



Werewolves and warning signs: Cultural responses to tropical cyclones in Mauritius

Rory A. Walshe^{a,*}, Robert M. Roupail^b, George C.D. Adamson^c, Ilan Kelman^{d,e}

^a Department of Geography, University of Cambridge, UK

^b Department of History, University of Iowa, USA

^c Department of Geography, King's College London, UK

^d Institute for Risk and Disaster Reduction and Institute for Global Health, University College London, UK

^e University of Agder, Kristiansand, Norway

ARTICLE INFO

Keywords:

Disaster
Culture
History
Local knowledge
Tropical cyclones
Mauritius

ABSTRACT

The role that culture plays in the way different groups experience, respond to, and recover from disasters has been widely discussed. Yet, while there is a considerable (and growing) literature of case study evidence for the need to account for culture in disasters, comparatively few studies take a long-term perspective on cultural interactions with disasters, resulting in a lack of exploration into the diachronic nature of these cultural responses, both past and present. The literature that does exist tends also to focus either on western cultures or on groups that pursue highly traditional livelihoods. Communities that call on elements of both local or vernacular knowledge and scientific or external knowledge are underrepresented.

This article presents an examination of cultural responses to tropical cyclones on Mauritius Island in the South West Indian Ocean over the long-term. We combine historical archive and contemporary interview data to uncover an extensive history of cultural responses to cyclones in Mauritius, including revealing the use of local knowledge, early warning signs, and superstitions surrounding cyclones in early Mauritian history and today.

Our research refutes the portrayal of isolated ‘episodes’ of cultural responses to cyclones, such as the reports of ‘mass hysteria’ following tropical cyclone Hollanda in February 1994, when a considerable proportion of Mauritians believed that a werewolf or *loup garou* was terrorising villagers. Whilst this experience has been portrayed – both at the time and currently – as an embarrassing and one-off incident, we show that this is rather part of a long pattern of cultural responses to tropical cyclones. Our results therefore have implications for how cyclones and disasters are understood and experienced.

1. Introduction

This research examines how culture has shaped the experiences of, and responses to, tropical cyclones over time in Mauritius. Although disasters (like those related to tropical cyclones – henceforth just cyclones) are often presented as ‘natural’, they are, in fact, anything but, and should instead be understood as a result of the actions, decisions, and structures people live with (Ball, 1979; Dynes, 1975; Hewitt, 1983; O’Keefe et al., 1976; White, 1974), all of which are shaped by culture. The often misunderstood and overlooked role of culture in disasters is one of the key challenges that prevents effective and sustainable disaster risk reduction (DRR) (Bankoff et al., 2015). This continues despite a long history of scholarship demonstrating that human vulnerability is

culturally complex and multifaceted (Bankoff et al., 2015; Krüger et al., 2015). The idea that disasters and ‘extreme’ events are both physically and culturally constructed has been suggested within works from the disciplines of history (Behringer, 2010; Steinberg, 2006; Horowitz, 2020), economics (Merz et al., 2010), sociology (Rodríguez et al., 2007), anthropology (Oliver-Smith & Hoffman, 1999) and human geography (Blaikie et al., 1994; Kelman, 2020), among others.

Understanding the exact role of culture in disasters is not a straightforward task, partly as a result of the difficulty in defining culture itself (see Kroeber and Kluckhohn, 1952 for an overview). In the following pages, we conceive of culture as a continuously evolving set of social practices, norms, and values based on shared societal experiences and social relationships (Sperber & Claidière, 2008). This paper aims to

* Corresponding author at: Room 1.20, Department of Geography, University of Cambridge, Downing Site, CB2 1BY, UK.
E-mail address: rw647@cam.ac.uk (R.A. Walshe).

emphasize the deeply layered historical component of these aggregate experiences and relationships. Societies express and practice culture at various scales and through intersecting discourses, including divisions such as sub- and contra- cultures (see Lewis, 2015). It is important to accept and even stress this complexity in order to resist the erroneous characterisation and simplification of “culture” that emerged as a constitutive element of colonial ethnographies of domination, when the production of ‘otherness’ and difference formed the epistemological foundations of imperial expansion and extraction (Said, 1978; Kasbarian, 1996). Therefore, for the purposes of this article, culture is deliberately defined in as broad a sense as possible, as being the beliefs, attitudes, values, knowledges, narratives, and experiences and their resulting behaviours that are shared (on any scale).

The very nature of culture as a ‘historically transmitted pattern of meaning’ (Geertz, 2000, p. 89) points to the need to consider the historical dimension of its development as a dynamic long-term process. Research investigating the role of cultural history in disasters has developed significantly over the last twenty years (García-Acosta, 2017; Schenk, 2007, 2015). This has advanced with the recognition of disasters as temporal processes and the products of long-term interactions of hazard and vulnerability with social and cultural dynamics (van Bavel et al., 2020; Endfield, 2007; Garcia-Acosta, 2007). Yet, as Bankoff (2004) notes, while social science disaster studies often acknowledge the importance of history and the long-term cultural processes of vulnerability, specific analysis or examples are lacking. Therefore, past cultural responses are often presented either as part of an unspecified ‘past’, or an historical curiosity with unknown relevance today (Riede, 2014).

This research demonstrates the possibility of combining historical archive data with contemporary interview data to understand cultural responses over time. Specifically, this paper provides a case study of the role of culture with regard to the responses to, experience of, and recovery from cyclones over time in Mauritius. This is important because the cultural ways in which both normal and extreme weather are created, remembered, and recorded may determine how descendants understand risk emergent from those extremes and hence how climate risks, and climate change, are positioned, contextualised (Hall and Endfield, 2016; Lorenzoni and Pidgeon, 2006; Palutikof et al., 2004), and particularized (Adamson et al., 2018; Livingstone, 2012). As Nunn and Campbell (2020) argue, for small islands, like Mauritius, facing disasters and the impact of climate change, rediscovering cultural history may be an important resource in order to negotiate the future.

There are several reasons why it is important that culture be considered when trying to understand responses to disasters. Firstly the label of behaviours as ‘cultural’ can offer explanations of practices which might be viewed as irrational from other perspectives (particularly scientific). Secondly, it provides a self-reflexive base to examine different perspectives on the role and nature of disasters, the environment, and climate. Finally, the agency of culture is often concealed and is key to understanding responses to disasters and how research can contribute to DRR (Bankoff et al., 2015; Cannon, 2008). Even the identification of an event as a disaster is cultural. Yet cultural ways, practices, and knowledge are often considered as irrational, backwards, archaic, or unreliable by the dominant ‘experts’ of DRR, who themselves have various political and epistemological biases and influences that preference positivist ways of knowing (Donovan, 2017). Disaster studies and policies around the world are still dominated by scientific epistemologies (Gaillard, 2019), with a large body of western scientific research examining how disasters or climate are understood and experienced in western culture and the developed world (Appleby-Arnold et al., 2018; Gierlach et al., 2010; Hoffman, 2015).

There is a considerable body of research demonstrating the value of cultural knowledge in disaster response. These studies generally focus on indigenous communities that pursue highly traditional livelihoods and have responded to disasters for thousands of years (McAdoo et al., 2006; Nunn et al., 2007; Walshe and Nunn, 2012), and the potential use of these cultural responses in DRR today (Hiwasaki et al., 2014; Mercer

et al., 2010). Within this literature, cultural knowledge is defined as being the product of long-term interactions with the environment and as being holistic in nature, contrasted with ‘western’ knowledge, generally seen to be derived from positivism and the scientific tradition. However, terminology is often overlapping (including local, lay, indigenous knowledge, traditional ecological knowledge and many others) and inconsistent across disciplines (for discussion on the definition of these terms see Dekens, 2007; Shaw et al., 2009; Kelman et al., 2012). Moreover, the division and distinction between knowledge types may preclude analysis of communities that make use of both local (or vernacular) and non-local (or external) knowledge traditions.

The global disaster policy landscape exhibits similar trends and recognition of cultural factors in policy remains comparatively rare. If cultural responses are valued and approached by policy makers at all, it is often as neutral and uncomplicated, particularly devoid of contestation or contradiction (Mondragon, 2015). As Briggs (2005) argues, much of the research examining cultural responses represents empirical or ‘(arte)factual’ evidence of specific, and mostly positive, coping strategies in communities, instead of a deeper understanding of how culture influences responses. There is therefore a particular need for a diachronic understanding of the role of culture over the long term, as opposed to a snapshot approach. It is also important to consider all cultural responses to disasters (the ‘good’ and ‘bad’), acknowledging that cultural responses to disasters are not necessarily accurate, reliable, or positive in a western scientific sense. This is key to understanding past and future disaster responses, particularly on small islands (Lewis, 1990; Mortreux and Barnett, 2009; Nunn et al., 2017).

Investigations into cultural knowledge of cyclones around the world have uncovered the use of local warning signs based on the environment, from Bangladesh (Howell, 2003; Paul and Routray, 2013), Samoa (Lefale, 2010), Fiji, and Tonga (Johnston, 2015) among others. These examples detail a range of predictive knowledge of cyclones centred on environmental cues, in many cases involving animal behaviour or weather conditions, providing around 1–3 days advanced warning of cyclones (Paul and Routray, 2013). Yet such research remains the exception rather than the rule and there are comparatively few small island examples of cultural knowledge of either cyclones, disasters, or climate change. In a global inventory of academic literature related to indigenous knowledge and climate change adaptation, small island states consist of only 6% of publications on these topics, and most studies consider indigenous knowledge in isolation (Petzold et al., 2020) (although such reviews overlook sources of knowledge outside scientific academic and ‘grey’ literature).

This research focuses on Mauritius island (20°10’S 57°31’E), which has been devastated by cyclones at multiple points in its past. Consequently, cyclones have played a considerable role in shaping Mauritian history, from concepts of racial belonging and community (Rouphail, 2020) to agriculture (Rouphail, 2019), and meteorological science (Mahony, 2018; Walshe, 2022). Large cyclones in Mauritius are relatively rare (Vaghjee and Yan, 2003); in popular belief around 15 years apart (Walshe et al., 2020). Yet it has been a comparatively long time since the last very damaging cyclone struck Mauritius, considered to be either cyclone Dina in 2002 or Hollanda in 1994. There is a pressing need to better understand how people in Mauritius might respond to, or experience, future cyclones, and the historical record in Mauritius offers a potential reservoir of knowledge. This paper presents a case study of cultural responses to cyclones over time in Mauritius, focussing on two particular elements: cultural myth-making in response to disasters, and the existence and use of local environmental cyclone warning signs, which have not previously been documented. Thus this paper has important theoretical implications for disaster research and DRR. It should be noted that it is not in the scope of this paper to necessarily connect or draw definitive conclusions about the current state of vulnerability in Mauritius. Instead this paper points to the need to consider culture and that the past may provide an insight into the cultural ways people respond (or may respond) to disasters.

This paper first presents the methods used to draw together archive historical research and interviews in Mauritius to understand cultural responses to cyclones. In particular, we focus on a specific cultural response to a cyclone in modern Mauritian history, the 1994 hysteria that a *loup garou* or werewolf was reported to be terrorising villagers in the aftermath of the cyclone Hollanda in 1994. At the time this was described as a ‘mass hysteria’. Yet we show that this response has deep cultural roots, and has been reported in several forms in the past and in relation to previous cyclones. The paper then goes on to detail a particular form of cultural knowledge in the use of local and environmental warning signs of cyclones. The paper finally discusses the cultural nature of responses to weather in Mauritius and the theoretical and suggested implications for a broader understanding of the role of culture and memory in disasters.

2. Methods

2.1. Archive data collection

The research collected archive data from several locations in Mauritius, focusing on building a rich descriptive picture of the experience, impact and response to past cyclones. This primarily focused on governmental records stored in the National Archive of Mauritius, and newspapers stored in the National Library of Mauritius, supported by a collection of complementary sources including early scientific books and reports, almanacs, chronicles and histories, personal papers, travelogues, and literature from a number of archives in Mauritius (detailed separately where cited in footnotes as per convention). The methodology for the sampling of archive data is described in Walshe et al. (2020).

2.2. Interviews

139 semi-structured interviews were conducted in 52 different settlements in Mauritius (see Fig. 1). This focused on the smaller, more rural, lower income or subsistence orientated settlements, in order to capture a diverse sample of Mauritians that are suggested to be more vulnerable to the impacts of tropical cyclones. Participants were sampled using opportunistic snowball sampling, either based on approaching participants on the street or knocking on house doors, and as such the dataset is not intended to be nationally-representative. This resulted in a slight under-representation of younger people within the sample (see Table 1), who were more likely to be at work or away from their homes in rural communities (see Kirchhnerr and Charles, 2018). However, this was mitigated by deliberately trying to reach as broad a cross-section in the chosen communities as possible. The interviews were conducted with a local research assistant who provided translation and helped navigate any cultural dynamics if necessary. Interviews involved a series of questions aimed at gauging how people currently perceive cyclone risk, the extent to which memory of past cyclones informs this understanding, and how communities experience the impact, response and adaptation to cyclones in Mauritius, both currently and in the past. This included detailing memories of specific historical cyclones (if the respondents had experienced any) and any cultural experiences the participant remembered and wanted to share. Data collection underwent institutional ethical approval through King’s College London.

3. *Touni minuit*: A werewolf in Mauritius and its historical roots

Tropical cyclone Hollanda was one of the larger cyclones in recent history. Hollanda started to be felt in Mauritius late on the 9th of February 1994 and reached peak intensity at midnight on 10th. At its height the Mauritian Meteorological Services (MMS) recorded that the wind gusted at a speed of 216 km h⁻¹ at Fort William, with potentially

stronger gusts in mountainous area, where it was noted that there was particular damage on the eastern side of the central plateau. Hollanda also brought excessive rainfall in a relatively short amount of time. Quatre Bournes, for example, recorded 387 mm of rainfall in 24 h.

The newspaper *L’Express* reported that damages and impacts were considerable; two people were killed, 1,336 houses were destroyed¹, 20–30% of sugar crops were lost, and the telephone and power networks were knocked out², in some places for over a month. The economic impacts of Hollanda were estimated by the government to be approximately Rs2.5 billion (\$140 million USD³) due to the extensive damage to vegetables, fruit crops, sugar cane and tea plantations and the disruption of economic activities⁴.

The descriptions of cyclone Hollanda that are available in newspapers and governmental reports (among other sources) are mostly constrained to the type of details provided above and attempt to define and explain the event in physical, meteorological terms. Yet for many Mauritians the memory of Hollanda is characterised and dominated by a cultural phenomenon experienced in its aftermath: a mass hysteria⁵.

Hollanda resulted in power blackouts for over a month for large swathes of the island due to damage to vulnerable over ground infrastructure. In the darkness of the blackout a hysteria gripped the island, with communities believing that a *loup garou* (or werewolf) was terrorising villagers and assaulting women. The stories of this phenomenon mostly involved a naked man, in many cases oily (and therefore hard to catch), who would break into houses to terrorise women and then turn into a large black dog before disappearing into the night. Communities reacted by forming vigilante groups to patrol the streets and enforce an unofficial curfew:

“Exorcists were now at the gates of villages; the slightest suspicious behaviour by a resident could lead to a beating; never before had such a large number of people been seen in churches and temples ... In the midst of Hollanda’s damage, the men gathered to fight his ghost. Women and children were barricaded inside with a ban on going out. The men drank and made rounds. Nothing reasoned with them ... No, these inhabitants said, it was not their imagination that played tricks on them, they were not crazy, the ghost was real, they felt it, there, on their skin, behind their back, blowing on their neck” (Appanah, 1996).

The collective ‘psychosis’ was reported to have originated from a village called *Lalmatie* in the North East centre of the island, but journalists at the time speculated that the source of the story may have been a prank, or burglary with copycat imitators spreading the hysteria using phone calls⁶. The experience was described by one interviewee as:

“it was something that was scary - it was like dark magic, it was like an invisible thing, a wind which would get inside the house, you won’t know it’s there and then it would destroy the house ... it would strangle you - you won’t see it coming but you would feel someone strangling you. People were very scared - I was afraid ... it was invisible - but people who saw it were scared of it. Some people did not believe it but when they saw it, they actually believed it, after that they had to believe. Hollanda. ... everyone

² Ibid.: 18th of February.

³ As estimated by fxtop [online, see <https://fxtop.com/en/historical-currency-converter/>].

⁴ BA / 1994 / VI / p0066 – debates 22nd of March – cyclone Hollanda damages / National Archive (NA).

⁵ Hysteria and/or psychosis were the terms used in much of the reporting at the time and thus are used here, although this term has a long legacy of negative connotations and reductionist uses (see: Mackay, C. (1841) *Extraordinary popular delusions and the madness of crowds*. Richard Betley: London). It has also been termed a ‘mass panic’ which has an associated literature, most of which rejects the assumption that panic is the default response to disaster (Heide, 2004; Quarantelli, 2001).

⁶ *L’Express* / 1994 / 3rd of March / NL.

¹ *L’Express* / 1994 / 12th of February / National Library (NL).

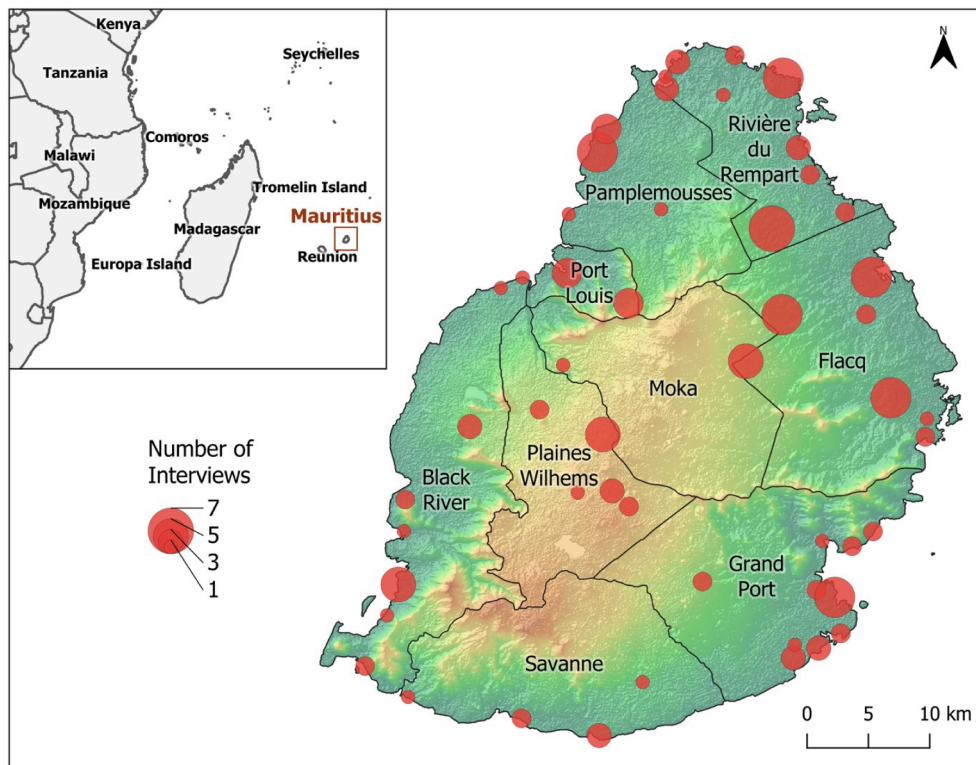


Fig. 1. The location of communities sampled with the number of interviews (map by author).

Table 1
Demographics of Interview participants.

Gender	No.	Age	No.	Occupation/work sector	No.
Male	86	20–29	7	Construction	8
Female	53	30–39	6	Cook/Chef	4
		40–49	17	Custodial staff/estate management	15
		50–59	34	Driver/transport	5
		60–69	44	Education sector	8
		70–79	26	Factory	6
		80–89	4	Farmer (livestock or agriculture)	16
		90–100	1	Fishing	11
				Government employee/contactor	10
				Housewife	9
				Manual labour	3
				Other	6
				Service sector (Inc. tourism)	16
		Skilled trade	10		
		Student	3		
		Unemployed/“no occupation”	8		

would get inside by 6 o'clock. If you are outside after 6, he will come after you” (Interview No.93).

The “*touni minuit*” (the general creole term for this episode, literally translated as ‘naked midnight’) quickly involved large parts of the island. On the 22nd of February the hysteria was such that the President at the time Cassam Uteem “*intervened in the psychosis*” and convened a meeting of religious leaders and police to “*to do everything possible to restore calm in some parts of the capital, where there is tension following reports that a werewolf terrorizes the capital’s inhabitants at night*”⁷. The central electricity board (CEB) were also forced to expedite their efforts and move forward the date of restoration of electricity due to the “*impatience fuelled by the psychosis created and held around touni minuit*”⁸.

The episode was widely covered in newspapers as well as popular writing at the time, although contemporary reactions to *touni minuit* were mostly expressed in tones of condescension and disbelief:

*“in this age of supposed enlightenment and of science people can go about peddling rumours about ‘loup-garous.’”*⁹

*“I hardly know whether to laugh or to be angry. Here is a nation, by no means uneducated and well launched economically, ready to gobble up the most absurd of tales: a werewolf prowling around and bent on mischief.”*¹⁰

This tone continues today, and in many interviews in communities around Mauritius participants were disparaging or embarrassed about the *touni minuit* story: “*it is complete nonsense - it’s the supernatural, no no no, ... that’s all bullshit*” (interview No.96) and instead sought to portray this as an isolated and embarrassing incident, consigned to the past.

Despite being reported to be a relatively widespread phenomenon effecting large proportions of the island at the time¹¹ (and requiring the president to intervene), the *touni minuit* is not discussed or remembered widely today, and has previously only been detailed in a handful of contemporary blogs and online forums. Of 139 interviews conducted in Mauritius, which included specific questions on cultural responses and stories about cyclones, only 13 participants mentioned the mass hysteria, and only one said they had believed it either at the time or now. This means that it is not possible on the basis of our interview data to establish which parts, groups, or proportions of the island did in fact become convinced about the *touni minuit*. Yet this also points towards a collective forgetting of the phenomenon, given the widespread reporting at the time and the fact that most of our interviewees were adults in 1994 (see Table 1). This may be related to its portrayals as an

⁷ L’Express / 1994 / 22nd of February / NL.

⁸ Ibid.: 23rd of February.

⁹ Mauritius Times / 1994 / 3rd of March / NL.

¹⁰ L’Express / 1994 / 3rd of March / NL.

¹¹ L’Express / 1994 / 22nd of February / NL.

embarrassing one off, both at the time and currently, although this is speculation. However, as the following sections will show, there is in fact a long, complex, and as yet mostly undetailed history of cultural responses to cyclones in Mauritius.

3.1. Culture, identity, and myth-making in response to cyclones in Mauritius

Tropical cyclones lay at the heart of numerous modern Mauritian identities. Whether it be how the lived environment has shaped national notions of belonging, how Afro-descendant Creoles understand their past, or how contemporary notions of the family became reified through disaster policy, the spectre of the cyclone has long shaped the Mauritian past. Indeed, because of the profound material transformation engendered by these storms, they emerged as critical components of vernacular cultural forms—from mythology to music—and constitutive components of the literary landscape of the southwest Indian Ocean.

One of the most salient cultural forces that routinely engages the theme of cyclonic weather in Mauritius is *séga*, the national music of Mauritius and relative to *maloya* in neighbouring La Réunion. The history of *séga* is synonymous with the history of slavery in Mauritius. Although now considered, alongside the language of *Kreol*, as emblematic of Mauritius' multiracial and multi-ethnic character, the musical form is widely understood to have its provenance in Mauritius' Afro-Creole community, the descendants of those originally enslaved. *Séga* has long formed part of a broader cultural scaffolding of Mauritius; it is often a vehicle to both sift and process historical change and one to make political claims. In the wake of cyclone Carol in 1960 one of the most famous *séga* musicians, Serge Lebrasse, penned “*A Cause sa Siklon la*,” or “Because of the Storm,” which narrated the struggles everyday Mauritians following Carol's landfall. The lyrics emphasized the fragility of life of the everyday poor of the island in the wake of the storm: of deceased family members, of houses “crushed like accordions,” and of the chronic lack of food. Fifteen years later another *segatier*, John Kenneth Nelson, penned a similar song, “Cyclone Gervaise,” to remember the passing of Gervaise in 1975 (Rouphail, 2021).

Within the realm of the literary, Mauritian writers and intellectuals have long employed the natural world, and the cyclone in particular, as a marker of social and cultural identity. Scholars and writers alike have developed the concept of *coolitude* to speak to the intersection of the social and the natural in the southwest Indian Ocean. The term, originally coined by Mauritian poet Khal Torabully, was developed as an analogue to *negritude*, the social and cultural movement developed by Francophone intellectuals, as a means to speak to the experiences of South Asians in the labour diasporas built by indentured servitude (Torabully and Carter, 2002). As cohorts of indentured laborers traversed the Indian, Atlantic, and Pacific Oceans to Mauritius, Natal, Fiji, and Trinidad, they built new communities, new cultures, and new methods of belonging. These so-called *coolies* made new lives for themselves across the dark oceanic waters, the *kala pani*. The term *coolitude* therefore strategically appropriates *coolie* as an act of reclamation. Within this category, Indian Ocean writers developed their own literary aesthetic, *Indianocéanisme*, which was marked, Torabully notes, by a number of characteristics, including an emphasis on “nature in the tropics—flaming and blossoming” (Carter and Torabully, 2002, p. 7). This “flaming and blossoming” should be understood in distinction from colonial visions of the tropics as “torrid zones” spaces where colonial subjects (and, indeed, officials) suffered a moral degeneration driven by the perceived instability and destructiveness of tropical climes (Nussbaum, 1995). Indeed, the discursive construction of the tropics as a space of co-constitutive natural danger and moral hazard formed part of the conceptual backbone of European imperial rule throughout Asia, Africa, and the Caribbean (Sutter, 2015). Similarly, Amitav Ghosh's novels on labour mobility and indenture across the Indian Ocean have demonstrated, the figure of the vast, dark expanse of the sea, known colloquially amongst the indentured and their descendants as the *kala*

pani, the importance of the ocean as space across which cultural, linguistic, and political change takes place (Ghosh, 2008). The aesthetic conceptualization of the natural world within *Indianocéanisme* emphasizes the generative capacity and transformational power of the people and the environments of the oceanic tropics. At their core, *coolitude* and *Indianocéanisme* are artistic positions driven by the transformational social and cultural salience of the ocean itself. Indeed, as Kumari Issur has argued, a feature of some Mauritian literature, in particular that of novelist Abbinayu Unnuth, is a notion that the ocean gives birth to a new world (Issur, 2020).

Within this literary tradition, the spectre of the cyclone holds an important symbolic and discursive role. Indeed, Srilata Ravi has suggested that Mauritian literature shows a “grammar of...cyclone aesthetics” (Ravi, 2017, p. 14). Addition examples include Marcel Cabon's (1981) use of the cyclone in *Namasté*, arguably the most famous literary portrayal of agricultural life in Mauritius, Ananda Devi's (Tyagi, 2009) invocation of cyclonic winds as “means for expression” (Tyagi, 2009, p. 144) of unity between feminine spirits, and renown playwright Dev Virshawmy's (1999) retelling of ‘The Tempest’ with the cyclone at the heart of the story. The cyclone is therefore central to Mauritian literary expressions of the past and present.

The history of cyclonic weather is also embedded in a broader ecological landscape of myth making on the island. Many elements of the 1994 *Touni Minuit* experience can be connected to cultural artefacts from history that can be found in the archives. Here, the spectre of the werewolf becomes less an aberration in 1994 and more representative of a deeper conceptual whole. Indeed, the *loup garou* was a known quantity: not only do werewolves following cyclones appear as a theme in children books published recently (Slew, 2003), but also as a part of the deeper mythologies of Mauritius, ones largely connected to its enslaved African population. The wolf as a non-human animal actor in the world of the human can be found in Mauritian mythology. In the late nineteenth century, a Franco-Mauritian linguist and author, Charles Baissac, sat down with the descents of two enslaved Africans, Papa Lindor and Mama Telisille, to listen to and collect the folklore of Afro-descendant peoples. The resulting *Le Folklore de L'île Maurice* was first published in 1888¹², including a creole story about a man who transforms into a wolf due to Malagasy magic¹³ and terrorises women and indeed the wolf is an omnipresent figure: always a trickster, a murderer, a sexual predator. Similarly, Haring (2001) argues that a Mauritian fable involving a wolf was created to encourage Mauritians to accede to the system of arranged marriage.¹⁴

There are also a range of other superstitions that have been invoked, conjured, and remembered during and in the aftermath of historic cyclones. One early example is from 1891, when an article in the *Merchants and Planters Gazette* on 15th December 1891 (four months before the deadly April 29th 1892 cyclone) detailed “an alleged vision”, that “it has been rumoured in recent days that Mother Barthélemy had a vision and that it was announced that Mauritius would suffer a short flood and that the country would then disappear. Now we are authorized to declare that this rumour is the work of some maniac and that the good sister had no vision”. The ‘vision’ itself is detailed (potentially with embellishment) in the *Gazette des*

¹² Baissac, C. (1888) *The Folklore of Mauritius*. G.P. Maisonneuve and Larose: Paris / Mahatma Gandhi Institute Library (MGI).

¹³ It has also been suggested that the mention of the man as oily is a reference to Chagosians working in coconut plantations, and coconut oil refineries (Olsen, 2016), although this is conjecture.

¹⁴ The spectre of the touni minuit mirrors that of the famed mumiani, or vampire, of eastern Africa that historians have understood to operate, in part, as a symbol of the extractive threats posed by colonial rule and multiple cultural “others.” See: Luise White, *Speaking with Vampires: Rumour and History in Colonial Africa* (California, 2000); James R. Brennan, “Destroying Mumiani: Cause, Context, and Violence in Late-Colonial Dar es Salaam,” *Journal of Eastern African Studies* Vol. 2, No. 1, 2008.

Îles¹⁵, that a woman in black, unknown to everyone, came to Mother Barthélemy (a nun) to tell her that “*a terrible disaster will soon arrive on this country. Water, fire and wind will ravage everything, and Mauritius will never have gone through such a terrible ordeal ... there will be thousands of dead and wounded*”. The woman in black then supposedly disappeared without a trace and the Gazette claims that many people after the cyclone recalled this prediction¹⁶. This is mentioned occasionally in contemporary sources¹⁵ as a curious incident but like the werewolf is at risk of being forgotten. This story of a cyclone prediction also did not evolve from a vacuum. It is part of the cultural traditions and knowledge of Mauritius and another key element of cultural responses to cyclones across Mauritian history: the use of local knowledge based predictive warning signs.

4. Early warning signs, past and present

The earliest use of local knowledge based predictive warning signs that are found in the archive data relates to the “*great hurricane of 1760*” when warning signs were noted: “*the day passed in rains and gusts; a very unusual sign of an atmospheric disturbance ... without any breeze, the sea, united like ice, rose inland, at a height that frightened the fishermen. All the inhabitants who had settled in the country for 30 years, not boding well, returned to the city*”¹⁶. In his travelogue of Mauritius, French author Bernardin de Saint-Pierre describes similar signs of the approaching 1769 cyclone:

“The winds came from the southeast and seemed to announce a storm. Clouds gathered around the mountain peaks. They were of an olive and copper colour. One could see a long range of them, higher than the rest and motionless. Clouds below them were blowing rapidly past. The sea broke with great noise on the reefs. Many seabirds came from the open sea to take refuge on land. The pets seemed worried. The air was heavy and warm, although the wind had not fallen. With these signs promising a cyclone, everybody rushed to prop up their houses with poles and close all their doors and windows” (Bernardin de Saint-Pierre, 1773).

This experience was later used by Bernardin de Saint-Pierre as inspiration for the cyclone at the climax of *Paul et Virginie* published in 1788, including the same announcing signs (Ravi, 2017).

While a small number of meteorological instruments started to arrive (and be used exclusively by the governing elite) in French Mauritius, it was not until 1872 that Mauritius began to operate a cyclone early warning system for the general public (which was the world’s first single station cyclone early warning system, see Walshe, 2022). Consequently, many early Mauritian institutions continued to rely on the cultural knowledge of the environment and predictive warning signs as a form of forecasting. In some cases, those in positions of power in French Colonial Mauritius prioritised the use of local knowledge early warning signs over early meteorological instrumental indications. One example concerns the port captain of 1771. Writing about the cyclone in 1771, Abbe Richon a clergyman in colonial French Mauritius, stated that he and M. Poivre¹⁷ were concerned about the descent in barometric pressure, and went to warn the port captain. The port captain, however, was not worried and informed them that there “*were more certain indications. Twenty-four hours ... before the hurricane, you will see the black clouds descend from the mountain and declare the approaching storm; besides the setting of the sun will decide the measures I shall employ on the occasion*”.

¹⁵ Unknown author (2017) <https://wanderingexpatfamily.wordpress.com/2017/04/29/the-lady-in-black/>.

¹⁶ *Gazette des Îles / 1774 / p3 / Carnegie Library Curepipe (CLC)– 1992 reprint.*

¹⁷ Pierre Poivre was the French colonial administrator of Mauritius (Isle de France) in the 1760s, among other things he is known for establishing the third botanic garden in the world (see Grove 1993) ²⁰ Abbe Richon (1771) quoted in Pridham (1849; p352) National Archive.

Despite attempts to change his mind the port captain was “*free from alarm as to any threatening danger*” and “*seemed to pity us for giving so much importance to the predictions of the barometer*”. The sun did indeed set in “*great beauty and serenity*”, however an hour after sunset the cyclone stuck Mauritius, and all ships but two (which also sunk) were driven ashore²⁰.

The archives contain several cases where the absence of the “*signs by which the approach of a great tempest is announced*” are noted, again highlighting that, at the time, such warning signs were expected to be observed. One example was reported in the cyclone of 1773, that the usual indications were ‘invisible’ and despite increasing intensity of the wind, “*few inhabitants manifested inquietude*” and “*neglected the precautions usually adopted when they are apprehensive of a hurricane... few vessels strengthened their cables, and none of the planters thought of cutting the stem of the manioc to save their roots*”¹⁸.

This cultural and local knowledge was, to an extent, formally adopted in the British colonial period. Writing in 1849, Pridham (1849, p. 311) instructed colonialists settling in Mauritius and its dependencies that the “*approach of these hurricanes may be known, without the assistance of a barometer, by the darkness of the atmosphere, rising of the water above its usual level, and the hollow roaring of the breakers on the reef and shoals, and they generally give about twenty-four hours warning*”¹⁹. The 1852 Mauritius Almanac also urged readers to be aware that “*many premonitory signs of hurricanes are perceptible ... [particularly that] the sea rises and breaks sometimes with fury against the reefs*”²⁰. This demonstrates that before the establishment of a formal early warning system for cyclones, physical premonitory signs were used by some in positions of power, as well as the general community. These warning signs were also respected by colonial meteorology, as the founder and director of the observatory Charles Meldrum reported in 1879: “*A few minutes after sunset ... the upper cirrus clouds assumed at first a yellowish ash colour, which deepened into scarlet, and then changed into dark red. At one time the whole sky looked as if it were on fire. This was an indication of a coming storm*” (Meldrum, 1879, p. 222).

Indeed, the efficacy of early meteorological forecasts and cyclone warnings were judged against this pre-existing cultural knowledge. For example, an early use of Meldrum’s cyclone early warning system in January of 1881 was criticised in the newspaper *Le Nouveau Mauricien* as a slow reaction to the environmental warning signs; “*positive signs of the cyclone days earlier, such as red and copper clouds at sunrise and a stormy sea*”²¹.

While communities in the 19th century clearly used physical warning signs as an element of local cultural knowledge, these were ignored in the days and hours before the cyclone of 1892 (partly due to the cyclones unseasonal timing). Several archive documents detail the physical warning signs, including those listed above, that were noted by in Mauritius, but were ignored, including:

*“[due to the late season] The atmospheric changes observed from the 27th of April of this year, and which at any other time had been considered as ominous omens, caused little anxiety”*²².

“Until the storm was almost upon us the chance of such a thing was never entertained – or, at any rate, by very few and such would have been laughed at for their prophecy. Yet signs were not altogether wanting. There had been for some time past a feeling of oppression in the air ... the night of the 28th was so hot and still and breathless that the sound of the distant surf was heard beating upon the reefs with a sullen, ceaseless

¹⁸ Description by M. Brunel of the Hurricane of April 1773, reprinted in Pridham 1849 / page 352 / NL.

¹⁹ Charles pridham was a colonial historian and chronicler.

²⁰ ‘Hurricanes’, Mauritius Almanac, 1852, p175, NL.

²¹ *Le Nouveau Mauricien*/1881/23/01/JPC.

²² G. Toulorge. April 29, 1892 in île Maurice. A. Ollivry, 1892. - p. 35.

roar— a deep, long-drawn note, like the laboured moaning of a creature in pain”²³.

These warning signs, that were ignored in 1892, were noted at the time to be the same as those described in relation to the cyclone in the novel *Paul et Virginie* written 130 years earlier. Although this source also implies that by 1892 this knowledge about warning signs (such as the sounds of a cyclone) were less widespread or observed, and in contrast, that this knowledge was known by those writing the records (the chroniclers) of cyclones 130 years earlier “thus had it [the cyclone] sounded, say the chroniclers”²⁴.

As well as the audible warning of waves on the reef caused by ocean swells, the appearance of a red sky at sunset is one of the mainstays of local knowledge cyclone prediction in the archive. Such sunsets are to be expected before cyclones in this part of the Indian Ocean with the “formation of wisps of high cirrus cloud ... and halos are formed by the refraction of the suns light through the ice crystals of which they are composed; lurid sunsets are also observed”²⁵. This was also noted by one observatory director, Walther, as “one of the first indications of an approaching storm” (Walter, 1914, p. 188). This connection was clearly well known in early 20th century Mauritius, as remarked upon by Captain Brebner²⁶ in relation to a 1912 cyclone: “The sunset was a phenomenon. It appeared as if Etna, Vesuvius, Stromboli, and all the other burning mountains of this sphere ... were vomiting out flames to consume us. The skies at this moment presented a truly appalling appearance”. The observers of which were under no illusions as to its connotations; “this storm-laden sunset had decidedly a moral effect on many passengers ... [who] consoled themselves with whisky and soda and hopes for the best”²⁷.

The aforementioned Mauritian novelist Marcel Cabon’s book *Namasté*, that was based on cyclone Carol in 1960 begins with similar tell-tale atmospheric changes: “Three days ago, there were only red streaks in the horizon ... a strange smell hung in the air” (Cabon, 1981, p. 60–61 – and as noted by Ravi, 2017). This is the only acknowledgement of predictive warning signs found for cyclone Carol and mentions of predictive phenomena tail off sharply in the 20th century archives. This suggests that in the age of technological warning systems and meteorology, the use of local knowledge-based warning signs was increasingly rejected by those whose voices are represented in the archives.

4.1. Contemporary local knowledge of approaching cyclones

The data from community interviews, however, suggest that the same announcing signs and the local cultural knowledge behind them detailed in the archive were not lost and instead was passed down across generations. A considerable number of people in Mauritius still use (to varying extents) the same local knowledge cyclone-warning signs today: 54 interviewees (of 135 conducted – i.e. 40%) mentioned or described some form of anticipatory local knowledge for predicting cyclones. This takes a wide range of forms, levels of knowledge and applications including various local and cultural ways to predict the approach of a cyclone. For example, the belief that a particularly red sky at sunset is a warning sign of a cyclone that can be used to anticipate its approach (as described as early as 1771) was mentioned by 17 interviewees:

[How do you know when a Cyclone is approaching?] “The sky in the afternoon, 5o’clock – you see the sky, red, red, my father told me that

– all men – it’s true – the sky comes red red red ... they tell us there may be a cyclone in the next days” (Interview No. 142).

An additional two participants spoke of observing the sky as a predictor of cyclone but did not specify that it would be red. An even larger number of participants (n = 20) either mentioned or recommended paying attention to the behaviour of the sea in order to predict cyclones:

“I can tell [how a cyclone is coming] by looking at the sea, and looking at the way the waves are moving ... my grandparents taught me that ... [they] were fisherman ... so I can tell when the cyclone is coming – I do not trust the Meteo and warnings” (Interview No. 10).

“You can also see the weather changing, the fishermen are really good at that, and their predictions are 80 percent true, better than the Meteo [the Mauritian weather service]!” (Interview No. 20).

Similarly, thirteen interviewees attested to the ability to use indicators from plants, and animals to predict cyclones:

“We can tell when a cyclone is going to be really bad – the wind will whistle; we can feel it. Nowadays we don’t feel it, so that’s why I believe there won’t be another big one. When the wind ... make a whistle sound in the trees, I will know that a big cyclone is coming. We used to watch frogs, when the frog is croaking ... it means you are going to have heavy rain. If it continues long enough, maybe you will have a cyclone. We also look at ... a special tree which has a flower ... if it blooms it’s going to be a big cyclone. I can also tell by looking at black ants – if they are grouping a lot, if there are small white things on them this means that a big rain is coming” (Interview No. 138).

“Of course I can tell when one is coming - it’s really hot, lots of mosquitoes, I can feel something is coming ... when you see frogs and snails moving to dry land then you know it’s going to be terrible. And if the snails go up the banana tree, that’s when you have to take precautions - my grandparents taught me that. My children say I should have worked in the Meteo!” (Interview No. 101).

Furthermore, several participants combined a number of local knowledge indicators:

“The sky tells me when a cyclone is coming – the colour of the sky becomes strange, orange colour. And when snails climb on the walls there are heavy rains” (Interview No. 136).

“I look at the ants and the snails – and the sky turns red. Yes I still do this today” (Interview No. 140).

This is not to say that those who mentioned such warning signs exclusively used them, several (n = 8) of the responses were either ambivalent or denigrated the local knowledge in favour of the technological, for example:

“At first, we did not really have Meteo, so we had to rely on the nature. The moment you see the clouds gathering around and getting red, so you know one is approaching so you have to take precautions, but now we have Meteo today who tell us what to do” (Interview No. 29).

Yet, an equal number (n = 8) of participants prioritised observational warning signs above any formal meteorology, for example:

“I look at the weather to find out about the cyclone - I don’t need to listen to the Meteo - I know about cyclones without them. I trust the weather and what I see more than the Meteo and the government” (Interview No. 48).

The use of either local cultural or scientific warnings is not mutually exclusive, and by coincidence an equal number of participants (n = 8) implied that both cultural and scientific warning could be used or consulted together. The average age of participants who mentioned cultural anticipatory knowledge (in any guise) was 59.9 years, only fractionally older than the average age of the whole sample (58.9 years). Yet some of

²³ Pendavis / 1893 / p33 / Reprinted in *The Colonies and India*, July 1892 / NL.

²⁴ *ibid.*

²⁵ Claxton / 1899 / p13 / CLC – On Cyclones, a lecture at the Quatre Bourne club 28/01/1899.

²⁶ C.W. Brebner was a master mariner, captain of the clipper *Sir Lancelot* (among others) and author of the 1898 *New Handbook for the Indian Ocean* including advice on how to avoid cyclones.

²⁷ *Planters and Commercial Gazette* / 1912 / 14th of April / NA.

the interviewees mentioned the knowledge retrospectively and in the past tense, either stating that it was once used but now was gone, or alluding to it being a disappearing knowledge:

“The sea and the water can tell you, and the weather is not normal, I can tell just by looking at the sea - but my sons don’t know how to tell this or see this” (Interview No. 19).

“On the radio they tell you. And when it’s gone. Fishermen can tell when its coming - but not us. We depend on the Meteo” (Interview No. 106).

As shown in several quotes, many said their grandparents or parents directly passed this knowledge on to them and a small number ($n = 3$) said that that they could no longer predict cyclones because the climate/environment had changed:

“climate has changed. Before, the fisherman could predict the sea, but now they cannot” (Interview No. 104).

These data suggest that many people in Mauritius pre-empt and respond to cyclones using local knowledge predictive warning signs and while local knowledge is mostly absent in the archive from the 20th century onwards, it has clearly not been lost entirely, and it continues to be used and transmitted in Mauritian communities. However, it is not clear how this knowledge is valued or used beyond the participants and communities interviewed for this study. An important future research question should be how this cultural knowledge may be used in cyclone warning today.

5. Conclusion: Weather is Cultural

The combined archive and interview data show that, contrary to claims – both at the time and today – that the 1994 cyclone hysteria was an isolated cultural ‘episode’, the effect of culture is pervasive in all responses to cyclones in Mauritius. All cyclones, and indeed all disasters, are cultural events (often linked to a physical hazard, see McGowran & Donovan, 2021) and the responses to them are therefore cultural too. One clear manifestation of this is the use of predictive warning signs in Mauritius as a way to forecast cyclones. Elements of this cultural knowledge existed in Mauritius as early as 1760 and played an important role in how cyclones were responded to in the past. These cultural responses are still remembered and used today.

While specific cyclones are easily forgotten (Walshe et al. (2020) show that the memory of specific cyclones in rural communities does not extend past 1892), this research shows that local cultural knowledge, including of cyclone warning signs, has been maintained, transmitted, and handed down orally and in written sources since the late 1700’s, far exceeding the memory of actual cyclone events. This points to the need to consider memory more broadly – beyond a focus on memory of historical events – to incorporate collective and cultural memory of past responses and experiences, and memory in a holistic sense, including cultural knowledge forms such as local knowledge warning signs. This is in line with the suggestion that memory can take a double form between personal memories of disasters (events) and the social constructions surrounding them and the overall experience which are shared, and do not necessarily have to be experienced personally (Assmann, 2011). Thus, just because the memory of cyclone events themselves in Mauritius may not extend far back into the past, this does not mean other forms of cultural knowledge from further back are not present and used. Social science methods and historical archive approaches are therefore both required, while being aware of the challenges and issues with island disaster archives that privilege certain knowledge types and forms (see Walshe and Foley, 2021).

These results also highlight the cultural nature of all knowledge, and that the division of knowledge into ‘types’ may not be useful. Culture, and the responses to disasters it informs, are not binary; either local or scientific (Briggs et al., 1999; Leach and Fairhead, 2000). Places like

Mauritius that call on several different knowledge traditions also have complex cultural responses to disasters that may be overlooked. This binary tension is sustained by the scientific desire to categorise, which also likely fuels the suppression and marginalisation of cultural responses in contexts like Mauritius. Equally there is a clear desire in parts of Mauritian society for Mauritius to be categorised as a developed and scientific society, which is partly why the 1994 mass hysteria was responded to with derision in most places and is at risk of being forgotten (or repressed).

Moreover, it should be noted here that the Mauritian case poses a conceptual challenge to the scientific contra local or vernacular dyad that often frames disaster risk reduction research and policy (cf Mercet et al., 2010). The long history of mobility, diaspora, and cultural connectivity across the Indian Ocean between East Africa and South Asia has produced an array of cosmopolitan cultural forms (i.e. *séga*) that elide these categorizations and instead show the oft-cited ethno-racial “plurality” of Mauritius.

Finally, as this Mauritian case study shows, past disaster response, knowledge, and historical experience all frame how specific societies engage with new disasters. In the Mauritian case, the spectre of the *loup garou*, a shared meteorological vernacular, and a collective memory of cyclonic pasts evidence the embeddedness of these storms in parts of the history and cultural worlds of everyday Mauritians. Indeed, cultural responses are not limited to the distant past; cultural frameworks for understanding a ‘scientific’ phenomena are not signals of pre-modern sensibilities. Rather, cultural responses evidence the plurality of the human experience that must be considered for in developing comprehensive disaster preparation and response policy.

CRediT authorship contribution statement

Rory A. Walshe: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Writing – original draft, Writing – review & editing. **Robert M. Roupail:** Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing. **George C.D. Adamson:** Supervision, Conceptualization, Methodology, Project administration, Writing – review & editing. **Ilan Kelman:** Supervision, Conceptualization, Methodology, Project administration, Writing – review & editing.

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.

Acknowledgments

The authors wish to thank and acknowledge the interview participants, the assistance of the National Archive and National Library staff in Mauritius, research assistants Vasishth Rajcoomar, Sharon Ram-sawmy, Tarun Seetah, and Priya Doya. Thanks to the three anonymous peer reviewers for their comments which greatly improved this manuscript.

Funding statement.

The involvement of RW in this research was part of a studentship funded by the UK Natural Environment Research Council (NERC), grant number NE/L002485/1.

References

- Adamson, G.C.D., Hannaford, M.J., Rohland, E.J., 2018. Re-thinking the present: The role of a historical focus in climate change adaptation research. *Global Environ. Change* 48 (1), 195–205.
- Appanah, N., 1996. *Hollanda, Petit Éloge Des Fantômes*, Editions Gallimard (25 Aug. 2016), Port Louis.

- Appleby-Arnold, S., Brockdorff, N., Jakovljević, I., Zdravković, S., 2018. Applying cultural values to encourage disaster preparedness: Lessons from a low-hazard country. *Int. J. Disaster Risk Reduct.* 31, 37–44.
- Assmann, J., 2011. Communicative and Cultural Memory. In: Meusburger, P., Heffernan M. Wunder, E. (Eds.) *Cultural Memories: The Geographical Point of View*, Springer, Dordrecht, pp. 15–27.
- Ball, N., 1979. Some Notes on Defining Disaster: Suggestions for a Disaster Continuum. *Disasters* 3 (1), 3–7.
- Bankoff, G., 2004. Time is of the Essence: Disasters, Vulnerability and History. *Int. J. Mass Emerg. Dis.* 22 (3), 23–42.
- Bankoff, G., Cannon, T., Kruger, J., Schipper, E.L.F., 2015. Exploring the links between cultures and disasters. In: Kruger, F., Bankoff, G., Cannon, T., Orłowski, B., Schipper, E.L. (Eds.), *Cultures and Disasters*, 1st ed. Routledge, New York, pp. 1–16.
- van Bavel, B., Curtis, D.R., Dijkman, J., Hannaford, M., de Keyser, M., van Onacker, E. and Soens, T., 2020. *Introduction: Disasters and History, Disasters and History*, available at: <https://doi.org/10.1017/9781108569743.001>.
- Behringer, W., 2010. *A Cultural History of Climate*. Polity, London.
- Bernardin de Saint-Pierre, H., 1773. *Voyage à l'Isle de France, à l'Isle de Bourbon, Au Cap de Bonne-Espérance, Etc. Avec Des Observations Nouvelles Sur La Nature et Sur Les Hommes. Tome 1/, Par Un Officier Du Roi*, available at: <https://gallica.bnf.fr/ark:/12148/bpt6k1019923.texteImage> (accessed 25 April 2019).
- Blaikie, P., Cannon, T., Davis, I., Wisner, B., 1994. *At Risk. Natural People's Vulnerability and Disasters*, Routledge, London.
- Briggs, J., 2005. The use of indigenous knowledge in development: Problems and challenges. *Prog. Dev. Stud.* 5 (2), 99–114.
- Briggs, J., Badri, M., Mekki, A.M., 1999. Indigenous knowledges and vegetation use among bedouin in the Eastern Desert of Egypt. *Appl. Geogr.* 19 (2), 87–103.
- Cabon, M., 1981. *Namasté*, 2nd edition. Éditions de l'Océan Indien, Rose Hill.
- Carter, M., Torabully, K., 2002. *Coolitude: An Anthology of the Indian Labour Diaspora*. Anthem Press, London.
- Cannon, T., 2008. Vulnerability, 'innocent' disasters and the imperative of cultural understanding. *Dis. Prevent. Manage.: Int. J.* 17 (3), 350–357.
- Dekens, J., 2007. Local knowledge for disaster preparedness: A literature review. International Commission for Mountain Development (ICIMOD), Kathmandu.
- Donovan, A., 2017. Geopower: Reflections on the critical geography of disasters. *Prog. Hum. Geogr.* 41 (1), 44–67.
- Dynes, R., 1975. The comparative study of disaster: A social organizational approach. *Mass Emergencies* 1 (1), 21–31.
- Endfield, G.H., 2007. Archival explorations of climate variability and social vulnerability in colonial Mexico. *Clim. Change* 83 (1–2), 9–38.
- Gaillard, J.C., 2019. Disaster studies inside out. *Disasters* 43 (1), S7–S17.
- García-Acosta, V., 2007. Risks and Disasters in the History of the Mexico Basin: Are they Climatic or Social? *Medieval History J.* 10 (1–2), 127–142.
- García-Acosta, V., 2017. Building on the past: Disaster Risk Reduction including Climate Change Adaptation in the Longue Durée. In: Kelman, I., Mercer, K., Gaillard, J. (Eds.), *The Routledge Handbook of Disaster Risk Reduction Including Climate Change Adaptation*. Routledge, Abingdon, pp. 203–213.
- Geertz, C., 2000. *The Interpretation of Cultures: Selected Essays*. Basic Books, New York.
- Ghosh, A., 2008. *Sea of Poppies*. Viking Press, London.
- Gierlach, E., Belsler, B., Beutler, L., 2010. Cross-cultural differences in risk perceptions of disasters. *Risk Anal.* 30 (10), 1539–1549.
- Hall, A., Endfield, G., 2016. 'Snow Scenes': Exploring the Role of Memory and Place in Commemorating Extreme Winters. *Weather Clim. Soc.* 8 (1), 5–19.
- Haring, L., 2001. *Anu Koleksyonn Folklor Moris: Collecting Folklore in Mauritius*. Mahatma Gandhi Institute, Port Louis.
- Heide, E.A. Der, 2004. Common Misconceptions about disasters: Panic, the 'Disaster Syndrome,' and Looting. In: O'Leary, M.R. (Ed) *The First 72 Hours: A Community Approach to Disaster Preparedness*, iUniverse, Bloomington, pp. 340–380.
- Hewitt, K., 1983. The idea of calamity in a technocratic age. In: Hewitt, K. (Ed.), *Interpretations of Calamity. The risks, Allen and Unwin, Boston*, pp. 3–32.
- Hiwasaki, L., Luna, E., Syamsidik, Shaw, R., 2014. Process for integrating local and indigenous knowledge with science for hydro-meteorological disaster risk reduction and climate change adaptation in coastal and small island communities. *Int. J. Disaster Risk Reduct.* 10 (1), 15–27.
- Hoffman, A.J., 2015. *How Culture Shapes the Climate Change Debate*. Stanford University Press, Stanford.
- Howell, P., 2003. Indigenous early warning indicators of cyclones: Potential application in coastal Bangladesh. *Disaster Studies Working Paper*, No. 6, available at: http://www.benfieldhrc.org/disaster_studies/working_papers/pdfs/workingpaper6.pdf (accessed 23 October 2020).
- Horowitz, A., 2020. *Katrina: A History, 1915-2015*. Harvard University Press.
- Issur, K., 2020. Mapping ocean-state Mauritius and its unalaid ghosts: hydro-politics and literature in the Indian Ocean. *Cultural Dynamics* 32 (2), 117–131.
- Johnston, I., 2015. Traditional warning signs of cyclones on remote islands in Fiji and Tonga. *Environ. Hazards* 14 (3), 210–223.
- Kasbarian, J.A., 1996. Mapping Edward Said: geography, identity, and the politics of location. *Environ. Plann. D: Soc. Space* 14 (5), 529–557.
- Kelman, I., 2020. *Disaster by Choice: How Our Actions Turn Natural Hazards Into Catastrophes*. Oxford University Press.
- Kelman, I., Mercer, J., Gaillard, J.C., 2012. Indigenous knowledge and disaster risk reduction. *Geography* 97 (1), 12–21.
- Kirchhner, J., Charles, K., 2018. Enhancing the sample diversity of snowball samples: Recommendations from a research project on anti-dam movements in Southeast Asia. *PLoS one* 13 (8), e0201710.
- Kroeber, A.L., Kluckhohn, C., 1952. *Culture: A critical review of concepts and definitions*. Papers. Peabody Museum of Archaeology & Ethnology Harvard University.
- Krüger, F., Bankoff, G., Cannon, T., Orłowski, B., Schipper, E.L.F., 2015. *Cultures and Disasters: Understanding Cultural Framings in Disaster Risk Reduction*, 1st ed. Routledge, London.
- Leach, M., Fairhead, J., 2000. Fashioned Forest Pasts, Occluded Histories? *International Environmental Analysis in West African Locales. Dev. Change* 31 (1), 35–59.
- Lefale, P.F., 2010. Ua 'afa le Aso Stormy weather today: Traditional ecological knowledge of weather and climate. The Samoa experience. *Clim. Change* 100 (2), 317–335.
- Lewis, J., 1990. The vulnerability of small island States to sea level rise: the need for holistic strategies. *Disasters* 14 (3), 241–249.
- Lewis, J., 2015. Cultures and Contra-cultures: Social deviations and behavioural origins of vulnerabilities to disaster risk. In: Kruger, F., Bankoff, G., Cannon, T., Orłowski, B., Schipper, L. (Eds.), *Cultures and Disasters*, 1st ed. Routledge, New York, pp. 109–154.
- Livingstone, D.N., 2012. Reflections on the cultural spaces of climate. *Clim. Change* 113 (1), 91–93.
- Lorenzoni, I., Pidgeon, N.F., 2006. Public views on climate change: European and USA perspectives. *Clim. Change* 77 (1–2), 73–95.
- McGowan, P., Donovan, A., 2021. Assemblage theory and disaster risk management. *Prog. Hum. Geogr.* 45 (6), 1601–1624.
- Mahony, M., 2018. The 'genie of the storm': cyclonic reasoning and the spaces of weather observation in the southern Indian ocean, 1851–1925. *Br. J. Hist. Sci.* 51 (4), 607–633.
- McAdoo, B.G., Dengler, L., Prasetya, G., Titov, V., 2006. Smong: How an oral history saved thousands on Indonesia's Simeulue Island during the December 2004 and March 2005 tsunamis. *Earthq. Spectra* 22 (3), 661.
- Meldrum, C., 1879. Report on the storm of the 21st and 22nd of March, 1879, as experienced at the Royal Alfred Observatory of Nauritius. *Q. J. R. Meteorolog. Soc.* 5 (32), 223–225.
- Mercer, J., Kelman, I., Taranis, L., Suchet-Pearson, S., 2010. Framework for integrating indigenous and scientific knowledge for disaster risk reduction. *Disasters* 34 (1), 214–239.
- Merz, B., Kreibich, H., Schwarze, R., Thieken, A., 2010. Review article 'assessment of economic flood damage'. *Nat. Hazards Earth Syst. Sci.* 10 (8), 1697–1724.
- Mondragon, C., 2015. *Seasonal Environmental Practices and Climate Fluctuations in Island Melanesia: Forest, Reef and Sea Level Rise in North Vanuatu*, Vol. 1, doi.org/10.1017/CBO9781107415324.004.
- Mortreux, C., Barnett, J., 2009. Climate change, migration and adaptation in Funafuti, Tuvalu. *Glob. Environ. Change* 19 (1), 105–112.
- Nunn, P.D., Campbell, J.R., 2020. Rediscovering the past to negotiate the future: How knowledge about settlement history on high tropical Pacific Islands might facilitate future relocations. *Environ. Dev.* 35 (1).
- Nunn, P.D., Hunter-Anderson, R., Carson, M.T., Thomas, F., Ulm, S., Rowland, M.J., 2007. Times of plenty, times of less: Last-millennium societal disruption in the Pacific Basin. *Human Ecology* 35 (4), 385–401.
- Nunn, P.D., Runman, J., Falanruw, M., Kumar, R., 2017. Culturally grounded responses to coastal change on islands in the Federated States of Micronesia, northwest Pacific Ocean. *Reg. Environ. Change* 17 (4), 959–971.
- Nussbaum, F., 1995. *Torrid Zones: Maternity, Sexuality, and Empire in Eighteenth-Century English Narratives*. Johns Hopkins University Press, Baltimore.
- O'Keefe, P., Westgate, K., Wisner, B., 1976. Taking the naturalness out of natural disasters. *Nature* 260 (5552), 566–567.
- Oliver-Smith, A., Hoffman, S.M., 1999. *The Angry Earth: Disaster in Anthropological Perspective*. Routledge, London.
- Olsen, P., 2016. The legend of Touni Minuit. *Travel Iles*, available at: <https://www.travel-iles.com/espritedes-iles/la-legende-de-touni-minuit/> (accessed 13 June 2019).
- Palutikof, J.P., Agnew, M.D., Hoar, M.R., 2004. Public perceptions of unusually warm weather in the UK: Impacts, responses and adaptations. *Clim. Res.* 26 (1), 43–59.
- Paul, S.K., Routray, J.K., 2013. An Analysis of the Causes of Non-Responses to Cyclone Warnings and the Use of Indigenous Knowledge for Cyclone Forecasting in Bangladesh. In: Leal Filho, W. (Ed.), *Climate Change and Disaster Risk Management. Climate Change Management*, Springer, Berlin, Heidelberg, pp. 15–39.
- Petzold, J., Andrews, N., Ford, J.D., Hedemann, C., Postigo, J.C., 2020. Indigenous knowledge on climate change adaptation: a global evidence map of academic literature. *Environ. Res. Lett.* 15 (11), 113007.
- Pridham, C., 1849. *An Historical, Political, and Statistical Account of Mauritius and Its Dependencies*. T and W Boone, London.
- Quarantelli, E., 2001. Sociology of Panic. *International Encyclopedia of the Social & Behavioral Sciences*, Disaster Research Center, pp. 11020–11023.
- Ravi, S., 2017. Tropical Cyclones in Mauritian Literature. In: Collett, A., McDougall, R., Thomas, S. (Eds.), *Tracking the Literature of Tropical Weather*. Springer, London, pp. 1–24.
- Riede, F., 2014. Towards a science of past disasters. *Nat. Hazards* 71 (1), 335–362.
- Rodriguez, H., Quarantelli, E.L., Dynes, R.R., 2007. *Handbook of Disaster Research*. Springer, London.
- Rouphail, R.M., 2019. *Cyclonic Ecology: Sugar, Cyclone Science, and the Limits of Empire in Mauritius and the Indian Ocean World, 1870s–1930s*. *Isis* 110 (1).
- Rouphail, R.M., 2020. *Essentially cyclonic: "race, gender, and disaster in modern Mauritius"*, University of Illinois, available at: <https://core.ac.uk/download/pdf/238434083.pdf> (accessed 10 May 2020).
- Rouphail, R.M., 2021. Disaster in a Plural Society: Cyclones, Decolonization, and Modern Afro-Mauritian Identity. *J. Afr. History* 62 (1), 79–97.
- Said, E., 1978. *Orientalism*. Pantheon Press, New York.
- Schenk, G., 2015. 'Learning from History'? Chances, problems, and limits of learning from historical natural disasters. In: Kruger, F., Bankoff, G., Cannon, T., Orłowski, B.,

- Schipper, E. (Eds.), *Culture and Disasters: Understanding Cultural Framings in Disaster Risk Reduction*. Routledge, London, pp. 72–88.
- Schenk, G.J., 2007. Historical disaster research. State of research, concepts, methods and case studies. *Hist. Soc. Res.* 32 (3), 9–31.
- Shaw, R., Sharma, A., Takeuchi, Y. (Eds.), 2009. *Indigenous knowledge and disaster risk reduction: From practice to policy*. Nova Science Publishers, New York.
- Slew, P., 2003. *A Cyclone in Black River*. Editions VIZAV, Port Louis.
- Sperber, D., Claidière, N., 2008. Defining and explaining culture. *Biol. Philos.* 23 (2), 283–292.
- Steinberg, T., 2006. *Acts of God: The Unnatural History of Natural Disaster in America*. Oxford University Press, Oxford.
- Tyagi, R., 2009. *Ananda Devi's Narrative Strategies and Subversions*. Louisiana State University, Department of French Studies Dissertation. Access 2021: https://digitalcommons.lsu.edu/cgi/viewcontent.cgi?article=4560&context=gradschool_dissertations.
- Vaghjee, R.R., Yan, M.L.M., 2003. Improving the Tropical Cyclone Warning System and its Effective Dissemination in Mauritius. *Early Warning Systems for Natural Disaster Reduction*, Springer, Berlin, pp. 209–211.
- Sutter, P.S., 2015. Triumphalism and Unruliness during the Construction of the Panama Canal. *RCC Perspect.* 3, 19–24.
- Virahswamy, D., 1999. *Toufaan: A Mauritian Fantasy*. Border Crossing Press.
- Walshe, R.A., Adamson, G.C.D., Kelman, I., 2020. Helices of disaster memory: How forgetting and remembering influence tropical cyclone response in Mauritius. *Int. J. Disaster Risk Reduct.* 50.
- Walshe, R.A., Nunn, P.D., 2012. Integration of indigenous knowledge and disaster risk reduction: A case study from Baie Martelli, Pentecost Island, Vanuatu. *Int. J. Dis. Risk Sci.* 3 (4), 185–194.
- Walshe, R.A., Foley, A., 2021. Learning from the archives of island jurisdictions: Why and how island history should inform disaster risk reduction and climate action. *Small States Territ.* 4 (2), 205–230.
- Walshe, R.A., 2022. 'Who could have expected such a disaster?' How responses to the 1892 cyclone determined institutional trajectories of vulnerability in Mauritius. *J. Hist. Geogr.*
- Walter, A., 1914. Climate of Mauritius. In: Macmillan, A. (Ed.), *Mauritius Illustrated: Historical and Descriptive, Commercial and Industrial, Facts, Figures and Resource*, p. p188.
- White, G., 1974. *Natural Hazards, Local, National, Global*. Oxford University Press, Oxford.