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Abstract

As population-related climate change research increases, so does the need to nuance approaches to this complex phenomenon, including issues related to cultural and linguistic translations. To explore how climate change is understood in understudied societies, a case-study approach is taken to address social representations of climate change by inhabitants of a Maore village in the French island of Mayotte. The study explores how local fishers understand the issue when considering observed environmental changes. Based on analyses of 30 interviews, the study found that social representations and related climate change discourses are not well established, except for individuals in close contact with French institutions. Issues regarding local culture and language reveal the importance of understanding the different components of climate change. Climate change communication and awareness-raising on the island are explored, as well as considerations of culturally and linguistically complex settings with a Global North/Global South interface.

Keywords

communication, discourses, French overseas territories, Global South, global warming, Indian Ocean, perception, social representation theory, translation

1. Introduction

In climate change research, understanding how this phenomenon is lived and understood by non-Western societies remains challenging due to cultural and linguistic translations (Rudiak-Gould, 2012). Little is known about communicating the concept across and within various languages, including those of the Global South, and studies often do not address translation issues (Haq and Ahmed, 2017; Cameron et al., 2015; Glory, 2019; Nielsen and D'haen, 2014; Schäfer et al., 2020). In addition, due to its connections to embodied problems facing communities, climate change's polymorphism (processes, issues, timing of impacts) makes it subject to a variety of interpretations (Jaspal et al., 2014). While many studies have focused on psychological frameworks, specifically individual perceptions of climate change as related to awareness, understanding, and affect (Brosch, 2021; Lee et al., 2015, 2020), some researchers have recognized the importance of looking at how the phenomenon is realized culturally and anchored socially (Mambet Doue et al., 2020; Wibeck, 2014). Because individuals act in culturally embedded contexts, it is important to understand the psycho-social interface using a theoretical framework.

One such approach is Social Representation Theory (Moscovici, 1961, from hereon SRT), which allows for the analysis of shared climate change knowledge among social groups. In SRT, language and communication are essential components for comprehending the interaction between individuals while constructing social knowledge of events. For example, it addresses linguistic aspects by focusing on how individuals name and discuss phenomena, such as the term climate change itself. Varying social representations exist regarding climate change, and there are still many communities whose perspectives are unknown (Crona et al., 2013; Mambet Doue et al., 2020). Few studies explore how climate change interpretations differ across specific populations through SRT, whose logic can help explain social paradoxes.

One population of growing interest due to its complex societal and environmental conditions is the small tropical island of Mayotte in the Western Indian Ocean. It is a newly French overseas department where climate change awareness has yet to be seen at a level comparable to the Global North¹ or small island communities, such as those found in the South Pacific Ocean. For example, media coverage of the issue is scarce, and governmental bodies and educational systems have yet to engage the population in large-scale awareness-raising campaigns. This makes climate change discourse(s) rare in any of the three main languages, which are French, Shimaore, and Kibushi. Moreover, these latter local languages are understudied and lack an institutional presence; for example, no written press exists in either of them and schooling is in French. Even if studies are limited, the island is most likely threatened by climate change in various spaces, including its mangroves and its double barrier coral reef from bleaching (Hughes et al., 2017; Obura et al., 2018; Trégarot et al., 2017), increased air temperatures (Météo-France, 2021), and higher-magnitude cyclonic events (Cattiaux et al., 2020; Yamada et al., 2017). These observations echo what is most likely happening on other isolated islands.

Despite these increasing risks to Mayotte and territories around the world like it, few studies on them exist looking at climate change from a social science perspective. To counter this lacuna, the study explores climate change understanding in Mayotte through the intersection of social representation theory and language use, whose crossroads could lead to an innovative approach to societal climate change research. By examining focused interactions on the issue as they relate to social representations, the field could become more informed about how multilingual and multicultural individuals comprehend climate change before implementing local awareness-raising initiatives. The study analyzes social representations of inhabitants practicing fishing activities on the island, who are of interest due to their knowledge of coastal environmental changes (Bercht, 2021). The study seeks to understand how language use (including translation issues) and early stages of climate change awareness interact during the emergence of a social representation of the phenomenon in Mayotte. Moreover, this case study allows space for analyzing social representations of people located in developing regions that have connections to the Global North's socioeconomic and political systems, something that is not often addressed.

2. Social representation and language on climate change

Social understandings of climate change

Research looking at people's understandings and opinions of climate change dates to the late 1980s in the United States and Europe (Bostrom et al., 1994; Kempton, 1991; Lofstedt, 1991, 1994). These initial studies showed that people were unfamiliar with the causes of climate change. This unfamiliarity continued, as shown in the 2007 and 2008 Gallup World Polls, conducted in 119 countries, where most respondents in developing countries never heard of climate change (Lee et al., 2015). Likewise, in the 2021 Gallup World Polls, 23% of East Africans answered they did not know about climate change (Lloyd's Register Foundation, 2022). Many studies focus on people's awareness and understanding of the phenomenon (Bord et al., 1998; Dunlap, 1998; Lee et al., 2015; Leiserowitz, 2007; Rudig, 1995), while others overlook verification of familiarity with the topic (Brechin and Bhandari, 2011; Kvaløy et al., 2012). Research has also addressed the perception-action interface to understand the relationship between opinions of climate-related risk and willingness to act, such as with preventive measures (Maiella et al., 2020; Weber, 2016).

Overall, findings show that people create geographical, temporal, and psychological distance between themselves and climate change. It is something that happens elsewhere, in a far-off future, or is not a threat. For example, in the Global North, people think that climate change will mostly

affect geographically distant territories and vulnerable populations such as Small Island Developing States and the Arctic (Chen, 2019; Leiserowitz, 2005, 2007; Lorenzoni et al., 2006). They believe impacts will be moderate and will happen later. Confusion persists for certain aspects which influence judgments, such as the differences between weather and climate (Lorenzoni et al., 2006; Moloney et al., 2014). In-depth studies tend to focus on the Global North (Moloney et al., 2014; Weber, 2016); studies on the Global South are more recent (Brügger et al., 2021; Crona et al., 2013; Fierros-González and López-Feldman, 2021; Schäfer et al., 2020; Wolf and Moser, 2011), with just one research mobilizing SRT (Mambet Doue et al., 2020).

Social representations of climate change

SRT is an established theory looking at the intersection of sociological and psychological research (Moscovici, 1961). It can be defined as a “system of shared and socially elaborated opinions, beliefs and knowledge, which has a practical aim and contributes to the construction of a common, shared reality” (Jodelet, 2003: 53). Social representation refers to social objects that interact with other knowledge systems on similar objects. They are culturally anchored, socially organized, and produced by and for a group (Moscovici, 1961). They explain and orient practices, facilitate communication between actors, and define the identity of an individual or a group—all this to create a feeling of belonging. Social representations have social (Jodelet, 2003; Moscovici, 1961), cognitive (Abric, 1994), linguistic (Jodelet, 1989, 2003), and emotional dimensions (Höjjer, 2010). Polymorphic social representations can associate various semantic categories, such that group members are constantly negotiating the meaning of the object in question (Moliner, 1996). Research on people’s understanding of climate change has developed over time using SRT; initial studies were published in the early 2010s targeting either the social representations of specific populations (Bohn Bertoldo and Bousfield, 2011; Caillaud and Flick, 2013; Smith and Joffe, 2012) or those driven by media discourses (Höjjer, 2010; Jaspal et al., 2014; Olausson, 2011). They highlight some evolution in the temporal distance to climate change, such as one study that showed Germans felt the threat closer to them than French (Caillaud and Flick, 2013).

Two processes are identified when creating a social representation: objectification, which reduces the complexity of the phenomenon by adapting it to a social context and rendering it concrete; and anchoring, which integrates the object into pre-existing categories or cognitive schemes, making it familiar through association to previously held knowledge (Minsky, 1975; Moscovici, 1961). For example, climate change has been objectified in terms of industry pollution with allusion to smokestacks, polar ice caps, melting glaciers, endangered polar bears, and flooding, all which reference climate change effects (Caillaud and Flick, 2013; Smith and Joffe, 2012; Wibeck, 2014). In territories less influenced by the Global North, other objectification process can be found, such as a personification of the planet under divine punishment in Cartagena, Colombia, and an image of an angry sea (because of anthropogenic degradation) in Pointe à Pitre in Guadeloupe, France (Mambet Doue et al., 2020). Climate change has been anchored to extreme weather events, the hole in the ozone layer, and memories of nostalgic, typical weather (see Mambet Doue et al., 2020; Smith and Joffe, 2012).

Importantly, before the elaboration of these processes and the creation of a social representation, people often first develop an awareness of the object in question before developing a full understanding of it. Breakwell (2014) notes some people “will simply not know that there is a social representation in existence; others will know only part of its scope . . .” (p. 121). Awareness is a primordial stage that must be experienced before reaching “understanding” (Breakwell, 2001; Jaspal et al., 2014).

The role of language and communication on social representations of climate change

Language and communication are important factors when examining social representations of climate change. First, SRT functions by considering the term of the represented object. Second, language proves vital during objectification and anchoring processes. Terms such as climate change are cognitively anchored through language and embedded in a web of other semantic terms and phrases, such as “melting ice caps.” That is, SRT does not just look at cognitive aspects but also sociolinguistic processes. Individuals establish social representations of various phenomena through communicating with others, which is a dynamic process (Jodelet, 1989; Moscovici, 1989; Rateau et al., 2012; Wagner, 1994; Wagner and Hayes, 2005). Social representations are understood to be “at once fixed in language and as functioning themselves as language through their symbolic value” (Rateau et al., 2012: 483). People introduce and adapt ideas and language during climate change discussions, as seen with metaphor use in Sweden (Wibeck, 2014). In fact, language background may be an influential factor in understanding the phenomenon (see Brügger et al., 2021).

Second, climate change is discursive, and the way people talk about it matters despite its difficulties (see Arnall and Kothari, 2015; Hochachka, 2021; Janif et al., 2016; Moser, 2010; Nerlich et al., 2010). The Global South face their own linguistic and cultural challenges brought on by translation issues (Cameron et al., 2015; Glory, 2019; Rudiak-Gould, 2012), an aspect often overlooked in qualitative studies (Nielsen and D’haen, 2014). This includes language use regarding local knowledge on climate, weather, change, and climate change (Clifford and Travis, 2018; Hulme, 2015). A look at the history of terms in the Anglo-Saxon Global North shows that as our understanding of climate change has developed, so has the way we talk about it. With the initial studies looking at CO₂ emissions (Cambre, 2011) came the use of the metaphoric term “greenhouse effect” to explain the process before “global warming” became popular. Over time, the nuanced term “climate change” was adopted to indicate global but also local change due to increasing global temperatures, precipitation pattern changes, and ocean acidification (Kay, 2018). These variations can affect how people understand the phenomenon, particularly in consideration of SRT.

Considering the terms separately, climate is not just a physical phenomenon, but something attached to social meaning that has evolved over time in various societies (see Hulme, 2015). Climate is global, abstract, and understood on a macro-level, but at the same time in relation to weather, which is local and visible. These terms are not universal: in the Marshall Islands a single term, *mejatoto*, is used, which also refers to social realities, not just physical ones related to weather and climate (Rudiak-Gould, 2012). In the United Kingdom, people have more difficulty distinguishing climate and weather compared to Americans (Lorenzoni et al., 2006). This is also the case in the Cook Islands, where *reva* can indicate both weather and climate (Glory, 2019). The term “change” as it relates to time remains problematic. Due to the long-term nature of climate change, discussions related to change and time prove to be difficult to articulate (Arnall and Kothari, 2015; Glory, 2019).

In addition, observable weather patterns and understanding of time are inextricably intertwined. They influence culturally anchored social representations of climate change. Scale continues to be an issue (Adamson et al., 2018): in the Cook Islands, the term *tuatau* represents time on various scales, as it can reference hours, periods, or seasons (Glory, 2019). The word is integrally linked to weather changes over many years, but not on a scale large enough to reflect climate change. Furthermore, seasons are identified in various ways across cultures, making universal underpinnings difficult to identify (Orlove, 2003). Cross-cultural issues persist, as can be seen in the

Maldives, where awareness efforts remain challenging because policymakers and academics do not share the same scales of time with most of the population; thus, options for reacting to climate change are not shared (Arnall and Kothari, 2015).

3. Methods

This study used case-study methods through semi-directive interviews conducted in April and May 2021 from a SRT framework, which takes into consideration social and linguistic factors (see Supplemental Material for interview protocol). Because social representations can develop through conversation, it is important to study exchanges during interviews (see Wibeck, 2014). In multilingual contexts, such interactions are complex and call for fine-grained, qualitative analyses. Various methodologies have been applied to address climate change in populations, but certain methods can be limiting (Fierros-González and López-Feldman, 2021). For example, opinion surveys are constrained in their understanding of people's perceptions and the way culture can affect them (see Rudig, 1995). Qualitative studies have proven to be instructive and abundant in recent decades (see Nielsen and D'haen, 2014). Bercht (2021) makes the case that qualitative studies reveal details that cannot be seen in purely quantitative studies, such as surveys. She shows how over the course of an interview, Norwegian fishers express concern about climate change after having initially denied being worried about it. That is, case studies allow for analyses of specific contexts to make space for "thick explanations" (Watson-Gegeo, 1992) of people's understanding, including in relation to climate change.

Setting

The study took place in the village of Mtsamboro on Mayotte Island, located in the northern part of the Mozambique Channel (Figure 1). It was selected because it is an ongoing research site for watershed, coastal, and coral changes (Jeanson et al., 2014, 2022), and because it is among the first villages of Mayotte. A French department since 2011, Mayotte is densely populated with 256,500 inhabitants in 2017, a substantial growth from the 1958 population of 23,000 (National Institute of Statistics Economic Studies (INSEE), 2017). Half of the inhabitants are below the age of 18 and two-thirds live in slum housing (INSEE, 2017). In 2018, the poverty rate was 77%, with only 30% of Maore employed (Daubaire, 2019). Most of the population practices Sunni Shafi'i Islam (Lambek, 2018). Changes in watershed coverage (deforestation, urbanization) are leading to increased sediment on the coastline, which could endanger coral reef growth (Landemaine et al., 2017; Mulochau et al., 2020). Since 2018, seismo-volcanic activity has caused a rapid, unexpected island depression resulting in land subsidence of up to 20 cm (Cesca et al., 2020; Feuillet et al., 2021; Lemoine et al., 2020). Induced sea level rise has led to more frequent high spring tide flooding (Jeanson et al., 2021).

Participants

This study interviewed 30 subsistence, leisure, and professional fishers (Table 1). They were mostly men in their 40s, because many if not most fishing activities, particularly those practiced from boats or with fishing lines, are done by men (Guezal et al., 2013). Women and men practice fishing activities from the shore, collecting shellfish, octopus, or small fish. Fishers were chosen because they are a group in contact with nature and the coastal climate (see, for example, Bercht, 2021).

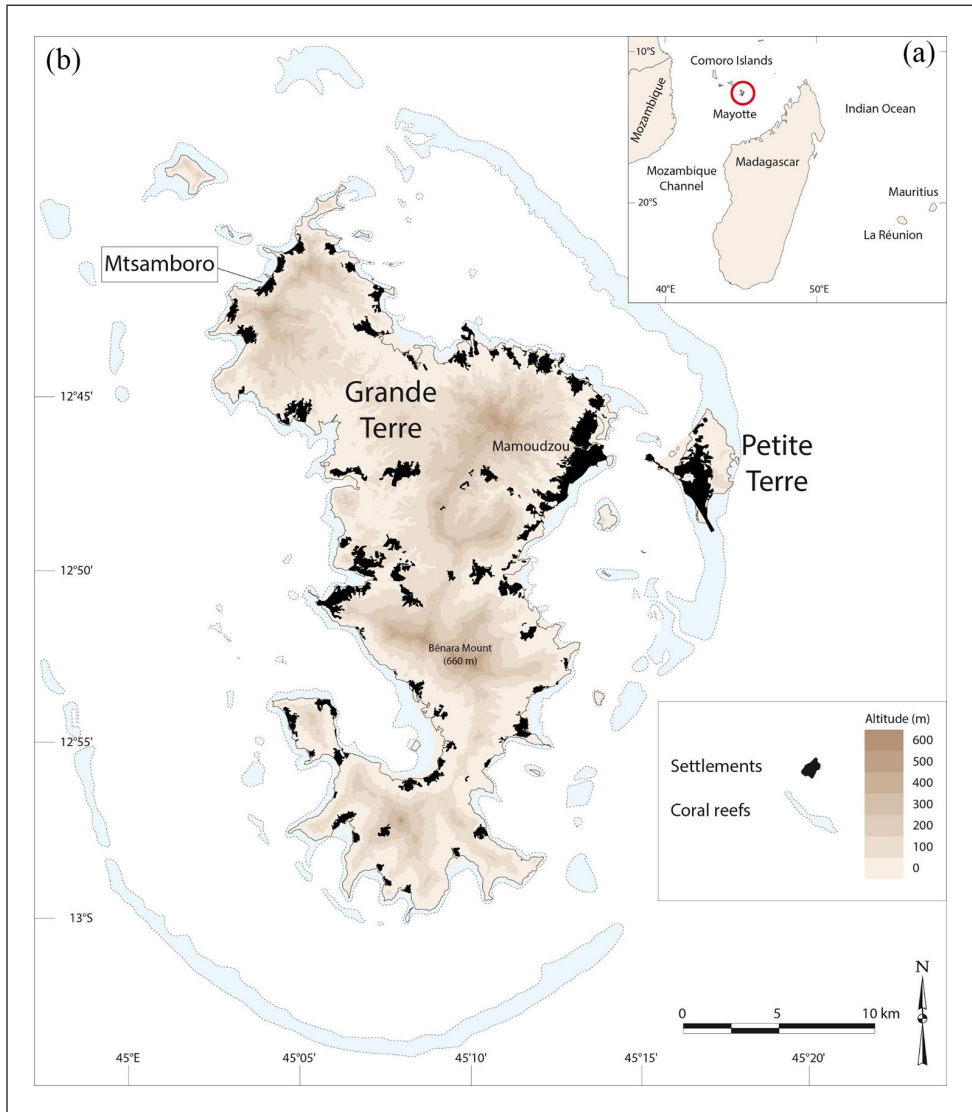


Figure 1. Location of Mayotte Island in the Mozambique channel and the study site, Mtsamboro.

Procedure and analyses

Interviews occurred on the seafront in groups of three: the participant, the interpreter, and the researcher. Interviews in Shimaore were transcribed and translated to French by bilingual Shimaore-French university students.² Next, the original interviews, their transcriptions, and their translations were then verified by other bilingual Shimaore-French university students. Analyses were conducted in several steps. An initial qualitative thematic analysis was performed on all the interviews to identify the discussed themes as they related to the research question (see the “Introduction” section, last paragraph) through Taguette (Rampin et al, 2021). With these results, a more detailed analysis (Gavard-Perret et al., 2012) was done to see if participants were aware of the climate

Table 1. Background of participants interviewed in April and May 2021.

Variable	Items	Number	%
Interviews	Total	30	100
	Average duration	58 minutes	–
Gender	Men	28	93.3
	Women	2	6.7
Age (in years)	20-29	4	13.3
	30-39	7	23.4
	40-49	10	33.3
	50-59	4*	13.3
	60-69	5*	16.7
	Language	French	11
	Shimaore	15	50.0
	French & Shimaore	4	13.3
Fishing purpose (multiple responses possible)	Leisure, pleasure	17	56.7
	Livelihood	20	66.7
	Direct selling	10	33.3
	No longer practiced	1	3.3

*of which one woman.

change phenomenon as defined in the Intergovernmental Panel on Climate Change (IPCC) (2014) report: “a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.” Participant answers were analyzed to determine familiarity with the scientific concept regarding its causes and consequences. Answers were then evaluated for objectification or anchoring as per SRT.

A quantitative analysis through Tropes software (Molette et al., 2012) was performed on the corpus, allowing for categorization of themes and collocation of semantic categories (Seignour, 2011). The software analyzes word use and style through text mining to see what subjects are most often discussed during interviews. For example, “the ocean” could emerge as a theme if the software identified numerous references to terms such as “salt water,” “tides,” and other sea-related concepts. Finally, linguistic analyses were used through dialogical content analysis (Marková et al., 2007) to capture the dynamic and interactive character of the data. Specifically, discussion around climate change was analyzed to see how participants responded to climate change questions, as well as how the conversation evolved, including how the phenomenon can be broached in Shimaore.

4. Results

Associations, meanings, and relevancy of climate change

Analyses of the corpus show that participants referenced their lived experiences with the sea, time, climate, and people, as can be seen in Table 2. During the interviews, participants discussed the topic in an explanatory, critical or persuasive manner. They discussed physical aspects of the coast, such as fish or the tides, as well as observable weather conditions, such as rain and wind, and time periods, such as the mornings or years. When discussing climate change, the most salient references made were to fish, people, coral, beaches, and weather patterns. Their activities and lived experiences were integral parts of the conversation.

Table 2. Frequency of semantic categories in the entire corpus with Tropes.

Semantic category	Encompassing terms	Frequency
Sea	Sea, wave, beach, bay, tide	984
Time	Time, period, morning, evening, week, years, era	777
Climate	Wind, cloud, rain, sun, warming, storm, trade winds, ice	552
Fish	Fish	467
People	People, person, everyone, someone	376
Sea	Sea, wave, beach, bay, tide	984
Coral	Coral, Corals	265
Beach	Beach, Beaches	256
Seasons	Season, autumn, summer	175

Results show that climate change is not established as a social representation among participants, as many had not heard of the term at all (11 participants) or had heard of it but were unfamiliar with its meaning (seven participants). They did not give answers that aligned with scientific understanding. Social mobility, work, and education appear to be the salient factors influencing climate change knowledge. Among the 12 respondents who knew the scientific concept of climate change, nine spoke French fluently, whereas among the 18 who did not know of the concept, only two were fluent in French. Since French language fluency is often associated with formal education, it can be assumed that the French speakers had access to schooling, perhaps learning about climate change, or they acquired knowledge during occupational activities. Two respondents who knew about climate change learned it during their studies. One worked in the environmental sector and the other was a primary school teacher who taught climate change to his students. For the 12 respondents aware of the phenomenon, climate change and global warming did not emerge as important or well-known topics. Only three participants were concerned about climate change, one of whom was not worried because all of this was in God's hands.

Causes, effects, and scope of climate change

Climate change discourses were not easily wrought, and inconsistencies were observed. For the 18 respondents who had heard of climate change or global warming, most associated it with seasonal changes and irregularities, with one participant noting, "Sometimes in the same period of the year, the sea water can be very hot, and sometimes cold" (Man, 34 years old). Other associations include atypical weather patterns, such as it being hotter than usual and there being less cyclones. One person, who mentioned that a dam had broken in the Mozambique channel, inducing a sea level increase, appeared to conflate one climate change effect with another cause.

For the 12 respondents whose responses were clearly linked to the scientific view of climate change, most described its consequences, and many evoked its causes. These included human actions related to pollution, deforestation, and increasing use of cement due to urbanization, which were not associated with a specific geographic area. For example, one participant explained how "burning tires and other things create smoke that goes up into the sky and ruins the atmosphere" (Man, 49 years old). Concerning consequences, location and scale proved to be important because most participants only discussed effects in Mayotte. Only four participants brought up planetary-scale consequences of climate change, including global temperature increases, ecological equilibriums, melting ice caps, and

rising sea levels. In fact, there appeared to be confusion about the pertinence of climate change effects on the island. For example, one respondent noted that Mayotte is not affected because it has many trees compared to mainland France, which has many fields.

Eleven of the 12 participants who discussed climate change effects did so in the context of Mayotte along three categories: direct effects on the climate, impacts on marine species, and sea level rising with coastal erosion. For the first category, participants discussed the increase in air temperature or the intensity of the sun, the decrease in rain, and changes in seasons. Extract 1 shows one participant's explanation of temperature increases in Mayotte, including the fact that the dry season used to be much cooler, and that increased heat is destabilizing the island. As for discussion of impacts on marine species, two had heard of the sun's effects on coral, and one knew of coral bleaching induced by heat and its ecological repercussions, including for humans. This person had been trained in coral identification by staff from Reef Check (n.d.), an international non-governmental organization (NGO) dedicated to coral reef preservation (see reefcheck.org). Two participants discussed the disappearance of big fish and sea life because of warm ocean currents, as well as the arrival of fish that prefer higher ocean temperatures. Concerning rising sea levels and coastal erosion, only three participants brought up these issues. Finally, respondents linked stress induced by climate change with exacerbation of prevalent issues in the fishing and agricultural sectors. One participant explained that fish find refuge in deeper waters because there is less rain, more intense heat from the sun and noise from the boats' engines. He used an analogy to explain his rationale: "I think of the sun, and I look at myself. If there is a lot of sun, I will find a place to shelter" (Man, 54 years old):

Extract 1

Participant: There is this phenomenon that is threatening the planet. I tell them that it is—that it is starting to get hotter and hotter. So this phenomenon is upsetting the ecological balance.

Interviewer: [. . .] Are there already effects here, in Mayotte?

Participant: Yes, of course. There are effects because . . . it is starting to get very hot. And getting up early, everyone on the island is feeling that- this heat that is starting to become suffocating. [. . .] You know me, when I was young . . .

Interviewer: Yes?

Participant: It was very cold. It was very cool between June and September [. . .] Because in the 60s, 70s and 80s, the dry season, it was very, very cold. But we're not going to say too cold! (Man, 52 years old)

Expressing climate, weather, and change in Shimaore

Climate change was as much if not more difficult to discuss in Shimaore than in French. First, due to a lack of familiarity with the concept, more than half of the participants were not able to propose a translation for the term nor verify if *mugaudziyo wa hawa* (literally, "change of climate") was the best translation of it. For those that better understood climate change, some thought the proposed Shimaore term was appropriate, while others noted its shortcomings. This is because used in everyday conversations, *mugaudziyo wa hawa* means changes in the weather, such as moving from one season to another, or an impending storm and the resulting change in weather patterns over the day. It is not necessarily anchored to the concept of a global, enduring, menacing change in the planet's climate. Rather, it can simply mean changes in the weather observed through the *hawa*.

Participants proposed terms that highlighted the heat-related aspect of climate change, the negative connotation of the phenomenon, or verbs expressing change. One participant thought the term

should be *moro wa shivhandre ya ntsi*, where *moro* means fire and *shivandire ya ntsi* indicates the surface of the Earth. Another person suggested *wakati wa tsave*, which means the time, moment, or season (*wakati*) with heat (*tsave*). Note the ambiguity of this term, as it could also refer to an annual season with high temperatures. Other suggestions were made through phrases such as *hawa isubuza*, *hawa izingi*, or *wakati usumenyeha*, which translate to the climate is flipping over or turn around, the climate is turning, and the time/season is deteriorating, respectively. Translations were often not nominalized but in phrasal form, suggesting the lack of abstraction of the concept.

The relationship between climate and weather was discussed. Participants refer to climate at times as *hawa* and at times as *wakati*, the former occurring more in the corpus than the latter (273 vs 172). In general, *hawa* means the air and the atmosphere, whereas *wakati* means the moment, the time, or the season. *Hawa* can indicate both climate and weather and the two terms are not distinguished in Shimaore. Furthermore, *hawa* is observed daily, and it is through the tangible *hawa* that *wakati* is understood. As for *wakati*, it is discussed in context with various durations of time, from hours to months, but was most often linked to the notion of “today” and short durations. However, when using the term, participants described various annual *wakati* (in this sense, seasons) such as *kashikazi*, *kusi*, *djahi*, *nyombeni*, and *matulahi*.³

Discursively negotiating the sense of climate change

Interactions reveal that talking about climate change, regardless of language, involves negotiating meanings through discussion. Individuals do not create social representations in a vacuum, but through interaction, where meaning making is co-constructed discursively. Extract 2 highlights various dialogic aspects of meaning making regarding the sense of climate change. The participant engages in an extended, multiple-turn exchange in which the term’s scope is identified followed by questioning its meaning in Shimaore and in French:

Extract 2

Interviewer: OK, OK, umm, for you, does climate change evoke anything for you? Have you heard of climate change? Or of global warming?

Participant: *Changement climatiki* (climate change) in the whole world?

Interviewer: In the whole world, yes.

Participant: In the whole world, yes!

Interviewer: OK, and what does climate change evoke for you, then?

Participant: *Changement climatiki*!

Female bystander, in Shimaore: Hey there, what is *changement climatiki*?

Participant: *Changement climatiki*?

Interviewer: Or global warming if you prefer.

Participant, in Shimaore: Is it not—hot, hot, fire, a lot of fire?

Female bystander: He’s saying- he’s saying . . . in fact, he’s asking . . . if for example the- the-

Participant: The heat, like that?

Female bystander: Heat.

Interviewer: The heat?

Male bystander: It's hot here . . .

Participant: It's hot here!

Interviewer: Yes?

Male bystander: Yes, it's hot . . .

Interviewer: It's hot.

Participant: Heat!

Interviewer: Yes, it's hotter now?

Male bystander: Yes, that's *changement climatiki*.

Interviewer: That's climate change.

Participant: That's *changement climatiki*.

In this multilingual interaction, there are several exchanges regarding the meaning of the term, before the participant confirms that the increased heat felt in Mayotte but also in France Metropole (this last part omitted for length) is what defines climate change. After asking about both terms, the participant asks a question to confirm that they are talking about the global phenomenon before wondering aloud in Shimaore if they are not talking about heat (*hari*) and fire (*moro*). Then there are various exchanges, including with a bystander discussing the fact that it is hot, to which the participant echoes an agreement. The researcher asks if it is hotter now, and the participant confirms, before saying that the fact that it is hotter now defines climate change. Repetition and questions seeking confirmation show the dialogic nature of the phenomenon, including what it is and how people talk about it. For this participant, the most tangible indicator of climate change is heat. Another insight from this exchange is the use of the term *changement climatiki*, where the “i” is added to the end of *climat* (French for climate), a common phonological practice for words borrowed into Shimaore. The fact that the participant uses this term and not climate, *hawa*, *wakati*, or another term suggests the foreignness of the concept associated with the word in Mayotte and in Shimaore.

5. Discussion

This exploratory study sought to understand Maore coastal inhabitants' social representations of climate change through interviews with individuals who engage in fishing activities in one coastal village undergoing various changes to its shoreline and reef (Jeanson et al., 2014, 2022). Most participants were at a level of “awareness” regarding climate change (Breakwell, 2001; Jaspal et al., 2014) in that they knew some elements of the dominant social representation of it such as increased temperatures caused by anthropogenic factors, all of which were negative connotations of climate change. It was associated with increased air temperatures and the effects of such heat, including diminishing nourishment from the sea (e.g. fish). Struggles to discuss the phenomenon may be because it is difficult to discuss an object when in the awareness stage (Jaspal et al., 2014; Moscovici, 1961, 1989).

The two processes that contribute to social representations—objectification, and anchoring—were noted in some interviews (Jodelet, 1989; Moscovici, 1961). Objectification was observed when participants gave specific examples, like discussing corporal effects such as an increase in

sunburns and difficulty living in concrete houses due to rising air temperatures. These examples are pertinent to the island, contrary to studies in the Global North (Caillaud and Flick, 2013; Smith and Joffe, 2012; Wibeck, 2014). As for anchoring, participants appeared to associate climate change to pre-existing categories (Jodelet, 1989; Moscovici, 1961). In contrast to what has been observed in other societies, participants did not associate climate change with the pre-existing category of the ozone layer (Mambet Doue et al., 2020; Moloney et al., 2014) or other natural catastrophes (Mambet Doue et al., 2020). Rather, it was anchored to primary needs such as nourishment. Participants referenced local environmental problems, such as increasing lack of water for agricultural irrigation and decreased marine biodiversity, including the reduced fish population. Another aspect of anchoring which was not observed involves naming climate change (Moscovici, 2000), since there is not an established term in Shimaore, and the French terms evoked little meaning.

Participants did not appear to regularly discuss climate change in Shimaore. Nevertheless, there are aspects to consider regarding the language, such as the fact that *hawa* can mean both weather and climate, which parallels findings in Maori and Ebon (Marshallese) languages (Glory, 2019; Rudiak-Gould, 2012). *Wakati* can be both time and referential to seasons, not unlike the term *tua-tau* in the Cook Islands (Glory, 2019). These two terms appear to be complementary elements for understanding climate, weather, and change in Mayotte. It is important to study these discursive practices to better understand the ways in which this global phenomenon is appreciated locally, particularly since naming and discussing it are not apolitical tasks, as is the case in Inuktitut in Canada (Cameron et al., 2015). Methodological biases exist regarding the languages used in interviews and questionnaires (Fierros-González and López-Feldman, 2021; Lorenzoni et al., 2006; Soubry et al., 2020), thus there is a need to study social representations of climate change in local languages, not just colonial or dominant ones. While this study tried to address this issue by encouraging interviews in French and Shimaore, the interview triad—researcher, participant, interpreter—and researcher positionality are aspects to be taken into consideration when interpreting meaning and when considering biases (Nielsen and D’haen, 2014).

For geographical distance, there appears to be a paradox in that participants do experience the effects of climate change, such as increased air temperature while also maintaining that Mayotte is not as affected as other parts of the world, such as mainland France. In terms of psychological distance, there may be a semantic distancing occurring with the “hybrid” term *changement climatique* in which climate change is adopted into Shimaore without undergoing a complete transformation by being replaced by a local term. That is, the object remains to a certain degree semantically foreign, pertaining to mainland France. It is a concern for others, not the islanders, which has been observed elsewhere, such as in Wallis Island and the Rangiroa Atoll (Worliczek, 2013).

6. Conclusion

As research on the interaction between societies and climate change grows in scope, so too should approaches on how to understand it. SRT proves to be a useful framework for studying climate change understanding because it addresses social groups, the influence of culture, and various linguistic aspects. This case study focused on a place rising from the Global South, which allowed for insight into how climate change is understood in a space also in contact with the Global North. In a sense, many Maore have one foot in the Global South and one foot in the Global North in terms of climate change related identity and needs. They have multiple identities as French, as Maore, which at times entails conflicting belief systems that must be reconciled, such as climate change being caused by God versus being an anthropogenic phenomenon. And they must do this while communicating in multiple languages. If awareness-raising and climate change literacy (see Clifford and

Travis, 2018) are logical next steps, to act globally, we need to think locally and inclusively, such as questioning the relevancy of discussing melting ice caps in the North Pole. The lived reality on Mayotte Island is far from one where ice is regularly discussed. Rather, coral bleaching, coastal erosion, higher magnitude cyclones, and water shortages are references better situated for the population. All this while operating in a French educational and governmental system, where the eventual creation of social representations will inevitably be linked to changes in education, media, and access to information through social networks. It is necessary to study the development of climate change discourses, particularly how they might be adapted or contested by locals.

Finally, the “finite pool of worry” hypothesis (Weber, 2006, 2016) where people can only worry about a limited number of subjects, may be all too applicable to Mayotte (as cited in Fierros-González and López-Feldman, 2021). Island inhabitants have immediate, pressing needs related to satisfying necessities such as shelter, water, and nourishment.

Everyday violence and insecurity take precedence, such that climate change is the least of people’s worries, as is the case elsewhere in the Global South, such as in Latin America (Fierros-González and López-Feldman, 2021). For example, the 2018 seismo-volcanique events that at first shocked Mayotte’s population (Mori, 2021) has now taken a backseat to more (re)current issues, including near daily water cuts and increasing violence in public and private spaces, including theft and assault. In efforts to act against climate change around the world, attention to this “finite pool” needs to be considered in future awareness-raising efforts on the island, in addition to social representations and linguistic factors.

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Authors contribution

All authors contributed to project design, funding acquisition, and draft revision. Data collection was performed by Philippe Charpentier, Matthieu Le Duff, Gaëlle Lefer-Sauvage, Esméralda Longépée, Miki Mori, and Georgeta Stoica. Article conception, data analysis, and writing of the manuscript’s first draft were done by Gaëlle Lefer-Sauvage, Esméralda Longépée, and Miki Mori. All authors approved the final manuscript.

Data availability

The datasets generated during and/or analyzed during this study are not publicly available due to ongoing analyses but are available from the corresponding author on reasonable request.

Declaration of conflicting interests


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Supplemental material

Supplemental material for this article is available online.

Notes

1. Categorizing Mayotte as part of the Global South seems obvious, but its French status and associated French education system and laws, make it an interesting if not complex intersection of the Global South and the Global North in terms of culture, mobility, and rights.
2. Note that Shimaore is non-standardized with limited pedagogical and logistical resources, such that access to trained translators is nonexistent.
3. *Kashkazi*=rainy season, *kusi*=dry season, *djahi*=interim windy season, *nyombeni*=interim season after *kusi* with some rain, *matulahi*=interim windy season. Seasons are identified by two characteristics: the amount of precipitation and the type of wind.

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