homes. One of the reasons is that wood is hard to find and expensive. Besides, as we shall see below, villagers have found innovative ways of combining the strength of cinderblocks and stone with the flexibility of wood.

Residents have developed several methods to protect their houses and belongings. These practices rely on the experience and knowledge that residents—especially women—have gained over time. But they also depend on families' economic standpoint. Fisherfolk usually have better incomes than the rest of the families in Carahatas, between six and ten times the average salary. Remittances from family members living abroad are another source of money for villagers. Families with higher income and access to remittances can pay in advance for materials and labor. Thus, they often benefit from discounts and can act faster to recover from disasters. In contrast, residents who do not practice fishing or receive remittances rely solely on government subsidies after disasters and, for them, recovery is often slower.

Some actions include raising furniture from the floor (temporarily or permanently), reinforcing roof structures periodically, developing systems to seal windows and doors, and securing belongings located outdoors (see Figs. 1–4). Residents also build barriers to stop the flow of water and create walkways and elevated roads to move between

Fig. 3. Barriers built by residents to prevent flooding. Left: made of wood. Right: stone.

Fig. 4. Ditch and canals built by residents to prevent flooding on a main road.

structures (see Figs. 3 and 4). These paths are often made of wood and connect houses to the bathrooms, which are built close to the sea and on stilts. Residents also build canals next to roads to improve water drainage and thus prevent floods.

Homes are constructed to minimize construction costs as well as damage from floods. People in Carahatas elevate the ground level of the house, securing belongings during moderate floods. The bottom part of external walls, as well as columns within and outside houses are reinforced with stronger materials like stone and concrete (see Figs. 5 and 6). With this solution, households save on expensive materials, because the rest of the house can then be built with wood.

Another generalized practice is to raise valuables, such as furniture and animals, high aboveground before tropical storms and hurricanes arrive. Given that Cuba has an efficient early warning system, most

people have two or three days to prepare before a storm. Women in Carahatas use this time to protect valuable items, pets, and other animals. While some furniture is elevated permanently, such as by being placed on blocks, other goods are moved shortly before a storm (see Fig. 7): furniture, appliances, and goods are raised within houses using pulleys, and interior boards are installed to serve as off-ground storage. To protect domestic animals, community members build cages of wood and wire mesh that they place on stilts, at heights dependent on the water level marks left by previous floods (see Figs. 7 and 8). Solidarity plays a crucial role in both risk reduction and emergency measures. Even though many of the activities are conducted at the household level, evacuations are seen as a collective endeavour, where community members in general, and the Civil Defense representatives in particular, are expected to "protect" the most vulnerable.

People in Carahatas also deploy a retrofitting strategy that local researchers call *detrás de la fachada* or "behind the façade." This solution consists of constructing a stronger, inner, house, while leaving the original wooden walls as the exterior. Since the use of concrete bocks and bricks in façades is forbidden by law, this strategy allows residents to reinforce their homes without showcasing their violation of regulations. Besides, exposed concrete block walls are vulnerable to saltwater and humidity, and thus, the wood exterior helps protect the structural walls.

Community members have lived in this territory for several generations—only 3% have lived in the village for less than 20 years [55]. Community members often observe that "the blows teach you something" (*los golpes enseñan)*. They know how to rebuild and have learned several lessons in the process. Survey respondents mention the experience of rebuilding after a storm as leading them to realize that continuity in the village is not only possible, but preferable (at least for the majority). According to one resident, "If something falls, we build it up again." They see the village as a dynamic organism that has learned to "live with scars" (*viviendo con las cicatrices*). Residents often remark that, "Life has always been like this" (*asi es la vida acá*). A catastrophic event is

Fig. 5. Elevation of the mean level of the floor within and outside homes.

Fig. 6. Reinforced columns and sidewalls of houses in Carahatas.

Fig. 7. Left: A bed permanently raised on blocks. Right: Temporary elevated storage of a rocking chair.

Fig. 8. Animal pens and cages on stilts.

simply "another day that might leave one of those scars." But, respondents contend, disasters are events that are "best left in the past" and, like other scars, they learn to live with them. In Carahatas, residents accept meteorological events and see them as part of regular life.

6.2. Continuity despite hazards: "As long as we are allowed, living here is still possible"

So Carahatas residents "live with the scars" of past events and draw lessons from previous experiences to help prepare for the future. Community members know that there are significant hazards affecting coastal areas and that they are particularly vulnerable [74]. But, at the same time, they are not too worried about *natural* hazards and say that technocrats and external consultants overestimate the risks of

destruction. They see substantial benefits to maintaining their residence along the coast, and numerous downsides to relocation. As one villager summarized, "As long as we are allowed, living here is still possible." Some villagers recognize that at one moment the village will have to be relocated eventually, but they see this relocation in the very long term and want to make sure that the timeline is not unnecessarily hastened.

Villagers say they can rely on a good system of information that permits both advance notice of extreme events and sharing of knowledge on how to deal with challenges. The alarm system allows for organized evacuations; vulnerable people—such as the elderly, pregnant women, women with infants, and people who live alone—are the first to be relocated. People trust authorities and their capacity to conduct timely and efficient evacuations and temporary relocation.

Community members often argue that "the sea is not the enemy."

Although experts predict that the first row of houses will be flooded within 30 years [41,75], villagers say they do not fear the consequences of raising water levels. They see coastlines as fluid. Water now covers parts of the settlement that were dry a few years ago, but locals observe that other areas are no longer navigable by boat due to ongoing sediment accumulation. While elders contend that the intensity of hurricanes has increased, they see it as normal that, from time to time, a strong natural event reminds them of "the mighty power of nature." Residents respect the ocean, but rarely fear its influence on the village.

In fact, almost no changes can be see in the settlement, or its layout, despite the number of minor events and major disasters that have hit it in the past years. The changes that have occurred are as much a product of government policy as of hazardous events. For instance, the so-called Pioneers Palace of Coastal Marine, a youth recreation center and study place, was destroyed by Hurricane Michelle in 2001. The government reopened it in the city of Quemado de Güines, about 17 km from Carahatas. But at a distance, the youth center is almost useless for the Carahatas community where young residents say they "don't have a place to have fun anymore." Similarly, new regulations on public security now prevent children from embarking on fishing boats. Residents argue that children's participation is crucial to preserving know-how of fishing and work at sea. In the absence of local employment and educational opportunities, teenagers and youngsters who want to work or study move to Quemado de Güines, Santa Clara, and other larger cities.

In social and economic spheres, lack of change is a central problem. In addition to a paucity of social spaces for youth, some medical services needed by the elderly, among others, are unavailable in Carahatas. Given the area's designation as a no-build zone, investments in expanding services and amenities in the village are unlikely. Local employment alternatives to the fishing boats are similarly limited and seen as unlikely to expand. Several years ago, decision-makers launched an initiative to farm lobsters and harvest sea sponges in an attempt to diversify the local economy. This business did not produce the expected results. The initiative received support from international charities and brought economic benefits to some local villagers in its early stages. But observers mentioned that it was doomed to failure, citing the ideas' and funding's origin outside Cuba. The result was a weak alignment with wider Cuban plans and social programs and a lack of proper training and operational support for the people in charge, which eventually led to failure. Stories about the experience communicate a tone of frustration common to local conversations about new economic activities in the region; as one resident quipped, "We are not allowed to improve ourselves."

Residents often refer to common priorities such as getting kids to school, purchasing essential goods like hygiene products (often scarce due to the American embargo), and access to equipment and medicine. Despite the hardships, though, most respondents state they prefer to maintain their residence in Carahatas, to evacuate only during weather events, and—once hazardous conditions subside—to return and repair their homes. "If the government ever forces me to leave," one woman said, "I would rather live on my boat than relocate to one of the apartment buildings inland." While this "return and rebuild" practice leads to a high debt burden among those residents who repeatedly opt for loans to repair their homes, they still prefer it to the disruptions, risks, and uncertainty of relocation. Most of the elderly do not want to relocate because "the sea is all [they] know" and they have a sense of belonging to the community and the territory. Although some respondents said they liked the prospect of moving closer to family members elsewhere in Cuba, many elders repeated: "We know the effects of climate change, and still we wish to die close to the sea."

Hesitations regarding relocation are compounded by the lessons of the past. Previous relocation initiatives are viewed by locals as ineffective. For instance, a few years ago, several families were relocated from Carahatas to a new development of five-story high apartment buildings called Lutgardita. A similar relocation process happened in the coastal village of Isabela de Sagua, where residents were moved to apartment buildings inland. Many of those relocated suffered psychological effects; others refused to move. In Carahatas, another relocation project moved about 60 families to two-storey attached units located in "safe" areas inland. Post-occupancy surveys find that the "solution" created new problems: for example, the second, higher level of the new houses often remains unused because elders and others with reduced mobility cannot easily access it.

Most local decision makers are now at a crossroads in how to apply current regulations. Law 212 is a policy at the national scale that does not fit particularly well with the characteristics of places like Carahatas or Isabela de Sagua. Local political leaders are aware of the construction and reconstruction activities occurring in coastal communities. They recognize that the risks of relocating are, for many coastal residents, greater than those of remaining in place. They see that local people prioritize a sense of belonging and the known challenges of daily life over what seems to them an extreme and precipitous response to the uncertain risk of floods. Many local officials are now helping fishermen in their reconstruction efforts, but fear that such support may result in punishment by national authorities.

7. Discussion: four tensions in DRR

Terms linked to the resilience framework, such as mitigation, adaptation, and adaptive capacities, are increasingly used in DRR policy in Cuba and many other countries in the Global South. They are now used to justify extreme risk-reduction measures such as Law 212. Decisions in the face of CCV are also increasingly based on terms that are closer to a narrative of enforced change than a narrative of tolerance, continuity, and social justice. As such, these decisions are becoming disconnected from the reality of residents in coastal villages.

Previous studies have found that the resilience framework, a notion largely developed in the Global North, is increasingly adopted in the Global South [4]. Mainstream implementations of the "adaptation" concept has often failed to include the more concrete, day-to-day perspective of the communities at risk. In many cases, the narratives about how to continue living in flood-prone areas and preserving local traditions have been largely missing from CCV-related policy. There is, therefore, a tension between protecting residents by reducing their inherent social and economic vulnerabilities, and protecting them at all costs through permanent relocation. By applying Law 2012 indiscriminately, authorities might overlook the risks and vulnerabilities that are created by relocation of coastal communities.

Our empirical study revealed four main tensions, each of which highlights mismatches between new resilience policy and local realities:

1st tension –Living with hazards vs. securing public safety: Villagers see the primary risk as that of moving from where they have friendships, history, livelihoods and a link to the water; they prioritize continuity and a sense of belonging. Government officials prioritize public safety and, though not always stated, investments that will generate benefits over many years (or at least ones that will not be washed away by next year's storm). Differing understandings of risks, of the timeframes within which they are experienced, and of the ways in which difficulties are managed, accepted, or avoided have generated conflicts over the new resilience-oriented regulations. Such differences mean Carahatas residents often find it hard to accept that relocation will reduce the risks they face in the short to medium term, and thus to make sense of the national government's relocation dictates.

2nd tension – External control vs. local autonomy: The plans and strategies designed to face CCV set actions to be applied across a wide range of sectors and communities, regardless of local characteristics. Each community has singularities and methods to face natural hazards. But local governments do not, at least in the Cuban context, have the authority to make exemptions or to give specific settlements more autonomy than others. Even if local residents communicate their expectations and urgent needs to local officials, they still have to comply with

national regulations even when they know they lead to poor results. Places like Carahatas enjoy a form of complacency from their local government, which is not yet fully enforcing Law 212 and acts as an intermediary between locals and national authorities. But residents fear that the central government, which sometimes applies measures more stringently, will actively intervene. This applies to housing construction, but also to regulation of livelihoods and economic activities. Fishing activities, for instance, are regulated by the national government. One-size-fits-all regulations of economic activities make it hard for villagers to innovate, start new initiatives, and modify their practices to respond to local conditions.

*3*rd *tension – Utopian solutions vs. pragmatism:* Most people in Carahatas believe that the village relocation program promoted by Law 212 is a utopian solution. Many recognize that in a system where housing must be guaranteed by authorities, the government does not have enough resources to apply this principle at large. They thus find a gap between policy intentions and the pragmatic means to achieve them. Many residents find it problematic that in this context, Law 212 is applied indiscriminately to coastal villages, rather than according to studies and technical data about local socio-economic risks in each village.

*4*th *tension – investment in small village vs. elsewhere:* Residents also suspect that economic returns on investments are a factor, though they state this is simpler terms. They recognize, for instance, that there is a lack of economic activity in Carahatas compared to that which exists—to a certain extent—in Quemado de Güines. Given the political system in place, there are no market pressures on housing and land in Cuba. But residents sometimes resent that coastal villages are not seen as generators of wealth or as administratively important. Their populations often have little access to construction materials, must rely on a limited number of traditional technologies, and have few financial opportunities. Large cities, such as La Havana and Santiago are also at risk of CCV effects, but, there, people have access to various materials, construction technologies, and financial investments, including those coming from the national government. Villagers question the fairness of limiting their own opportunity to stay in place, rebuild, and solve their housing needs. Previous studies have examined how citizens faced with risk must fight capitalist and neoliberal interests, which are often promoted by political and economic elites. This paper reveals that differences in the perceptions of vulnerabilities in the absence of market pressures also determine different risk-management approaches.

How representative is Carahatas of other coastal villages and settlements in Cuba? Our work in the province of Villa Clara, where Carahatas is located, suggests that even though conditions in Carahatas are particular, several coastal communities are facing similar challenges and tensions as those presented above. As mentioned above, a relocation project was completed a few years ago in Isabella de Sagua, and several members of the community have reported psychological distress after relocation. Plans to enforce Law 212 also exist for other locations, including Caibarién.

This study faces two main limitations. First, we focused on one community at risk of droughts, hurricanes and floods. This case is probably not generalizable to other threats such as earthquakes (a risk that is present in cities on the eastern part of the island) and heat waves. Second, it focused on conditions in the built environment, with only sparse references to other important aspects of well-being such as public health, education, security and livelihoods.

8. Conclusion: The importance of vernacular narratives in DRR in times of climate change

There is a gap between how (a) academics, decision makers and international consultants, and (b) local residents understand risks related to climate change. As climate change adaptation is mainstreamed in policy in the Global South, language and concepts derived from the resilience paradigm are increasingly depoliticized and universalized.

And yet, measures to address CCV produce winners and losers, and creates tensions that are overlooked in both local policy and international guidelines such as those produced by UN Habitat and UNDP.

Residents of Carahatas explain risks and threats through a narrative of continuity and social struggle that is often overlooked by climate change adaptation policy and international frameworks. This narrative is based on two main pillars. First, the acceptance of natural events as being part of their daily lives. Second, the idea of continuing current modes of living, despite imminent threats. Given this understanding of space, place and time, villagers transform their houses, land, and practices to maintain a connection to traditions, local values, and community rituals. They adopt a language of social struggle to ask authorities for socially just treatment and support for local initiatives. But they also adopt a narrative of tolerance to ask authorities for permission to remain in their location and improve their conditions by themselves. These narratives highlight four tensions that exist today in CCV-related policy in Cuba. Revealing these tensions contributes to a better understanding of competing objectives about protection and risk reduction. A deep analysis of these tensions also sheds light on the challenges that exist in the actual system.

Vernacular narratives should be the starting point of policy in Cuba and other Caribbean nations. The idea of continuity of communities at risk should be respected. Academics must help understand the expectations and needs of communities at risk. The inclusion of local beliefs and the narrative of continuity in research can help improve policies and decisions in Cuba and might lead to better prevention of loss of resources and people.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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