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CULTURAL PATHWAYS TO CLIMATE ACTION IN THE ANGLOPHONE CARIBBEAN

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CHAPTER ONE

INTRODUCTION

June too soon, July stand by, August get ready, September remember, October all over... (the Caribbean Atlantic Hurricane Season Rhyme)

When Hurricane Beryl made landfall in the Lesser Antilles of the Caribbean in July 2024, it had rapidly intensified from a Category One to a Category Four hurricane in the space of one day and became the strongest formed hurricane that early in the season¹. This was due to the warmer than normal seas of the Atlantic Ocean, a testament to the changing climate and the ongoing reality faced by the small islands of the region.

Globally, coastal areas are acknowledged to be among the most vulnerable environments to climate warming and climate-induced hazards, with rising sea levels, coastal inundation, coastal erosion, storm surges, and other extreme weather events contributing to the acceleration of coastal loss (Egberts & Renes, 2020; Intergovernmental Panel on Climate Change (IPCC), 2007, 2019). This loss is further compounded by the high level of infrastructural development and ecosystem degradation in these same coastal areas which have served to exacerbate the impact of these hazards. These amplified impacts have also come to define the susceptibility of the coastal zone, and the resilience of this space within the context of the threat of ongoing and future risks from climatic challenges. The IPCC specifies that ‘coastal risks will increase by at least one order of magnitude over the twenty-first century due to committed sea level rise impacting ecosystems, people, livelihoods, infrastructure, food security, cultural and natural heritage and climate mitigation at the coast’ (IPCC, 2022, p. 62).

¹ How Record-breaking Hurricane Beryl is a sign of a warming world. Accessed at: <https://www.bbc.com/news/articles/c9r3g572lrno>

The forgoing description best captures the Caribbean, where the region faces an uncertain future due to accelerated and ongoing climate warming. The region has been described as unusually vulnerable due to its geophysical characteristics, the annual tropical cyclone season, among other climate stressors and natural hazards, and in some studies, the region is characterized as having one of the highest experiences of vulnerability in the world (Cambers & Roberts-Hodge, 2014; Cooper, 2013; Douglass & Cooper, 2020; Hofman & Hoogland, 2015; Nurse et al., 2014; Mycoo & Donavon, 2017; Simpson, 2010; Strauss & Kulp 2018; Taylor et al., 2012).

Traditionally, the Caribbean is known as a tourism epicentre for sun, sea, and sand. It is perhaps now ironic that this same sun, sea, and sand are profoundly connected to its vulnerability and current precarious position in relation to climate-induced hazards in the form of increased land and sea temperatures, sea-level rise and significant coastal erosion or loss. Glavovic et al., broadly define the coastal zone as “the area where land, sea, and air intersect” (2014, p. 3), and the region’s coastal zone is also the location of a significant number of towns, many of which are historic, such as Historic Bridgetown in Barbados, Port Royal and Falmouth in Jamaica, Georgetown in Guyana and St. George’s in Grenada, and contains historical and other critical and tourism infrastructure (Cashman & Nagdee, 2017; Mycoo & Donavon, 2017) such as ports and airports, as well as providing evidence of past human settlements and activities, and an extensive archaeological record.

This archaeological record is testimony to the attractiveness of coastal areas to pre-Columbian populations concerning the accessibility of water and food resources (Fitzpatrick, 2012; Hofman et al., 2021a). The popularity of the coastline remains today, acknowledged by the extensive infrastructural development in these areas, often compromising its capacity to respond to severe or even minimal environmental shocks due to significant ecosystem degradation, among other contributing factors (Siegel et al., 2013).

As the region has become more aware of the increasing threats posed by accelerated climate warming and climate-induced hazards, it has recognized that what is needed is to seriously elaborate climate action, particularly adaptation planning, and in the coastal zone. This awareness however has come with a seeming absence of the importance of pursuing this climate action

agenda through a multi-disciplinary approach, and so this perspective is only slowly evolving or taking root.

The IPCC through its Assessment Report Six (AR6) acknowledges that human influence has warmed the atmosphere, ocean and land, and so to better interrogate the human element of climate action, the role of culture in bridging key gaps is critical. This centrality of culture is key, as it defines how human environment interactions and environmental challenges are perceived, and the approaches utilized to respond are very much in keeping with the cultural knowledge and practices of people. This cultural element and its intersection with climate change is relevant to our ways of being, our relationship with the land and sea, our biodiversity and ecosystems, Indigenous and local knowledge, our sites, and finally our health and well-being as part of this socio-ecological system.

Culture and heritage have a role in framing climate warming and its attending changes as a societal concern as suggested by Adger et al. (2013) and is crucial for understanding climate action. Rockman (2024) also stresses that as culture is a central component of all human systems, it should be part of any solution or climate action. Streamlining or integrating cultural knowledge, responses, processes, and solutions into non-culture based national systems provides unique opportunities to highlight a diversity of *pathways* concerning approaches for climate action with unique island perspectives and context, while at the same time re-visioning our resilience as a region to the changing climate through cultural lens.

The word *pathway* is a commonly used term and is often employed in diverse ways depending on the subject area of focus. The online Merriam-Webster Dictionary (n.d) refers to it being a line of communication over interconnecting parts, or a series of actions that can be taken to achieve something (Online Cambridge Dictionary, n.d). They (*pathways*) also provide an analytical approach for exploring and sequencing a set of possible actions. *Pathways* can also be named depending on the issue they are framing, such as adaptation, development or impact pathways.

The literature review undertaken suggests that *pathways* as a theoretical concept, while not being firmly established is nevertheless not a new concept. The use of the term however has implications for how an issue – in this case, cultural data for climate action - can be framed, which further guides

how it is understood and addressed. In other words, *pathways* is one way of conceptualizing planning, policy or programming responses to present and future challenges related to addressing the effects of climate-induced hazards or climate action.

Werners et al. (2021) emphasize that considering *pathways* require flexibility due to varying external factors, however *pathways* may be understood as varying alternative sequences of discrete actions to achieve a well-defined need or as a metaphor for broad directions of change and transformations. A notable difference between researchers is whether *pathways* are understood as alternative sequences of measures to realise a well-defined adaptation objective, or as broad directions of change for different strategic aims or outcomes, as well as who defines objectives and outcomes for *pathway* development.

The *pathway* proposed as the central tenet of this research concerns a study of possible cultural pathways to climate action in the Caribbean. In this way, it considers *pathways* as an alternative sequence, *and* a broad direction for attaining change, as suggested above. It thus explores climate action through cultural lens from archaeology and traditional knowledge as the *context* and identifies and discusses how cultural data can be integrated, connects actions to achieve goals in relation to policy, planning and programming as the *method*. Climate action then identifies a place for culture or integrates culture, maps actions and entry points, resulting in a trajectory which is the manifested output or visualization.

This research presents and zooms in on cultural pathways as a framework and a process that is transformational and multi-actor in its orientation. In doing so, it suggests that the pathways include multiple actors with conflicting goals, interests, and contested values, and also as a metaphor for broad directions of change that represent different strategic aims. The outcome of this research identifies how this data is of value to the system and how it could be better integrated.

This research also presupposes that as our culture is central to who we are and guides our approaches to how we prepare, mitigate, respond, and adapt to the changing climate and climate-related disasters, we can learn much from understanding how populations responded to these hazards from the past to today or through a long-term perspective. It also puts forward that the challenge, however, is that how persons *act* in response to climatic challenges is not widely seen

as a cultural response in the Caribbean. In addition to what prompted these responses, we can also examine threats to present heritage and how engaging communities through culturally focused actions contributes to advancing climate literacy and awareness in our region, promotes community, grass roots or human-centred or bottom-up approaches to climate action.

As the thread woven throughout, *cultural heritage* is thus the source of cultural data promoted under this research. The term, as defined or described by researchers and cultural organizations such as the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Council on Monuments and Sites (ICOMOS) refer to our tangible and intangible heritage, or the legacies received from the past for the present that have become the heritage of the future. Brumann (2015) suggests that *cultural heritage* is constantly expanding as a concept. However, this is essentially an expansion of the various categories that comprise the term cultural heritage. In the Caribbean, perceptions regarding cultural heritage and its value and uses, often align with what is known globally as the *authorised heritage discourse*. Smith and Waterton (2012; see also Rockman, 2024), discuss this concept in detail as the dominant way of thinking about and defining heritage, and is seen as the “most persuasive and pervasive narrative” (2012, p. 156). Here, this authorised discourse focuses on cultural heritage as “grand, tangible, old, aesthetically pleasing, sites, monuments and buildings”² (Waterton, 2012, p. 156) etc. As such, the role of this specific discourse in identifying cultural pathways to climate change action in the Caribbean will be further articulated throughout this research.

Cultural heritage produces content in varying forms, which become cultural heritage data. Thus, a simple definition for cultural heritage data is the information generated from the cultural heritage sector and its processes, or any data that emerges from research in the field. This can be further segmented or sub-divided as the field itself often is, such as archaeological (and its various fields) data, ethnographical data or even heritage data, and can be both quantitative and qualitative. Adger et al. (2013) highlight that the analysis of culture (i.e. through cultural data) is critical to understanding human responses and adaptation to climate challenges. Cultural data is relevant

² Authorised Heritage Discourse (AHD): heritage is seen as ‘grand, tangible, old, aesthetically pleasing, sites, monuments and buildings; All that is ‘good’ and ‘great’; value inherent; conserve as found for future generations; expertise has ‘duty’ to act for and steward a universal past; *fragile, finite and non-renewable* (Smith and Waterton 2012).

because as suggested by Rockman (2024, 2), it is a “part of human systems that are affected by or part of solutions to climate change.”

In looking at cultural heritage data, it must be considered what types of knowledge or data need to be harnessed or mobilized to enable its integration at varying levels, and how this knowledge can be better mapped, synthesised, and applied. Also important is an examination of the gaps in practices, tools, and knowledge to empower, as well as the opportunities to test and innovate to close these gaps. In other words, creating *pathways*.

Pursing a study of this data through a long-term perspective helps us to better understand and learn from how communities adapted or maladapted to severe environmental disruptions in the past and how they utilized resources and various strategies. Within the Caribbean, research by Douglass & Cooper, (2020), and projects such as Islanders at the Helm,³ and the Barbuda Historical Ecology Project,⁴ and wider a field such as the Socio-Ecological Archiving: Coastal Communities’ Heritage in times of climate change (SEA-CCHange Project⁵), are a few of the increasing number of projects which have developed in recent years in support of the intersections between cultural heritage and climate change. Other projects are also highlighted throughout this research.

The cultural data that forms the basis of this research stem from archaeology and ethnography through traditional knowledge systems, which extends the traditional authorised heritage discourse to include intangible elements.

Research Context

Research by the Climate Change and Cultural Heritage Working Group of ICOMOS (2019) draws attention to the place for cultural heritage in climate change discourse and action by highlighting that this relationship is limited and not well articulated. Specifically in the Caribbean, this component remains underdeveloped and not significantly considered by non-culture actors, and

³ Island(er)s at the Helm: co-creating sustainable and inclusive solutions for social adaptation to climate challenges in the (Dutch) Caribbean.’ Accessed at <https://www.kitlv.nl/islanders-at-the-helm/>

⁴ Barbuda Research Complex (BRC),’ Accessed at <https://www.facebook.com/people/BRC-Barbuda-Research-Complex/100063316234274/>

⁵ The SEA-CCHange Project. Information accessed at: <https://english.cultureelerfgoed.nl/latest/news/2024/01/30/international-projects-receive-funding-jpich>

even within the field itself, actions in response to climate impacts are similarly poorly defined or developed.

This research aims to better articulate this paradigm for the Caribbean in support of cultural pathways to climate action. The notion that climate action receives varied attention and prioritisation based on a patchwork of policy, programming, and planning frameworks from the national to the local level, means that climate action involving culture in the region begs for more profound or robust research, particularly the place for a narrative based on archaeology and traditional knowledge in relation to how islands responded to and can respond to accelerated and ongoing climate warming and its effects.

To illustrate this, past Caribbean populations would have developed and built on strategies to manage challenges from natural hazards existing within their environment, such as slow onset, cyclical, or one-off rapid or catastrophic events. These strategies would also have been captured within a better understanding or symbiotic connection with the natural environment based on seasons of making observations. This relationship is today fractured in the region, due to myriad issues stemming from colonialism, the societies, economies and industries that stemmed from it, and the ongoing fragmentation of our socio-ecological relationships. These strategies utilized by past communities and evidenced through the archaeological and ethnographical record, have the capacity to better guide us as a region in pursuing and attaining climate action that could be more in tune with the natural environment, and as such, specific to our uniqueness as islanders.

This research therefore expands the discussion on the value of and pathways for integrating culturally specific or generated data and community-based initiatives within our national climate action framework. By doing so, we stand to learn from and better adapt to climate change through our cultural heritage, thus centralising culturally derived data as a critical component in discussing future climate change and action.

While this avenue is important, Adger et al. (2013) contextualised this as an undeveloped relationship, which remains the case in the Caribbean. Yet, the relationship between heritage and climate change in the climate literature, while lacking depth in its articulation, has benefited from significant research and actions in the most recent decade (ICOMOS, 2019). In previous years, the

methods for studying culture and heritage and their intersections with climate change were more narrative based or as suggested - qualitative. With this, Adger et al. (2013) put forward that the focus on the qualitative instead of the quantitative – used in other social and natural sciences on climate change - excluded cultural heritage from much of the significant climate change dialogue because of its approach.

The value and applicability of cultural data integration or cultural responses concerning climate change adaptation planning is an area currently undergoing a global awakening, and Fatorić and Biesbroek (2020) suggest that the literature is increasing. This progress is however not without significant disparities at the international, regional, and local levels and the type of data used. The Caribbean region presents an excellent case study here. As suggested earlier, more and more research projects are being developed focusing on addressing climate action through multidisciplinary lens to include culture. Yet this type of collaborative research requires resources and perhaps poses a significant challenge to the Caribbean that can only be addressed at the regional level, where organizations benefit from considerable funding – not available at the local level - to tackle global issues through this multidisciplinary research. Yet, these research projects are still not the norm in the region although few have and are being developed, such as the Islander(s) at the Helm project being implemented in the Dutch Caribbean, and the Curacao Cultural Landscape Project, also in the Dutch Caribbean, which aim to study human response and solutions to environmental challenges.

More recent IPCC reports, such as AR6, have highlighted anthropogenic contributions to the current climate crisis. It can therefore be deduced that if these contributions are as a result of humans, then culture should have a more prominent role based on the various intersections presented earlier in this chapter. The challenge of highlighting and bringing cultural heritage and its applicable data to the table remains but also requires broader and more robust articulation to demonstrate the value it brings to the process for the region. The region being one that is currently plagued by low resources applied to the culture field, and a sector that does not fully understand and has not sufficiently documented the intersections between cultural heritage and climate change. The present context therefore remains one of limited data collection, absence of baseline

data and its use as part of integrated approaches, no methodologies demonstrating how this data could be used, lack of community-focused initiatives, reliance on top-down approaches and solutions and general ignorance regarding local knowledge systems or seeing their value as being only folkloric.

Thus, more actions which demonstrate respect for local knowledge and involving local communities in data generation, monitoring the impacts of climate-induced hazards, and seeking to highlight the wide-ranging implications of climate change on cultural heritage and cultural responses to undertake and support climate action are needed. This challenge is much more pronounced in a region where heritage-centred projects are still more or less viewed as expendable, receive limited investment or resources, or are considered an addendum to tourism (Siegel & Richter et al., 2011; Siegel et al. (2013).

Multidisciplinary research, specifically those combining paleoclimatic, paleoenvironmental and archaeological data in the Caribbean, have provided evidence that past populations in the region faced severe climate variability and would have likely experienced climatic challenges since the first settling of the islands, as illustrated by Beets et al. (2006); Cooper and Boothroyd (2011); Curtis et al. (2001); Ezcurra and Rivera-Collazo (2018); Fitzpatrick and Keegan (2007); Hodell et al. (1991); Hofman and Hoogland (2015); Hofman et al. (2021); Malaizé et al. (2011); Perdikaris and Boger (2022).

This robust body of research suggests that for the Caribbean, significant alternations of wet and dry conditions, changing local environments, and significant relative sea level rise were experienced over many thousands of years (Cooper, 2013; Cooper & Boothroyd, 2011; Cooper & Peros, 2010; Hofman & Hoogland, 2016; Keegan & Hofman, 2017; LeFebvre et al., 2019; Pagán-Jiménez, 2013; Perdikaris & Boger, 2022; Siegel, 2018). The ongoing adjustment to severe climate variability over the long term, particularly in the various landscapes has contributed to a region with the capacity for far-reaching social and cultural endurance and adaptation over thousands of years, evident in the available paleoclimatic, paleoenvironmental, archaeological, and ethnohistorical records and data (Hofman et al., 2021).

The climate crisis can be framed within a human-environment discussion, as climate change is a threat to socio-ecological relationships. Burke et al. (2021) suggest that the nature of climate variability makes it an ongoing human challenge best examined through a long-term human-environment perspective or lens. It represents an inevitable, predictable, yet also unpredictable threat for the future of the islands of the region, as the Caribbean's contemporary and future climate scenario of accelerated air, sea and land temperatures, rising sea levels, coastal erosion, severe wet and dry seasons, and stronger tropical cyclones articulated throughout the latest State of the Caribbean Climate Report (CSGM, 2020 and hereafter referred to as SOCC Report), align with the climate future predicted within the context of reports generated by the IPCC. The SOCC Report is used throughout this research for climate change projections specific to the Caribbean, as these projections are the ones likely used to guide and inform governments' sectoral plans in the region. The climate change projections for the Caribbean have indicated that even moderate changes in sea level rise will significantly impact coastal areas (CSGM, 2020). Under a high emissions scenario, a significant rise in sea level will translate to severe impacts in coastal zones, not just for islands but in larger countries, all within the context of continuing glacial retreat and melt contributing to further and ongoing sea level rise.

While existing research examining climate change effects and action in the Caribbean have tended to focus on what are deemed critical sectors such as agriculture, tourism, transportation, energy, health, and infrastructure, among others (CSGM, 2020), very little attention - if any - has been directed at the culture sector, except perhaps within the context of where specific or iconic sites are used for cultural tourism and as such are referenced under tourism. Studies on climate-induced hazards and implications for the region's heritage have instead been driven by few archaeologists and researchers, cultural resource managers, and projects mentioned throughout such as the Islander(s) at the Helm project in the Dutch Caribbean, the Barbuda Research Project in Barbuda, the Descendants United for Nature, Adaptation and Sustainability (DUNAS⁶) project in Puerto Rico. Despite the multidisciplinary aims of these projects and a research programme that seeks to transform the ways in which this data can be used by policymakers, these projects are

⁶ See <https://www.climate-science-alliance.org/dunas> for further details.

perhaps being implemented in a siloed context as there is limited integration of these projects for the wider benefit of the region, and cultural data is not generated or structured in ways that allow its utilisation by policymakers and other actors in sectors external to culture, and by extension to contribute to policy and planning.

With this in mind, the further use of this data in other national strategies is impeded and can hardly be expected to support or inform dialogue, policy, planning, or programming in meaningful ways. An example being where significant research and documentation are undertaken on how heritage is impacted in coastal areas, with no promotion of its use in building current or future resilience or building climate change literacy concerning coastal planning or in the utilisation of specific construction techniques, resulting in the identification of solutions that align with national adaptation planning. Projects generating and utilizing cultural data include the projects mentioned previously, however, at present, there is little to no evidence of their contribution to more comprehensive national or local strategies. Concerning coastal planning, it is essential also to highlight that approximately fifty percent of the global population lives within 100 km of the sea (Glavovic et al., 2015) and around ten percent in low coastal areas. This figure increases to fifty percent in the Caribbean (Fitzpatrick, 2018; World Bank, 2014), where in some islands the coastal zone is the entire island, and so there are opportunities to integrate cultural data in development processes at many levels concerning our coastal areas.

Notwithstanding the suggestion that cultural data and approaches can be utilised to diversify climate action in the Caribbean, the data problem must first be addressed. There is an increasing perspective that culture can fill the gaps and contribute to transformative climate action with people at its core, as posited by ICOMOS's Climate Heritage Network's Theory of Change. If these gaps persist, efforts to integrate cultural data in this discourse and strategy will remain stymied in relation to policy, planning, and programming in the Caribbean.

Although the region has benefited from paleoclimatic studies which have contributed to the reconstruction of past climates in the Caribbean, the work needed to develop meaningful reconstructions and identify valuable human-centred approaches through integration with archaeological and ethnographical research remains limited. In instances where this data does

exist, such as through the various historical ecology studies undertaken in the region (see Siegel et al., 2015), the collaborations have not generated purposeful or usable solutions or strategies concerning past human responses applicable today. The results have remained squarely within the reports or articles produced by the archaeological community with a non-academic or non-culture reach. Neither is this data being generated for use in and by the culture sector itself. The sector has not utilized this data to develop actions, such as through a sector plan or strategy for addressing climate-induced hazards or environmental change. The same applies to archaeological research that provides evidence of past human resilience within the context of severe environmental change.

This research focus emanated from a 2014 - 2018 project in the Dutch Caribbean islands and Suriname,⁷ which examined the role that intangible cultural heritage (ICH) played in the various phases of the disaster management cycle, and how Caribbean islanders prepared, mitigated, and responded to natural hazards. This eventually led to a focus on the role that ICH - through traditional knowledge systems – can play in helping to understand the vulnerability that exists within the region, how persons adapted in the past, and what can be learned from past responses for present and future environmental change. Understanding is particularly sought from the perspective of the various Indigenous communities living in the region and is framed by their established long-term relationship with the natural environment. There is therefore an expectation of a unique understanding of the natural environment coupled with better attuning to cyclical changes in nature. These communities would also have benefitted from an awareness and observation of past responses and adaptation through the transmission of ancestral knowledge, while at the same time, not romanticising this knowledge or seeing it as a cure all.

Research Aims and Objectives

This research explores the multi-opportunities for the development of a national climate action framework or approach for the Caribbean that considers the integration of cultural data, resulting

⁷ Project information accessible at: <https://ich.unesco.org/en/projects/strengthening-the-capacities-of-suriname-and-dutch-caribbean-islands-for-implementing-the-convention-for-the-safeguarding-of-the-intangible-cultural-heritage-00328>

in more robust interlinkages between cultural heritage and climate action in the Caribbean as its overarching objective.

It focuses on the actions needed to ensure resilience through culturally derived data-driven adaptation planning from a Caribbean small island perspective. This is examined through the primary research question: *How can culturally derived data add value to or be integrated within climate change discourse and action in the Caribbean?* This response will be articulated through the following three sub-questions:

How can studying the past through archaeology and traditional knowledge in the (Anglophone) Caribbean strengthen social and societal adaptation to climate change or support the development of innovative solutions, frameworks or approaches for climate action?

How can an analysis of the vulnerability of the archaeological record and an understanding of present threats to archaeological and built heritage guide and inform current national-level mitigation responses and strategies against climate-induced hazards and disasters?

How can culturally derived data implemented through community-based initiatives contribute to more climate-literate Caribbean islanders and support relevant climate–heritage social action and justice?

To achieve this objective, this research pursues a study of how this framework or approach could be constructed for the integration of cultural data in climate action at the *policy, planning and programming* levels in the Caribbean, and highlights the importance and relevance of culture in developing climate action and strategies, either through its mainstreaming in current actions or by guiding the development of new actions. This is pursued through a review of archaeological data from the past, an examination of present impacts on the archaeological record, and a study of traditional ecological knowledge, presented as Indigenous and local knowledge and where this is reflected in the archaeological record.

A study of traditional knowledge does not suggest reverting to the past but instead draws on this knowledge to better understand the approaches that guided past responses, the ways of doing things that are very relevant for us in how we build, address food and water security or insecurity,

how we manage flooding events, areas we choose to build in, and coastal and other planning, all critical in responding to the climate crisis in the Caribbean. As an example, the study of coastal archaeological sites converges with how we manage infrastructural development in our coastal zone and the cyclical environmental issues experienced by those who settled in these areas in the past. Through a connection with the recent experiences of the public, more sustainable initiatives that connect with the lives and livelihoods of Caribbean islanders can be built. This would make them human-centred in their approach and representing a seminal departure from how such projects are conducted in the Caribbean.

As such, a pathway is developed, pursued and interrogated through an examination of past actions, making the connection to current and future climate actions and opportunities for the intersection between traditional science and climate science (see Hofman et al., 2021). It utilizes archaeology, history, heritage, and ethnographic data to highlight the connection between the changing climate and its presented challenges, humans, cultural processes, and the environment, to facilitate a fluid study of how Caribbean populations perceived and adapted to sustained environmental change over time and how this could be harnessed for present and future climate action. As such, this dissertation undertakes a deep dive into these intersections, through a better understanding of and improving on these approaches, which are based on an intimate and sustained knowledge of ecosystems and their change over many generations.

Climate change presents a good example of the synergy between humans and their environment, through anthropogenic climate change, the processes, response and approaches from the past to the present and the future, while also being the greatest threat to this relationship. As a human-environmental or socio-ecological relationship, it recognizes that elements of the past can guide action for the present and the future. After all, the past demonstrates to us the worst that previously happened and acknowledges that not everything from the past will be applicable or valuable in the increasingly severe effects from accelerated climate warming.

Human-environment relationships in relation to climate change are to some degree causal, in that the environment (and *vis a vis* natural or climate-induced hazards) is a physical context at a given moment in history that persons respond to, based on the situation being faced. This suggests that

although the changing climate is a known phenomenon, actions in the past would have been unique to the setting at that time. This however does not mean that cultural responses – although locally based - cannot be studied broadly instead of specifying a particular response to a specific event. As the changing climate calls for the application of actions, knowledge, and processes from the past that can be used in the present and the future, what we can learn from the past for the future acknowledges that the past can inform adaptive pathways for the future. Thus, ensuring a place for cultural heritage in climate change discourse and action (Burke et al., 2021; Van de Noort, 2013). The elements are presented as data from archaeology, paleoclimatic studies, or traditional knowledge.

In discussing the importance of relevant knowledge, practices, and traditions, a definition of Indigenous and traditional knowledge is critical within the context of this research. The term *traditional knowledge* is used throughout this research and is meant to convey “knowledge, skills, and practices developed, sustained, and passed on from generation to generation within a community”⁸ (WIPO, n.d). This knowledge can be expressed through science, technology, ecology (and biodiversity), medicine, and expressions (also see WIPO definition). Traditional knowledge is amongst a suite of experiential or informal knowledge systems that overlap. Other terms used are Indigenous knowledge, local knowledge, traditional ecological knowledge, and Indigenous technical knowledge, all broadly defined as intangible cultural heritage (see Elango et al., 2020; Nakashima et al., 2018; Orlove et al., 2022; Reyes-Garcia et al., 2019, for a more robust discussion on slight distinctions between all forms).

This definition suggests that Indigenous and local knowledge are forms of traditional knowledge, but not all traditional knowledge comes from Indigenous sources. As such, Indigenous knowledge describes the knowledge and practices which comprise a system and is a process developed over a long period. Elango et al. (2020, p. 237) write that it is “the unique knowledge restricted to a distinct group of people, culture or society” (see also Imoro et al., 2022). It is seen as the opposite of the spectrum to scientific, western or modern knowledge (see Ajibade & Shokemi, 2003).

⁸ World Intellectual Property Office (WIPO). Accessed at: [https://www.wipo.int/tk/en/tk/#:~:text=Traditional%20knowledge%20\(TK\)%20is%20knowledge,its%20cultural%20or%20spiritual%20identity](https://www.wipo.int/tk/en/tk/#:~:text=Traditional%20knowledge%20(TK)%20is%20knowledge,its%20cultural%20or%20spiritual%20identity)

Agrawal (1995) suggested that what we know as Indigenous knowledge has also evolved from an intimate exchange between Indigenous and western knowledge.

The word *Indigenous* is itself often contested, and its meaning varies depending on a particular agenda being promoted and who its proponents are. An essential characteristic of Indigenous knowledge is that it is dynamic. The term does not suggest a beginning and an end point to this knowledge, and Dei, Hall, and Rosenberg (2000), suggest that Indigenous knowledge is by no means static due to it constantly evolving and not being limited to a particular timeframe.

The United Nations (2007), when speaking about Indigenous, refers to:

“self-identification as Indigenous peoples at the individual level and accepted by the community, historical continuity with pre-colonial and pre-settler societies, strong link to territories and surrounding natural resources, distinct social, economic, or political systems, distinct language, culture, and beliefs. It also refers to non-dominant groups of society who resolve to maintain and reproduce their ancestral environments and systems as distinctive peoples and communities.”⁹

Although the International Labour Organization (ILO; see Figure 1) points out that there is no universal definition for Indigenous and tribal peoples, it also states that “Indigenous and tribal peoples are often known by localized terms such as *native peoples*, *aboriginal peoples*, *first nations*, *adivasi*, *janajati*, *hunter-gatherers*, or *hill tribes* (ILO, n.d.). Given the diversity of peoples it aims to protect, [the Convention] uses the inclusive terminology of ‘Indigenous and tribal peoples’ and ascribes the same rights to both groups. In Latin America and the Caribbean, for example, the term ‘tribal’ has been most applied to specific Afro-descendent communities (ILO, n.d.).

⁹ Source: Adapted from the United Nations Permanent Forum on Indigenous Issues Factsheet *Who are indigenous peoples?* October 2007; United Nations Development Group, Guidelines on Indigenous Peoples Issued, United Nations 2009, United Nations Declaration on the Rights of Indigenous Peoples, 13 September 2007.

Figure 1. ILO Definitions concerning Indigenous Peoples

The International Labour Organization (ILO) Indigenous and Tribal Peoples Convention (1989) applies the following meanings under its Article 1:

'This Convention applies to (a) tribal peoples in independent countries whose social, cultural, and economic conditions distinguish them from other sections of the national community and whose status is regulated wholly or partially by their customs or traditions or by special laws or regulations; (b) peoples in independent countries who are regarded as Indigenous on account of their descent from the populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonization or the establishment of present state boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural and political institutions. 2. Self-identification as Indigenous or tribal shall be regarded as a fundamental criterion for determining the groups to which the provisions of this Convention apply.'

Source: Convention C169 - Indigenous and Tribal Peoples Convention, 1989 (No. 169) (ilo.org)

Dover (2006, p. 12) suggests that although uses of the term Indigenous connote “tribal or nativeness, formal international definitions focus on historical continuity, distinctiveness, marginalization, self-identity, and self-governance” and the United Nations definition speaks to *peoples and nations with a historical continuity with pre-colonial societies*.

Definitions put forward by the United Nations and other international organizations or development agencies are formalized definitions. However, the term *Indigenous* has been sometimes contested within Caribbean society when used by Maroon and Garifuna communities, although these communities self-identify as Indigenous. The terms Indigenous and or tribal are contested depending on particular schools of thought. Nevertheless, when references to Indigenous persons or communities are made throughout this research, they connote historical continuity and self-identification as such and draw on the guiding definitions put forward by the ILO Convention and the United Nations.

Current literature and discourse suggest an emergence of Indigenous knowledge as the champion against climate change (see recent discussions and inclusions by the IPCC and growing academic

research). This research does not pursue a discussion on whether or not Indigenous or traditional knowledge is the saviour of the world in the fight against climate change but merely seeks to argue for its place in interrogating the value of cultural pathways in the Caribbean. It is therefore important to consider that contrary to widely held perceptions which also romanticise traditional knowledge, Indigenous knowledge does not suggest cultural purity, which has been used in some instances to convey loss of indigeneity (Gupta, 1998). Caribbean history is littered with accounts of Indigenous persons in the Caribbean losing their traditions, which in no way acknowledges that these same traditions are not static but constantly evolving and always to be considered within changing historical contexts, disruption of socio-ecological relationships, and within the environmental and ecological degradation which exists.

Recognising Indigenous communities as traditional ones contributes valuable observations based on their long-term relationship with their natural environment, while possessing considerable traditional ecological knowledge, and having at times, applied management or adaptation strategies that are compatible and in harmony with this natural environment and based on processes of observation and application, compounded by inter-generational knowledge, and through trial and error. This recognition ascribes to not viewing Indigenous communities in the Caribbean as monoliths and recognises that these communities utilise knowledge that should not be considered pristine or uninfluenced by other cultural groups or processes, suggesting knowledge that is dynamic and evolving while integrating knowledge from external sources, be it European, African, Asian, or even other Amerindian communities outside of the Caribbean, and finally, as the knowledge that benefits from an extensive regional network. As Wilson (1997) argued, the original Carib (Kalinago) population, and its culture patterns, for example, were primarily exterminated by disease, warfare, and slavery during the earliest years of European contact. Yet, the cultures we see today have undergone significant evolution while retaining elements and surviving centuries of colonialism and disruption. As such knowledge and practices forged within these socio-ecological relationships over time in the Caribbean, are constantly transforming.

Overview of Data and Methods

A multi-disciplinary approach connecting archaeology, history, ethnohistory and ethnography is utilised throughout this research, through various methods and data sources outlined in greater detail later in this research.

In doing so, this research anchors itself in recognizing that an integrated approach is necessary in helping to contextualize human-environment-climate relations moving forward in the changing climate context. Answering these questions relies on various data methodologies, and this was approached by examining how communities in the Caribbean responded to climate-induced hazards from the past to the present as evidenced in the archaeological record and the implications for current and future response. This was undertaken primarily through a desk review of archaeological and contextual paleoclimatic and paleoenvironmental research undertaken in the region.

A critical component of this dissertation focused on the examination of and an understanding of the role that traditional knowledge systems currently play and can play in the Caribbean in identifying vulnerability and relevant climate action, while making practical contributions through multiple pathways. Particularly in the case of this research, ethnographical and ethnohistorical studies are also utilized to contextualise climatic data, provide insights into the impacts of climate-induced hazards and the adaptive solutions developed and applied, which are helpful in building strategies to a myriad of issues moving forward.

In considering prior ethnographical and ethnohistorical research, it was necessary to bring in to focus that not all accounts were neutral or objective and some were often fraught with the biases of those chronicling this knowledge. Yet, they sometimes remain the only source of documentation on the lives of the Indigenous peoples in the region within a particular timeframe, with descriptions in how they responded to certain environmental stressors and the cultural practices that would be deployed.

The ethnographic research component of this study was undertaken in partnership with Caribbean Indigenous communities on traditional knowledge systems being used for social adaptation to

climate change and from which our societies can use as a platform to explore local knowledge. This was pursued as a vital component of this research, as it considers that current climate action such as adaptation planning or the use of existing climate data can be made more robust and in coherence with the local context through combining traditional science with climate science to best adapt within our unique island settings (Makondo & Thomas, 2018).

In returning to the previous statement that traditional knowledge is not static, it is nevertheless important to examine inter-generational knowledge and practices that have remained with us, providing new data and perspectives for application, and offering opportunities for reinterpretation, while allowing us to formulate actions in the region that are based on the *best available knowledge*, particularly in specific fields or sectors, better observe the changing climate, and utilise evolving methods to convert observation to data. This process involves awareness-building around research and developing this data into approaches through positive collaborations between Indigenous and local communities, civil society, and non-governmental and government actors. This approach however requires a healing of relationships between government and traditional communities, which has become fractured, and over the years evolved into one of mistrust. Pursuing ethnographic studies centred on this long-term relationship between Indigenous communities and their physical environment within the Caribbean also supports comparative research within the broader context of how islands adapt to climate change in varying settings such as in Africa, Asia, the Pacific, and the wider Americas.

Finally, this multidisciplinary approach looks at how studying contemporary issues guides future planning. As such, this research will also be situated within the context of a contemporary assessment of the vulnerability of the region's archaeological record through select island case studies. Presently in the Caribbean, a large number of archaeological sites are being impacted by climate-induced hazards, with many affected coastal sites highlighting the extent of vulnerability of our coastline (see for example Boger et al., 2019; Crock and Haviser, forthcoming; Fitzpatrick, 2012; Hofman & Hoogland 2016). This research therefore utilises the surveying and recording of eroding sites through a vulnerability assessment and coastal change analysis along selected parts of the coastline in case study islands, as being critical to integrating cultural data in climate action.

Results from this data can inform site management and prioritisation of threatened coastal heritage and contribute data to general coastal planning processes. A detailed survey of sites around the coast in different environments will also facilitate the examination of coastal change at a refined scale. This study component as such provides the platform to engage contemporary coastal communities in documenting sites and recording coastal change through community-based initiatives developed with their inputs to demonstrate the rate and severity of coastal loss in order to improve climate literacy and encourage engagement with contemporary climate challenges. Although limited in the region, projects such as the ALOA: Coastal Archaeology across the Atlantic¹⁰ (Motte et al., 2022) in the French islands, the coastal survey in Saint Kitts (Stancioff et al., 2018a), and those previously mentioned from the region are interesting projects to build on in this area.

Very often, insufficient data exists that can guide mitigation and adaptation planning in the sector or inform community-based climate action initiatives. Heritage actors, for example, have acknowledged the dearth of baseline data. This research proposes innovation in using data to drive actions and relevant strategies, progressing beyond merely focusing on documenting impacts. This approach could inform more widespread use of heritage at-risk maps to guide heritage managers and policymakers to better identify specific vulnerabilities and required actions. This data will also be promoted as an entry point for multidisciplinary action. Vulnerability assessments also have the capacity to guide policy, other forms of protective measures, and informed climate literacy, climate heritage social action, and citizen science or community-based initiatives. These chapters also share specific case studies from select islands.

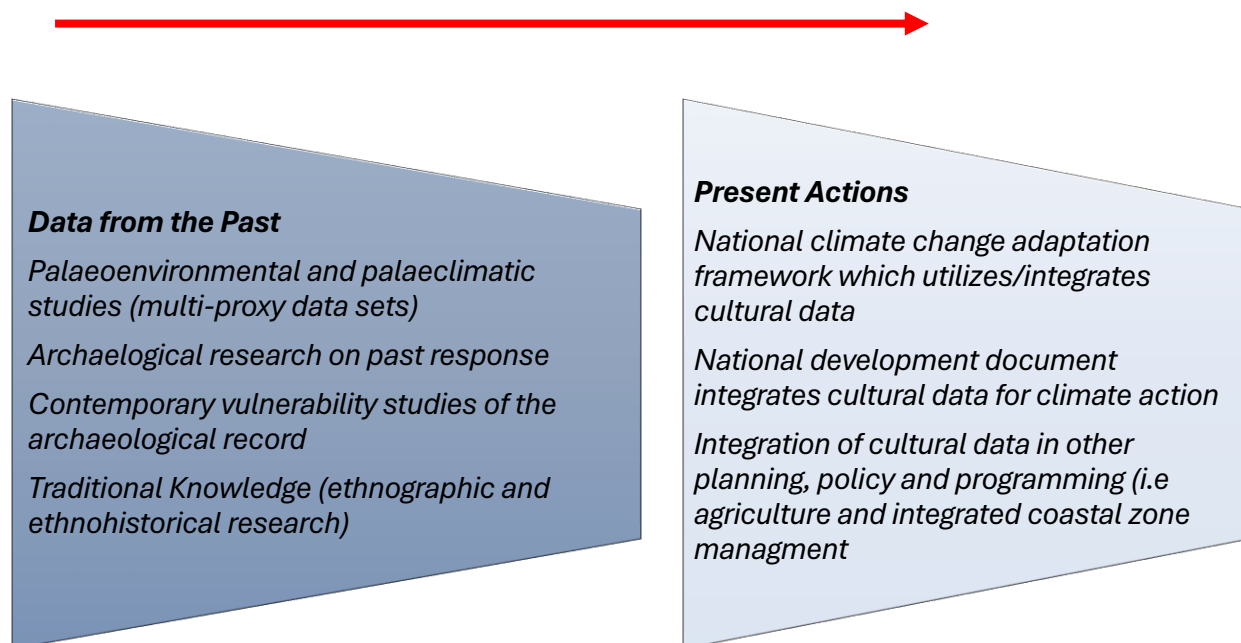
To highlight the value of cultural data to climate action in the Caribbean, a pathway (see Figure 2) is articulated that reflects on a long-term perspective from the past - through primarily archaeological and other paleoenvironmental research and data. This is connected to the present and contextualized in some instances by a study of traditional knowledge and practices and other

¹⁰ ALOA see <https://aloe.blog/accueil/> for further details.

ethnohistorical data. Added to this is a survey of contemporary impacts undertaken by examining the vulnerability of the coastal archaeological record.

Figure 2. Schema of a Proposed Culturally Derived Framework for Climate Action in the Caribbean

The Deep Past to the Present (Long-Term Perspective)



Note: Author rendition

As previously articulated, this research pursues the intersections between climate change and climate action as a relationship between humans and their environment (socio-ecological) and the processes and approaches from the past to the present to the future. As such, it proposes contributing to this gap by utilizing a human ecodynamics-centred interpretive research framework and approach (see Fitzhugh et al., 2019). With this approach, an understanding of these socio-ecological interactions are interrogated through a *long-term* study of the role and value of archaeology and traditional knowledge.

This is necessary in undertaking a study of how past human response to severe environmental change in the Caribbean impacts regional vulnerabilities and how we respond. This, while moving towards a future of continuous adaptation and resilience building through developed strategy and policy. This approach draws on an understanding of change over time, and benefits from the utilisation of several pieces of the puzzle through a multidisciplinary approach or lens, as highlighted by Perdikaris et al. (2017). This further brings together different types of knowledge and local communities in a dialogue of knowledge and discovery which promotes an integrated systems approach to studying human environment interactions in relation to climatic challenges.

The Caribbean Context

Throughout this research, the Caribbean region is utilised as its broadest study area. The Caribbean Basin comprises thousands of islands in various sub-island groups or archipelagos between North and South America, comprising the Bahamas Archipelago, the Greater Antilles, the Lesser Antilles, and numerous islands at varying distances from the continental coast of South America. Various geopolitical and linguistic groupings exist within these islands, such as Dutch, English, French, and Spanish, and highlight the region's colonial background.

This research specifically focuses on the Anglophone Caribbean through select islands in the Bahamas, Greater and Lesser Antilles sub-archipelagos of the Caribbean as its study area. These islands were formerly part of the United Kingdom and are now a part of the British Commonwealth as post-independence nations. The Caribbean archipelago also comprises varying island ecologies evident in desert to low coral to high tropical, volcanic island settings (Siegel, 2018), which have influenced human environment relations and climate synergies over time.

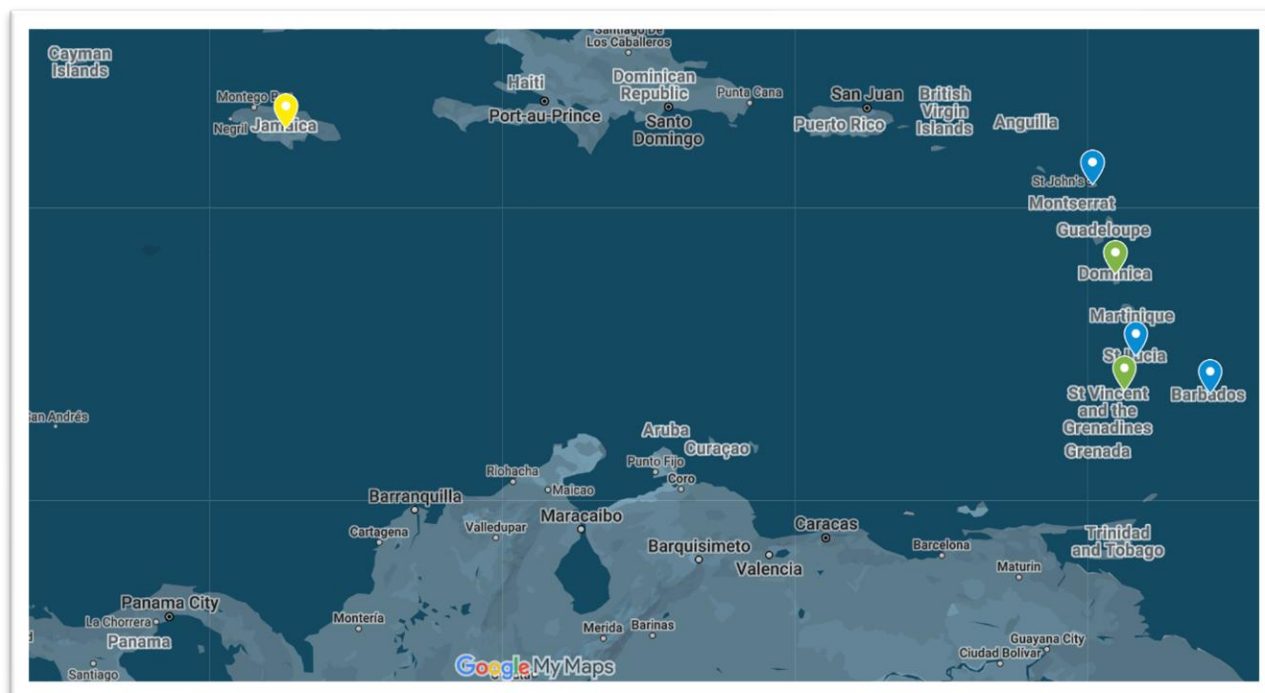
Yet, this research acknowledges that regardless of the island or island group's geographic, linguistic, or political framing, all islands experience and will continue to experience climatic challenges, albeit not heterogeneously, and have a multitude of frameworks guiding differences in climate action. These approaches are however guided by the island's specific colonial background and entrenched frameworks which continue to define how the culture sector continues to function today. The Anglophone Caribbean was selected to reflect perceived experiences and response

framework similarities. The author also grew up and lived in several of these islands. So, although not homogenous or characterized by exact similarities in early migratory or colonization processes (Keegan & Hofman, 2017; Wilson, 2007), these islands nevertheless have contemporary similarities, particularly in governance processes and based on being post-colonial but now mostly independent or formerly colonial states of the former British Empire. Although case studies predominantly emanate from this study area, broader regional examples and discussions are presented where relevant and applicable.

No island is spared the effects of the changing climate; however, case studies were selected based on the extent of previous research, which could be of value to this study. This research is, however, presented within the context of a broad discussion on the vulnerability of the coastal archaeological record within the region and as a tool for approaching future climate action that considers a small island context.

Specific case study islands (see Figure 3) include Antigua, Barbados, Jamaica, and Saint Lucia for vulnerability assessments, and the Commonwealth of Dominica, Jamaica, and Saint Vincent concerning ethnographic research, and were selected based on specific criteria. Islands for the vulnerability assessments were selected due to the existence of valuable baseline data and an institutional framework to support required field assessments. Concerning the ethnographic field research, these islands were selected due to the presence of self-identifying Indigenous communities and pre-existing research and relationships developed over several decades with these communities. Selected case studies will be discussed further in Chapter Three.

Figure 3. Map of the Caribbean Highlighting Case Studies



Note: Blue - Vulnerability assessment case studies; Green - Ethnographic field research; Yellow - Both vulnerability assessment and ethnographic field research

Climate Variability in the Caribbean

Robinson (2018, p. 79) writes that the islands of the Caribbean are “primarily adapting to changes in hurricanes, rainfall, and drought patterns”. The region also presents an attractive geographical area to study sea level rise (SLR) due to the long-term trend of relative sea level rise throughout the Holocene. Although historical records show regional variations in the rate of rise in sea level, there is a generally increasing trend in the sea level across the Caribbean region, with correlations to El Niño and hurricane activity. The mean rate of SLR averaged over the Caribbean Basin includes 1.8mm/year +/-0.1 (1950 – 2009) and 2.5mm/year +/-1.3 (1993 - 2010) (CSGM, 2020, p. 40).

When sea level rise and extreme hydro-meteorological events combine on the coast, the impacts on these areas can be catastrophic, resulting in damaging and increased flood conditions. In the present climate crisis and the forecast climate impacts, the IPCC estimates sea level rise of up to 1m by 2100 (IPCC, 2022; Burn et al., 2022).

The SOCC Report (CSGM, 2020) paints a picture of weather and climate events recurrently impacting economic performance, productivity, livelihoods, and quality of life. The 2017 hurricane season and subsequent years of intense cyclones forming early in the season to include Hurricane Beryl in 2024, which was the strongest cyclone formed so early in the season, underscored the Caribbean's persistent vulnerability to climate-induced hazards as a region, with seemingly very few actions taken to address this vulnerability and subsequent adaptation beyond hard engineering solutions as suggested by Robinson (2018) in examining climate change adaptation measures in the region.

As climate warming accelerates, the islands in the Caribbean will not escape the effects of these changes as the region localises the global climate discussion and realities and experiences impacts at larger scales. Cambers in 2009 highlighted that the region's vulnerability is linked to the most significant hazards of global climate change, identified as sea-level rise, extreme tropical cyclone events, and severe precipitation variability. Today, these phenomena have intensified, and while these experiences are not new to the region based on past climate studies, they nevertheless require examination within the specific environmental or ecological context (Douglass & Cooper, 2020). A more detailed discussion of accelerated climate change in the Caribbean will be presented in Chapter Two.

Relevance of Research

Climate change is a direct threat to socio-ecological relationships in the small islands of the Caribbean. The IPCC (2022, p.62) underscores that “under all climate and socioeconomic scenarios, low-lying cities and settlements, small islands, Arctic communities, remote Indigenous communities and deltaic communities will face severe disruption by 2100, and as early as 2050 in many cases”. In recent decades, the world and the attending scholarship on climate change have

acknowledged more and more the implications of the changing climate in every area of human life and livelihoods (see also IPCC, 2018). While these increasing effects are being experienced globally and not particularly unique to any one region, population, or sector, the effects are more critical in some areas, or as expressed by one Caribbean leader as being at the “front line of climate change” (Mottley, 2021; see also Agard et al., 2023; Douglass & Cooper, 2020). The preceding text suggests a call for urgent climate action at multi-scalar levels while utilising all forms of data and approaches, or as the Paris Agreement¹¹ (2015, p. 4) indicates, “the best available science”.

As part of the best available science (and action), this research is anchored within the broader considerations of the place for culture and heritage in addressing climate change vulnerabilities of and action in island groups globally, and within the context of islands - particularly the Caribbean - being at the forefront of this global issue. The earlier Barbados Programme of Action¹² (BPOA, 1994) for the Sustainable Development of Small Island States and the Rio+20 Outcome document¹³ speak to the climate crisis as it relates to small islands and identified priority areas. Later, the Mauritius Strategy of Implementation¹⁴ (MSI, 2005) and the SAMOA Pathway¹⁵ (2014) also called for urgent international and national attention to address climate change in small island states and stress preparing for more extreme weather events which have the most significant impact on the poorest and most vulnerable. The Samoa Pathway document further highlighted that climate change impacts are compounded by the limited financial and human resources of small island states to cope with the consequences, calling for the mainstreaming of climate in the national agenda rather than a siloed approach in different sectors.

The issue of climate change and small island states was again at the forefront at the May 2024 Fourth International Conference on Small Island Developing States (SIDS4),¹⁶ which called for increased recognition of culture as a lever for resilient economies,¹⁷ through planned actions linked to promoting and investing in the resilience of cultural heritage. At this meeting, Minister Daryll

¹¹ The Paris Agreement: Article 4. Accessed at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf

¹² Barbados Programme of Action (BPOA) 1994. Accessed at: <https://sustainabledevelopment.un.org/conferences/bpoa1994>

¹³ The Future We Want Outcome Document. Accessed at: <https://sustainabledevelopment.un.org/futurewewant.html>

¹⁴ Mauritius Strategy of Implementation. Accessed at: <https://sustainabledevelopment.un.org/conferences/msi2005>

¹⁵ The SAMOA Pathway. Accessed at: <https://www.un.org/ohrlls/content/samoa-pathway>

¹⁶ Fourth International Conference on Small Island Developing States: Charting the Course Toward Resilient Prosperity. Accessed at: <https://sdgs.un.org/conferences/sids2024> on 1 July 2024

¹⁷ Culture Makes Strides at SIDS4. Accessed at: <https://www.unesco.org/en/articles/culture-makes-strides-sids-4> on 1 July 2024

Matthew, Minister of Education, Sports and the Creative Industries of the Caribbean nation of Antigua and Barbuda, highlighted the critical importance of integrating “culture into curricula to preserve small island states’ values and histories in the face of climate change”¹⁸ (UNESCO 2024). The vulnerability of the Caribbean presents an interesting dilemma for its various island states. As articulated by Prime Minister Mottley of Barbados at the 2021 United Nations Climate Change Conference (COP26), “1.5 is what we need to survive, and two degrees is a death sentence for the people of Antigua and Barbuda, the people of Maldives...Dominica, Fiji...and Barbados, we do not want that dreaded death sentence...our people need action now” (Mottley, COP26).

Rockman and Hritz (2020, p. 8297) stress that the voice of small islands is important in the climate crisis and heritage discourse, and was instrumental in the inclusion of heritage in the United Nations Framework Convention for Climate Change’s (UNFCCC) Warsaw Mechanism for Non-Economic Loss and Damage.¹⁹ In order to fully acknowledge the voice of small islands in addressing this crisis, this research considers the importance of understanding how Caribbean societies adapted to climatic challenges over the long-term, in order to visualize the usefulness and applicability of cultural data. Using documentation and ecological and ethnological analyses, it is possible to trace a continuous reorganisation of society from pre-Columbian times through archaeology and gradually into the historic and contemporary periods. Unfortunately, the Caribbean has not yet embraced a substantial application of this kind of research.

If the Caribbean’s coastal zone is one of the most vulnerable globally, as posited by various studies, then the same can be applied to its coastal archaeological heritage. This research is therefore positioned within the context of examining the intersection of heritage and climate change within small islands and specifically in the Caribbean where the coastal zone is a vital component of the life and livelihood of these islands, with an extensive number of activities taking place there.

This research does not focus solely on the impacts that the changing climate will have on heritage. It instead challenges the actions needed to identify and reduce vulnerability in the region at the

¹⁸ Culture Makes Strides at SIDS4. Accessed at: <https://www.unesco.org/en/articles/culture-makes-strides-sids-4> on 1 July 2024

¹⁹ Warsaw International Mechanism for Loss and Damage associated with climate change impacts. Accessed at: <https://unfccc.int/topics/adaptation-and-resilience/workstreams/loss-and-damage/warsaw-international-mechanism>

national level. This is through data-driven climate action that examines how cultural heritage can be inserted into the current discourse on national climate action. As such, it does not anchor itself in a specific future climate scenario but posits that the region's focus should be directed to planning for a future of climatic impacts, that climate action is necessary, regardless, and that importantly, a framework that encompasses cultural data is needed, as this promotes human-centred and sustainable bottom-up actions, which are critical to maintaining socio-ecological relationships or human systems.

Caribbean archaeological researchers have documented the impact of climate change on heritage while our tangible and intangible heritage and cultural landscapes are adapting to or being destroyed by the effects of climate change and other natural hazards (Boger et al., 2019; Fitzpatrick, 2012; Hofman & Hoogland, 2016). Coastal archaeological sites - particularly pre-Colombian - have been in the path of unchecked coastal erosion (and development) on many islands of the region in recent decades. Research by Fitzpatrick (2012), Hofman and Hoogland (2016), and Murphy (2022), among others, for example, have extensively documented archaeological sites threatened by climate-induced hazards. Examples of a few of these sites include the Winthorpe site in Antigua (Murphy, 2020), Brighton Beach in Saint Vincent (Hofman & Hoogland, 2016; Mol & Boomert, 2011), Grand Bay in Carriacou (Fitzpatrick, 2012), Round Hill in Jamaica (Atkinson, 2021), Seaview in Barbuda (Rivera-Collazo & Perdikaris, 2023), various sites in Anguilla (Crock & Peterson, 2001); Baie-Rouge and Saint Martin sites (Henocq & Stouvenot, 2022; Henocq & Petit, 1995) and Lavoutte in Saint Lucia (Hofman et al., 2012), all exacerbated within the context of voluntary and ongoing ecosystem destruction, infrastructural development, and sand mining in coastal areas (Siegel et al., 2013). The effects of climate-induced hazards on the archaeological record will depend on its measure of vulnerability which factors in its exposure and sensitivity to these hazards and its capacity to adapt to these changes. Archaeology has also provided information on past response and adaptation strategies. Studied within the context of other paleoclimate data, these studies have identified valuable strategies that can be applied within the context of the Caribbean's current and future response and adaptation to the changing climate.

As an immediate response in the Caribbean, actions need to be set in motion for long-term climate action processes, requiring not just cultural heritage actors to plan but also collaborate with agencies that deal with planning, development, and environmental response. Emerging studies from international climate change organizations recommend an awareness of traditional knowledge and practices and the mechanisms that impact heritage as valuable guides for informed decision-making concerning climate change impacts. Islands therefore present excellent laboratories for combining studies on past responses to climate change with contemporary studies of the coastal record.

Noting the need to develop strategic actions concerning climate action for heritage, and as stated previously, this research does not propose focusing only on the impacts to these sites. It instead seeks to make a meaningful contribution to climate action in the Caribbean region by further articulating or expanding the dialogue to better interrogate the place for cultural heritage in a national platform to support climate change. This is with a particular focus on the role that archaeology and traditional knowledge can play in climate action and approaches, such as traditional building techniques, in response to the effects of stronger tropical cyclones or resilient agricultural strategies to counter food insecurity.

A review of the culture sector throughout the region reveals that very little progress has been made in developing climate change-related strategies for the sector. These strategies could also provide critical baseline data and demonstrate seriousness on the part of the culture sector to be viewed differently in terms of data it can provide to any national framework. Although much is to be learned from traditional knowledge systems and their intersection with contemporary climate studies, this is not being explored sufficiently in the Caribbean.

A significant body of global research points to the involvement of Indigenous peoples and local communities contributing to how contemporary societies address climatic variations. Markham et al. (2016, p. 24), in research on how intangible heritage adapts to a changing world, noted that these communities “observe and interpret climate phenomena in a different way and at a richer and finer scale than climate scientists”. As such, this data is also studied within the context of available ethnohistorical research on the topic in the region, albeit limited.

By pursuing this approach, this research aims to contribute to newer paradigms for this intersection while stressing the need for an integrated approach in addressing this threat. It develops and presents relevant case studies in the region and provides heritage actors with the applicable data and entry points to seek and make worthwhile contributions to the discourse, planning, policy, and programming mentioned. As adeptly put by Makondo and Thomas (2018, p. 89), instead of focusing only on a “singular science-centred solution”, utilizing an approach which calls upon multiple sources of evidence (i.e. archaeology, traditional knowledge), “provides one of the surest ways for the development of more effective and sustainable strategies”.

Dissertation Outline

After this introductory Chapter One in which an outline is made of the focus of this research, Chapter Two provides the background on the current situation globally and regionally in relation to the intersections between cultural heritage and climate action and discourse. To actualize this, the Chapter discusses the value of pursuing a paradigm shift in the perceived uses and importance of cultural heritage and opportunities for its integration in planning, policy development, and programming within the Caribbean, and specifically the Anglophone Caribbean.

The Chapter also articulates the current issues as they relate to the integration of this cultural data through a study of archaeology and traditional knowledge, demonstrating how communities experienced, responded, and adapted to climate change over the long term and what this record teaches us about socio-ecological relationships for future climate action.

Chapter Two also addresses another foundational issue in interrogating the place for cultural heritage in climate action and discourse, that of the intersection between cultural heritage and climate action, through the examination of cultural heritage as an agency for climate heritage social action, climate justice, and the ventilation of issues surrounding the colonality of disasters in the region.

Chapter Three highlights the methodology applied to this research and examines the multidisciplinary theoretical approaches and framework used to study this human, environment, climate relationship to better contextualize the place for cultural heritage in climate action and

discourse and vice versa. This framework is anchored primarily in human ecodynamics which delves into the processes of change in this socio-ecological relationship through time and at multiple levels, scales and contexts. This chapter also details the methods used for data collection through a desk-based review of archaeological research, vulnerability assessments, and ethnographic and ethnohistoric research collaborations with Caribbean Indigenous communities. This research programme builds on three essential pillars, that of identifying relevant data, approaches, solutions, and strategies through archaeology and traditional knowledge, converting this in to a format or a methodology quantitatively or qualitatively that can be used by culture and non-culture actors, and finally, applying this data to or integrating it within climate action (pathways), all applicable for guiding present and future climate action in the region, and call on a study of past response, present vulnerability of coastal heritage, historic response, and adaptation. This is possible through ethnographic and ethnohistoric studies involving Indigenous communities that have a long-term relationship with their environment and have demonstrated adaptation strategies over time. It also pursues an examination of pathways for the integration of cultural data in various actions concerning climate change adaptation, as well as the integration of this data into policies, planning, and programming.

As such, Chapters Four to Six present this data from the Caribbean to inform this process. These Chapters aim to provide the data foundation to construct a framework for examining the ways in which heritage can be applied in the region for climate action.

Through examining contemporary issues, Chapter Four presents data through vulnerability assessments and observations undertaken on four islands as a guide to examining how current climate-induced hazards and climate-related disasters are a threat to the archaeological record and how this knowledge can inform climate action planning, programming, and policy at multiple scales. This Chapter also utilizes this data to analyze and discuss the likely impact of climate change on the region's archaeological heritage, by examining critical data concerning predictive modelling for flood risk, coastal erosion, the impact of hurricanes, and projected sea-level rise, within the context of the specific vulnerability of coastal heritage in the region and the role of

humanity's contributions to our exposures, such as pollution, extractive processes, and infrastructural development.

Chapter Five explicitly presents data based on a desk review of predominantly archaeological with some paleoclimatic and paleoenvironmental research, illuminating data on how past populations responded to climate-induced hazards and other climate related disasters evidenced through the archaeological record.

As the final data component, Chapter Six focuses on the place for traditional knowledge and is presented through the lens of focus group and individual research discussions with Indigenous communities in the Caribbean that have experienced a long-term relationship with their natural environment and are in a position of authority to identify and articulate adaptation strategies based on observations made over time that are valuable to addressing climate-induced hazards through the co-creation of solutions with climate science data. The data related to this Chapter also represents the voice of these communities, who have largely been marginalized and ignored stemming from historical processes in the region.

Each data chapter assists with the visualization of entry points for this data. It, therefore, imagines what a national climate action strategy could look like and how it could work with integrated data from archaeology and traditional knowledge.

The data chapters lead to a discussion in Chapter Seven which visualizes this approach in the region by integrating this cultural data to explore the Caribbean's societal adaptive framework through cultural heritage lens. Utilizing all the data gathered, a discussion on climate action will occur in line with region-wide studies, which revealed that climate change adaptation responses are generally understudied in the region. Hence, the evidence points to limited research on the place for cultural heritage and opportunities for its integration. It also discusses how islands in the region might approach or envision climate action generally and specifically concerning the integration of cultural data and examines entry points for cultural heritage in national development and adaptation planning, identifying synergies between cultural heritage and national policies and institutions, physical development plans, land use, and coastal zone planning documents for example.

Chapter Eight concludes the discussion of this research by examining the next steps, discusses the key results, and responds to the research questions posed, in order to guide the policies and programmes needed concerning the integration of cultural heritage in the climate action discourse. It summarizes entry points at the national and regional levels concerning how the culture sector can influence this discourse and contribute to developing a framework or strategy to better integrate cultural heritage and climate data into national development planning in the Caribbean.

CHAPTER TWO

CURRENT ISSUES INTEGRATING CULTURAL DATA WITH CLIMATE ACTION

This Chapter examines the current discourse on the intersections between cultural heritage and climate action generally, and specifically through the lens of archaeology and traditional knowledge. It first pursues this from a global perspective then transitions to the Caribbean region in interrogating how cultural heritage and climate action is referenced by the other. This is followed by examining the important opportunities for the integration of the two in the other's existing framework, approaches and actions. This chapter also examines the intersection between cultural heritage and climate action, through a study of cultural heritage as agency for climate-heritage social action, climate justice, and the ventilation of issues surrounding the ongoing coloniality of disasters in the Anglophone Caribbean.

Although central in how humans identify actions and approaches in response to a myriad of issues to include the changing climate, the role of culture is largely unacknowledged by non-culture actors. This vital impetus was also put forward by Adger et al. (2013, p. 112) in stating that “culture has a significant role in defining climate change as a phenomenon of concern to society”. To better clarify culture's role in this process, and as a starting point, it must first be acknowledged that cultural data to support climate action or integration with climate studies is not well articulated globally and even less so in the Caribbean. This situation in the region is largely due to culture actors:

- being unsure of how to formulate this data for use
- not currently using this data within the culture sector
- being unsure of its wider societal applicability, and thus
- unsure of the pathways that can be actioned or pursued.

The result is that climate action in the Anglophone Caribbean - or the study area - integrates very little to no cultural data at the levels of policy, planning or programming. As this chapter will also demonstrate, there are many pathways which can be considered for the region.

As a direct connection to the human ecodynamics framework utilised throughout this research and introduced in Chapter One (see Fitzhugh et al., 2019), this entire background chapter coalesces around an inquiry on the role of cultural heritage in building agency and resilience as it captures processes of human adaptation or human agency relative to the natural environment and climate action (Adger, 2000). Adaptation in relation to climate change concerns adjusting to these changes while pursuing the opportunities which exist to better manage these challenges (IPCC, 2023a). In much the same way as disaster risk reduction, climate change adaptation can be “anticipatory, reactive [fragmented], incremental or transformational” (IPCC 2023b, p. 5-6).

Whether these actions are being pursued from the smallest such as at the community level to the broadest through international conventions, cultural knowledge and practices are at the centre and are vital for any decision-making. Human adaptation to climate change cannot simply be defined as a cause-and-effect relationship. In between these two words are numerous issues concerning capacity, resources, networks, socio-ecological relationships as well as perceptions regarding severe environmental change, among many other factors, all coalescing around culture. This is particularly illustrated in the Caribbean where Pre-Columbian populations responded in ways not all together heterogenous when faced with severe environmental change. Historical processes such as colonialism would later introduce practices which contributed to the susceptibility of these Pre-Columbian populations and would influence or impact their knowledge and practices in relation to human response to climatic challenges or related disasters. This is particularly the case where certain practices would be viewed as useless or viewed in a negative light.

Human adaptation or action must also be examined within the context of access, equity and agency. Fabinyi et al. (2014, cited in Van Dolah, 2018) stressed that human adaptation should “be viewed as more than a mechanical adjustment to natural hazards but as a more profound sociocultural confrontation with the root causes of vulnerability”. Finan (2009, p. 179) also put

forward that “through these sociocultural confrontations, human adaptation emerges as a mechanism to enhance resilience by carving access points to agency”.

In considering cultural heritage pathways to climate action, this point aligns with Rivera-Collazo and Perdikaris’ (2023) suggestion that adaptation within the context of the changing climate occurs when the hazard is perceived as a risk or a threat to components of social structures and cultural identity. As such, adaptation strategies identified in the archaeological record would suggest that these hazards posed a significant threat, were no longer tolerable to these populations and so required change (adaptation) instead of a temporary coping strategy. When socio-ecological systems are impacted, they trigger short term or coping responses and if coping capacity is exceeded, populations would demonstrate their adaptive resilience or capacity (Berkes, 2017). Such a paradigm makes a study of cultural pathways, through archaeology and traditional knowledge systems particularly beneficial for contemporary societal adaptation to climate change. As these forms of cultural data connect both the socio (human) and ecological areas of the system and point to resilience in relation to climate change.

As a result, throughout this chapter, an examination is made from an international perspective to a regional, national (and community) in identifying the current issues, approaches and trends in this area. By exploring these areas, the case is further articulated throughout this research for a new paradigm in the Caribbean, not only in the perceived uses and value of cultural heritage but also in opportunities for its integration in the stated areas of planning, policy, and programming.

The Changing Climate and the Caribbean

The United Nations Framework Convention on Climate Change’s (UNFCCC) Article 1 (United Nations, 1992, p. 3), defines climate change as a “change of climate, or the outcome of human activity that alters the composition of the global atmosphere, in addition to natural climate variability observed over comparable periods” (1992, p. 7). Widespread environmental change and increased greenhouse gases due to anthropogenic causes have pushed global temperatures

upwards, contributing to this present period of accelerated climate warming becoming one of our most pressing global crises (UNESCO, 2017).

Human activity remains at the centre of climate change (Berkes, 2017; Rockman and Hritz 2020; Smith, 2007), known as anthropogenic climate warming or change, and has impacted the earth's atmosphere, with greenhouse gases being at an all-time high, and contributing to a considerable amount of carbon-dioxide warming the planet (Ellis, 2023; Rockman & Hritz, 2019). Antagonists of anthropogenic-led climate warming have, however, argued that the concept of the Anthropocene seeks to homogenize past complexities in its idea of this new human-dominated geological epoch (Porr & Matthews, 2019).

Although the earth has seen fluctuations in its temperatures in the past and has gone through previous cycles of climate warming, scientists are unanimous in attributing present levels of greenhouse gases to the actions of humans – and therefore anthropogenic – as unprecedented, resulting in extreme weather events. Recognizing these anthropogenic causes as being the source of accelerated climate warming, collective human action is necessary to tackle this problem, and the various climate change scenarios are often linked to mitigation actions people will have to take, such as reducing greenhouse gases or keeping global temperatures to a certain degree above pre-industrial levels.

Humans are undoubtedly “earth’s ultimate ecosystems engineer” as suggested by Smith (2007, p. 1797), and societies have continuously evolved and accumulated the capacity to thrive in harsh environments or those that are environmentally unstable. To survive in these environments, human populations have called on systems of cultural exchange, address food and water procurement and security, utilize mobility, migration and other social networks, as well as varied environmental management practices. These depend on the socio-cultural capacities of societies to adapt, and constantly learn and adapt to address these challenges which have been ongoing from the past to the present time (Butzer, 2012; Ellis, 2023; Strunz et al., 2019). As climate change is a human challenge it calls for a coordinated and focused global political, scientific, and social response, of which the place of culture for action is required through what we can learn from the past and through traditional and contemporary local knowledge systems, currently experiencing a boon in

global discourse, although as previously posited, not well articulated in regions such as the Caribbean.

This research anchors itself in an examination of human responses and actions concerning climate change and acknowledges that although human activities are currently driving recent climate warming at unprecedented rates, anthropogenic causes are not the only driver of climate change.

The most important global organization in climate change is the Inter-governmental Panel on Climate Change (IPCC), the UN body for assessing climate science data. Its most recent assessment cycle - its sixth²⁰ (2022, p. 9) noted that:

“Human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability. Some development and adaptation efforts have reduced vulnerability. Across sectors and regions, the most vulnerable people and systems are observed to be disproportionately affected. The rise in weather and climate extremes has led to irreversible impacts as natural and human systems are pushed beyond their ability to adapt.”

This increasing acknowledgement over the years that anthropogenic causes drive climate warming has resulted in various global tools, one being the Kyoto Protocol, which is an international treaty based on country commitments to reducing greenhouse gas emissions and anchored in the reality that global warming is happening at unprecedented rates and is driven by anthropogenic causes. The Protocol bases itself on an acknowledgment that individual countries have different capabilities in combating climate change and places an obligation on countries to reduce current emissions. This does not however take away from the precarious situation that islands find themselves in being at the forefront of this global change, particularly as sea levels continue to rise.

An analysis of the impacts of climate change would also not be comprehensive without analyzing the role that existing threats play in the exacerbation of pre-existing vulnerabilities and the human impact on the environment through pollution, destruction of ecosystems - particularly coastal mangroves - deforestation, rapid urbanization, unsustainable land-use patterns, and the

²⁰ IPCC AR6 Working Group II Full Report. Accessed at: https://report.ipcc.ch/ar6/wg2/IPCC_AR6_WGII_FullReport.pdf

significant coastal infrastructural development. These cannot be dismissed and must be tackled in any action to address the impacts of climate change, and will worsen if there are no global, national, or local actions. Researchers are also increasingly suggesting a link between the changing climate and the exacerbation of existing risks from other natural hazards, such as tsunamis, earthquakes, landslides, and volcanic activities (McGuire, 2013). This correlation suggests that climate change is a direct threat and will exacerbate environmental instability beyond what was previously established, planned for, or imagined.

The Union of Concerned Scientists has highlighted that one in one-hundred-year extreme flooding events will now occur once every sixteen years and this already been seen across the globe, where sea levels rose at a rate of 1.8 ± 0.2 mm/year through the twentieth century. This increase was identified as the fastest increase in sea level for previous centuries (IPCC, 2014; Kopp et al., 2016; Pörtner et al., 2022; Robinson, 2018). Satellite altimeters have recorded 3.2 ± 0.4 mm/year during the end of the twentieth and the early twenty-first centuries, suggesting an acceleration of global sea level rise and projections to continue.

The UNFCCC's Paris Agreement (2015) sought to focus the world's attention on combating climate change while ensuring that "all countries worked towards enhancing their capacity to adapt and reduce their vulnerability to climate change" (Article 7.1, p. 9). This Agreement aimed to cap global warming to below two degrees above pre-industrial levels, a target scientists believed to be ambitious, as temperatures had already risen by one-degree celsius, and a target of more than two degrees celsius was more probable. Through the Agreement however, countries committed to submitting Nationally Determined Contributions (NDC), which they must report on and which also present opportunities for the integration of alternative sources of information such as cultural data. A discussion of submissions (national communications) by the Caribbean concerning the integration of culture will be elaborated later in this chapter.

Unsurprisingly, these issues have impinged on the global capacity to respond to and manage the effects of climate warming and call for targeted and more wholistic interventions, particularly for small or low-lying islands where the situation is more acute within the context of the sustainability of islandscapes. These changes have made persons and communities more vulnerable, which has

contributed to climate-led migration and placed the sustainability of islands, food security, and livelihoods at risk. Communities are already facing relocation, with the Indigenous Guna in Panama being one of the most recent²¹. The ongoing intensity of climate warming points to extensive effects around the world, with small islands bearing the brunt of these effects due to their small size and sometimes topography. These effects include far-reaching consequences for socioeconomic situations and lifestyle choices.

Past climate variability research in the Caribbean has benefited from an increasing number of paleoclimatic and paleoenvironmental studies, contributing to the reconstruction of past climates in the region. Previous climate instability was also identified through temperature and sea level rise fluctuations from the Pleistocene and Holocene to the present time (Beets et al., 2006; Curtis & Hodell, 1993; Curtis et al., 2001; Hodell et al., 1991; Hofman & Hoogland, 2015; Malaizé, 2011; Perdikaris & Boger, 2022; Rivera-Collazo, 2019). These have also contributed to the dramatic land transformations and landscape changes recorded by researchers across the region, as well as settlement pattern changes (Castilla-Beltrán et al., 2018; Castilla-Beltrán et al., 2020; Siegel et al., 2015, 2018).

These studies revealed that the Holocene was characterized by severe wet and dry shifts (Hodell et al., 1991; Hofman & Hoogland, 2015). The wetter period of the mid-Holocene period coincided with the earliest peopling of the region and subsequent migrations, as noted by Keegan and Hofman (2017) and Siegel et al. (2015). The data also suggest a cooling period and glacial build-up known as the Little Ice Age during the post-1400 colonial period. In the Caribbean, this manifested as cooler temperatures and sometimes drier periods punctuated by drought events, which would have depleted water resources and highlighted the challenges with water during this time (Perdikaris & Boger, 2022). These areas all present interesting areas for further archaeological research to better contribute to and support the climate change discourse in the region.

In articulating specific points on contemporary climate change in the Caribbean, this research uses the Climate Studies Group SOCC Report (CSGM, 2020), as its primary data source as the most

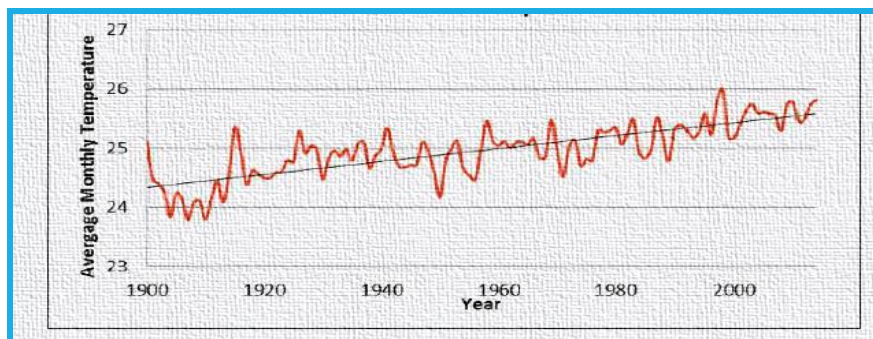
²¹ Indigenous Guna People of Panama to be Relocated Due to Climate Change. Accessed at: <https://www.climate-refugees.org/spotlight/2024/7/08/guna-planned-relocation#> on 24 October 2024

comprehensive study of climate change and its future trends in the region. The SOCC uses Global Climate Models (GCM) and calculated downscaling to provide more detailed information, becoming Regional Climate Models (RCM) driven by the outputs of the GCM. Thus, the data contained in regional documents such as the SOCC and the IADB report on Sea-Level Rise Threats in the Caribbean (Strauss & Kulp, 2018), suggest the region's average mean relative sea-level increase of 1mm/year during the twentieth century, and floods reaching at least 0.5m above the high tide line at the shore will become common events in the region. Further, floods above 1m may become standard as we progress towards the end of the century, with scenarios of unabated climate pollution projected to lead to sea-level projections exceeding 1.5m by 2100 across the region. These all align with global projections by the IPCC, albeit with some local variations. A simple review of the Caribbean media highlights the extent of the region's proneness to flooding, given its susceptibility to storms and hurricanes and attending storm surges (Burgess et al., 2018).

Figure 4, taken from the SOCC Report (CSGM, 2020), illustrates the historical trends in the Caribbean's temperature from the 1900s, highlighting the progressive warming of Caribbean temperatures. The report also notes that the literature on future climates in the Caribbean has grown in the last two decades. A consensus has emerged however across all modelling studies that the Caribbean will generally warm by the end of the century (CSGM, 2020). The means that the annual temperature of the region will experience warming from between 1.0 to close to 3.5 with resulting temperature extremes (ocean and land), and the region will dry toward 2100. Further, while there is little consensus about an increase in Atlantic storms and hurricanes, there is agreement that the intensity of these cyclones will increase under global warming (see Field, 2012), and sea levels will continue to rise and may be close to the projected global mean rise by the end of the century.

As small islands, the implications of this accelerated change cannot be easily dismissed as insignificant, particularly with such a large portion of the Caribbean's population living in coastal areas that are expected to experience the brunt of climate challenges (World Bank 2014).

Figure 4. Caribbean Historical Temperature Trend 1900 - 2014



Source: State of the Caribbean Climate (2020)

Continued global warming and higher temperatures, increased droughts, prolonged dry spells, melting of glaciers, rising sea levels, increased precipitation, and an increased frequency of extreme weather events describe our present age, with increased projections for the future. As climate warming accelerates, the degradation of socio-cultural systems will increasingly occur resulting in crop failure, food, and water insecurity, biodiversity and ecosystems loss among many other effects which will become commonplace (IPCC, 2014; Mysiak et al., 2016).

Within the region, the context at the local level or on the ground reflects that higher temperatures are contributing to the displacement of persons on small islands due to rising sea levels, increasing migration issues, the availability of resources, habitat destruction or degradation, and extinction. Severe or extreme wet and dry variations also result in flooding, and other water related issues in many areas. Between soaring heat and wetter conditions, extreme weather phenomena such as hurricanes increase because of warmer air and oceans. These all reflect possibly catastrophic scenarios for the islands of the Caribbean.

The recent, deadly and costly 2017, 2019 and 2024 hurricane seasons provided critical insight into what the Caribbean might face in the future due to accelerated climate warming (CSGM, 2020). The SOCC, however, acknowledges that far less research was completed on sea level rise, droughts, floods, and hurricanes in the Caribbean, than temperature and rainfall records. So, there is abundant data available on projections concerning these two. Nevertheless, the research

undertaken at the regional level makes the correlation between warmer sea and air temperatures and the formation of cyclones and presents an opportunity for linkages with data from paleoenvironmental and other paleoclimatic studies conducted at archaeological sites across the region to provide good contextual data at regional and local scales.

Familiar to small islands such as those in the Caribbean, coastal vulnerability often includes flooding, erosion, loss of ecosystems, and contamination of freshwater supply. These vulnerabilities are exacerbated by other human actions which contribute to ecosystem degradation. Within the Caribbean, a significant portion of the population – human communities, and infrastructure, are located on the coast in low-lying areas, and over fifty percent of the population lives less than 1.5km from the shoreline (IPCC, 2007; Miranda et al., 2021; Nicholls et al., 2018; Reguero et al., 2015). In addition, almost all the Caribbean's main cities, historical towns, and airports are less than a mile from the coast. The coastline of the islands of the Caribbean is experiencing unprecedented and rapid change, and while more severe change is foreseen, the time has long arrived where the development of integrated adaptation strategies for coastal areas unique to the region's island systems and which utilize multidisciplinary data solutions and strategies as the basis for action, are needed.

Rising sea levels affect all islands regardless of size, and for many islands, the entire geographical space is also their coastal zone. Coastal erosion is, therefore, a severe issue in the region, and due to rising sea levels, recurring storms, increasing wave action, and storm surges, most Caribbean islands have seen their coastlines and beaches disappear. In some areas of Saint Vincent and the Grenadines, Antigua and Barbuda, Saint Kitts and Nevis, beach erosion has been more than 20m in recent decades, is accelerating, and contributing to increased flood risk in these coastal areas (Cambers, 1997, 2009).

Research data from the previously undertaken project Coast and Beach Stability in the Caribbean (COSALC, 1985 - 2000), provided helpful monitoring evidence for several islands in the eastern Caribbean. Although this research was commissioned as a direct response to concerns about beach erosion and its impact on the tourism industry (Cambers, 1997), it also provided valuable data on annual beach rate changes concerning hurricanes impacting in a particular year as further

evidence of their role in increasing wave action, storm surges and exacerbating coastal erosion. Cambers' beach monitoring research (1997, 2009) from over five to fifteen years highlighted that of the eight eastern Caribbean islands where data was gathered, seventy percent of locations experienced erosion, thirty percent accreted, and a retreat rate of 0.5m/year over the period 1985 - 2000, with elevated rates in islands having more hurricanes. The author attributed the level of erosion to factors such as rising sea levels, beach sand mining, and coastal development but highlighted that the data was insufficient to quantify the various elements (see also Cambers & Roberts-Hodge, 2014). Undoubtedly, if such a comprehensive and comparative study would be repeated now, twenty years later, the continued loss would be significant, as was identified in the survey of coastal archaeological sites in Antigua and Barbuda undertaken in 2022 and referenced throughout this research.

In low-lying islands such as the Bahamas, Antigua and Barbuda, Barbados, and the Grenadines, emerging challenges concern saltwater intrusion into fresh water supplies (Douglass & Cooper, 2020). The region also relies on rainwater to refresh freshwater reserves, so, as the sea level continues to rise, these risks are exacerbated, also in wells, which are already drying up because of drought conditions and other issues. Without prompt action, desalination will be seen as the only solution for many islands, and all these changes have the potential to affect ways of living, doing and being and so the cultural factor undoubtedly has a crucial role in formulating climate action.

The SOCC (CSGM, 2020) also analysed the projected impacts of climate warming on the various sectors in the region. The culture sector was not addressed, however data presented on the tourism sector provides useful proxy data concerning coastal areas, such as for sea level rise, where many resort properties will likely be destroyed (forty nine to sixty percent), beaches will retreat inland at one hundred times the rate of sea level rise, droughts will result in declining water quality and availability affecting tourism operations, increasing temperatures will result in heat stress, coral bleaching, climate-induced vector-borne diseases, and sargasso blooms, and heavy rainfall and tropical cyclones will result in the destruction of tourism infrastructure. The foregoing description is already the reality for the islands of the Caribbean.

These studies and data further demonstrate that islands, mainly their coastal communities, are on the front lines of any form of global change, particularly large-scale environmental change such as the climate crisis (Fitzpatrick et al., 2015; Climate Change Working Group, 2019; IADB, 2018). These existential threats to island communities have also been articulated by others such as the Association of Small Island States in drawing attention to how these impacts will affect islands (Douglass & Cooper, 2020). The Caribbean and the Small Oceanic Islands have been acknowledged as having a particularly high climate disaster risk worldwide to natural hazards due to their flat, low-lying topography, porous limestone bedrock (in most islands) and its annual tropical cyclone season (Strauss & Kulp, 2018; Climate Change Working Group, 2019; World Risk Report, 2021), and the World Risk Report (2023, 39) identifies the Americas as the region with the highest disaster risk and exposure.

Cultural Data Informing Discourse: The Case for Archaeology and Traditional Knowledge

Within the context of the Anthropocene, and as a connector between humans and their relationship with their environment over the long term, climate change is best addressed through multidisciplinary lens instead of the perspective of one science or data source (Siegel, 2018). In identifying cultural pathways to climate action, this research crafts a narrative that delves into the role of cultural heritage in addressing issues related to the changing climate.

Through archaeology and traditional knowledge systems, the islands of the Caribbean present an exciting opportunity to envision and observe the development of this pathway from beginning to end. This is due to the relationship of its Indigenous peoples with their natural environment from the deep past, the harsh intrusion of colonialism and significant landscape transformations, and the forging of historical narratives of vulnerability and resilience, as well as the level of susceptibility of its coastal areas and the central role that these coastal spaces played and continue to play in the narratives mentioned.

It also provides a unique opportunity to examine pathways for integrating relevant knowledge and data from the cultural heritage field into planning processes. This cultural approach also adds to the discourse that supports islands being viewed as essential ecosystems instead of a strictly

vulnerable narrative (DiNapoli & Lepperd, 2018; Hofman et al., 2021). By combining traditional ecological knowledge and science with a contemporary or western focused climate science, our islands are better able to frame their understanding of climate vulnerability while strategizing for future adaptation.

Although not proposing homogeneity concerning past responses to climate change in island groups in Asia, the Pacific, the Mediterranean, and Africa due to similarities in ecology, size, historic processes, and geophysical characteristics, this research presupposes that the insularity of island living within almost similar island physiography would promote parallels in adaptation responses. Specific adaptation responses are however culturally based and dependent on the local setting and available resources.

Archaeological Research

Archaeology's contribution to climate action, and discourse, and as a method and tool for this action within the context of climate change happens at multiple scales.

The notion that examining climate change from an archaeological perspective has much to communicate regarding how past populations responded to these hazards continues to benefit from increasing research. This is termed “climate change archaeology” which, according to Van de Noort (2013, p. vii), refers to visualizing “the past as a repository of ideas and concepts that can help build the resilience of communities in a time of rapid climate change”. As a fully emerged study area, climate change archaeology views the intersections between archaeology and climate change as requiring deep examination to contribute to public discourse on long-term perspectives on socio-ecological interactions (see also Burke et al., 2021; Van de Nort, 2011; Rockman & Hritz, 2019).

Archaeology also provides researchers with data on the legacies of the actions and responses of past populations concerning these socio-ecological relationships and human settlement on their landscape (Siegel, 2018). In the same way, contemporary adaptation actions will also feed into the archaeological data and record of the future, where archaeologists will be unearthing evidence of good strategies as well as examples of maladaptation. Through the lens of archaeology, we learn

how past societies experienced, responded, and adapted to climate change. This awareness examines how contemporary, local, or traditional communities adapted to climate change and forged their resilience within the context of their long-term relationship with the environment. This examination is specifically relevant to us today.

Finally, archaeological research programming has the capacity to assist coastal or other communities in visualising themselves as part of the history and timeline of a particular area and contributing to resilience building through participating in monitoring and other climate action initiatives at archaeological sites being impacted by climate-induced hazards (Miller et al., 2024).

Rockman and Hritz (2019) suggest that even while archaeology and cultural heritage have so far contributed very slightly to addressing climate change targets, there is still the possibility for this to change because “archaeology is the study of interactions between the natural and social environments throughout time and across space” (2019, p. 8295). Because research opportunities are endless, they should be prioritized in broader answers to the climate crisis. Van de Noort (2013, p. 1) also indicated that “archaeologists have studied past climate change and its effects on human societies for over a century” and so archaeology’s contribution to climate action and discourse is essential for many reasons. Data emanating from research can also be used as proxy records for fuller and perhaps more accurately reconstructing past environments and highlighting how past populations understood and reacted to severe environmental challenges such as climate change (Pearson et al., 2021). This data can also be used to support wider policy development in coastal areas (Miller et al., 2024).

The IPCC’s Fifth Assessment Working Group II Report (2014) suggested how “an awareness of and research on the environmental stresses, responses, and adaptation limits of past societies, such as the Classic Mayan civilization, early Mesopotamia, and the medieval Viking settlements in Greenland, could be a valuable approach in how we examine our future adaptation” (p. 920). Its articulation of “it would be useful to consider how lessons learned from historical experiences may relate to the perceived multiple environmental changes characterized by the Anthropocene is strong evidence that the use of archaeological information (cultural data) for climate action is not

yet clearly defined” (Rockman & Hritz, 2019, p. 8297) and could be better articulated or made more robust.

At the global level, archaeological projects, such as at Monte Albán in Mexico, have focused on unearthing large-scaled ancient water engineering control systems which shed light on how water was managed in the past and how they could help present day communities being impacted by the effects of climate-induced hazards, particularly increased flooding events and droughts. Here the researchers used archaeological research to support environmental recovery, heritage protection and reconstruction of social bonds all aimed at building the site’s resilience (Rojas & Dávila, 2020). In the same way in Peru, archaeologists utilizing a multidisciplinary approach in collaborating with other scientists are researching and restoring “ancient but largely abandoned canal systems called *mamanteo* which are thought to pre-date the Inca empire” (Burkett, 2020, p. 32). These collaborative efforts are being undertaken to address Lima’s increasingly drier conditions by funnelling hydrological runoffs from the highland streams. They also work to allow more time for wet-season moisture to percolate, and also for slowing water delivery in drier times (Burkett, 2020). Van de Noort’s (2013) archaeological work in the North Sea also provided evidence of populations moving to higher ground in response to significant environmental changes related to rising sea levels.

Within the Caribbean, archaeological projects or those with a key archaeological research component have sought to unearth how past populations managed past environmental challenges, as well as interacting with present day communities through this heritage. Projects mentioned previously, such as the Islander(s) at the Helm in the Dutch Caribbean islands, the Barbuda Historical Ecology Project, Saint Kitts’s Coastal Erosion project, the Curaçao Cultural Landscape project, and ALOA, in addition to research projects by Cooper (2012) and Siegel (2018) illustrate this. Some of these projects are discussed in greater detail in the chapters following.

The DUNAS project in Puerto Rico presents another example which combines archaeology, community involvement, and restoration of coastal ecosystems. Within the context of coastal ecosystem restoration, the archaeological component explores how long people have lived on the coast, identifies sites at low elevations, and examines how they interact with the coast and the

dunes. This has contributed to a better understanding of how people respond to sudden environmental change, as well as increased resilience of the coastal ecosystem and nearby communities.

Unfortunately, despite their best intentions, none of these projects have, however, transcended the confines of the field and made it into climate action policy, planning, or practical programming. Although the Saint Kitts and Nevis project sought to generate data for policy by developing a database that would be useful to policymakers, checks made for this research revealed that the extent of its use by policymakers remains unknown.

The emergence and relevance of archaeological research in studying the impacts of climate warming on societies is not a recent occurrence based on available scholarship. For example, Trigger (1989) noted that this has happened for over a century. Unfortunately, this research has not been synthesized or applied to new insights or actions to respond to and plan meaningfully. Although the archaeology field has good intentions, its actions do not seem aligned internally to prioritize and address the range of challenges being experienced by communities in responding to climate-induced hazards. So, although it is uniquely placed to work with national and local mechanisms to build the capacities of communities in managing these hazards, it has hardly gotten to the stage of being applied archaeology.

Traditional Knowledge

When it is considered the extent to which Indigenous knowledge supports disaster risk reduction and its potential to contribute to the development of strategies in meaningful ways, Kelman et al. (2012, p. 12) point out that “no single knowledge form can be [suggested as] a panacea” for addressing impacts from climate-induced or other natural hazards. Neither does this research suggest this, particularly within the context of the often romanticization of traditional knowledge that occurs when its intersection with climate change and disaster risk is discussed. This research acknowledges that there are multiple layers and grey areas that exist when this convergence happens, meaning traditional knowledge is critical to climate action, but there are also ways in which it contributes to the vulnerability of communities. The capacity of traditional knowledge to

persist and evolve over time, however, is a strong indicator that as a science, it is not easily undermined (Adger et al., 2013, p. 114). However, many studies have also identified a gradual loss of these knowledge systems due to globalisation and played out in the ongoing effects of colonisation (Nurse-Bray et al., 2019; Nurse-Bray & Palmer, 2018). As highlighted, the availability of natural resources would also impact the use of sites, relationships with the landscape, and historical processes linked to colonialism. In research on how the Maya processed environmental stress, mainly drought, over the long term, Jobbová (2021) highlighted that the successes and failures of the responses of Indigenous populations were linked to their deep relationship with their local environment.

There is an increasingly acknowledged need to include traditional ecological and environmental knowledge in climate change-related considerations. Indigenous populations frequently serve as early indicators of environmental change that later affect non-Indigenous or non-traditional communities. Indigenous, and local knowledge can improve a community's willingness and capacity to act at different scales and inform and broaden more general academic knowledge. Due to differences between conventional Western knowledge that favours simple variable measurement and Indigenous-inspired techniques that emphasize the value of local and traditional knowledge, particular caution should be used while applying traditional knowledge.

Despite traditional communities continuing to practice an awareness of self, knowledge, and cultural practices honed from generations of interacting with their natural environment and being attuned to environmental changes or imbalances in nature, the integration of traditional knowledge in global climate discourse was virtually absent or highly dismissive until recently (Dove 2006; Foyer & Kervran, 2017; Kronik & Verner, 2010; Scott, 2020). This seeming lack of awareness of the role of traditional knowledge within the sphere of climate change however underwent a grand metamorphosis when the seminal international guidance for climate action by countries, the Paris Agreement (2015, p. 6), referenced the relevance and importance of traditional knowledge in its adaptation section in Article 7.5 (see Figure 5).

Figure 5. *Traditional Knowledge and Adaptation in the Paris Agreement*

Parties acknowledge that adaptation action (...) taking into consideration vulnerable groups, communities, and ecosystems and should be based on and guided by the best available science and, as appropriate, traditional knowledge of indigenous peoples and local knowledge systems, to integrate adaptation into relevant socioeconomic and environmental policies and actions, where appropriate.

Note: Adapted from the Paris Agreement (2015)

The Paris Agreement calls on its almost two hundred signatories to submit national reports on actions being taken to reduce carbon emissions [mitigation] and measures for adaptation. As alluded to, very few countries acknowledge the role of or report on cultural heritage in this process, so there is now space for improvement. However, the few countries that acknowledge cultural heritage speak to the much deeper issue linked to the inability to apply this data in valuable ways to be able to report on it.

The Hyogo Framework for Action (2005, 9)²² and later the Sendai Framework (2015 – 2030, 15),²³ a global blueprint for disaster risk reduction, also identified the use of “relevant traditional and Indigenous knowledge and cultural heritage” under its Priority Three section on education and knowledge. The IPCC and its Working Groups have also progressively increased awareness concerning Indigenous peoples and climate change (see Figure 6). Its most recent sixth assessment (AR6) examined issues related to climate change and Indigenous peoples and local communities. It built on AR5 by providing the most informed summary of how climate change impacts Indigenous peoples and local communities and how they apply their knowledge to adapt and cope with impacts. AR5 also included local and traditional knowledge in its chapter on human security.

²² Hyogo Framework for Action. Accessed at: https://www.unisdr.org/files/1037_hyogoframeworkforactionenglish.pdf

²³ Sendai Framework 2015 – 2030. Accessed at: <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>

Figure 6. Adaptation Planning from IPCC AR5 Synthesis Report

Adaptation planning and implementation at all levels of governance are contingent on societal values, objectives, and risk perceptions. Recognition of diverse interests, circumstances, social-cultural contexts, and expectations can benefit decision-making processes. Indigenous, local, and traditional knowledge systems and practices, including Indigenous Peoples' holistic view of community and environment, are significant resources for adapting to climate change. Still, these have not been used consistently in existing adaptation efforts. Integrating such forms of knowledge with existing practices increases the effectiveness of adaptation.

Note: Adapted from the IPCC AR5

Prior to this, the Fourth Assessment Report (AR4) referenced Indigenous knowledge as “an invaluable basis for developing adaptation and natural resource management strategies in response to environmental and other forms of change” (Nakashima et al., 2012, p. 6; see also IPCC, 2007; IPCC 2010).

Traditional knowledge was also integrated in the Cancun Adaptation Framework²⁴ adopted at the UNFCCC's Conference in 2010, and the Rio Declaration on Environment and Development also included this knowledge through its Principle Twenty-two (1992, p. 4).²⁵ These represent some global efforts that have sought to promote Indigenous and local knowledge – and by extension culture, particularly in shaping policy, planning, and programming for climate action. Today, indicators in relation to climate change and the application of traditional knowledge are being elaborated based on the various articles of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)

With these acknowledgments, the international community, primarily dominated by Western scientific knowledge in its approach, seemed to change the narrative and frame the climate action

²⁴ Cancun Adaptation Framework. Accessed at: <https://unfccc.int/tools/cancun/adaptation/index.html>

²⁵ Rio Declaration on Environment and Development Principle 22: ‘Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.’ Accessed at: https://www.iau-hesd.net/sites/default/files/media_files/rio_e.pdf

discourse as ‘bottom-up’ in focusing on the voice of Indigenous and other local communities. While this was a positive step in that the voice of Indigenous communities was introduced to this adaptation discourse, it was still, not a part of the dialogue on assessing climate change, and the scientific community generally perceived Indigenous knowledge as invalid and exotic with cultural biases imposed on these communities, stemming mainly from the legacies of colonialism throughout much of the world (Foyer & Kervran, 2017; Bruchac, 2014).

Today, more studies are being presented on climate-driven losses to traditional knowledge and practices, while Indigenous and other traditional communities also seek to lead or better contribute to the discourse concerning the interaction with their environment, especially on biodiversity, ecosystems, land use management, food security, water resources management, shelter, disaster risk reduction, and management, among other crucial areas. This has resulted in the development of significant partnerships as the voices of traditional knowledge-bearers are increasingly being heard through initiatives emanating from the International Indigenous Peoples’ Forum on Climate Change²⁶ (IIPFCC). The World Meteorological Organization’s (WMO) Geneva Declaration of 2019²⁷ was also borne from strategic relationships targeting “public–private–academia partnerships, including citizen scientists from Indigenous peoples and local communities”.

Traditional knowledge has taught us that in response to changing climatic conditions, Indigenous communities have migrated to other locations, changed settlement patterns as part of mitigation and adaptation strategies, adjusted or adapted agricultural practices, or developed technologies in response to environmental changes and challenges. With the significant progress made by Indigenous communities in articulating their space and voice in climate action discourse at the global level, and with case studies becoming more prominent, and essential innovations in regions such as the Pacific, progress in other countries and regions remains a challenge. The Caribbean remains one of these places where the climate action discourse and space have stayed firmly focused on the science of climate change and climate financing as the only priorities, even while

²⁶ International Indigenous Peoples’ Forum on Climate Change. Accessed at: <https://www.iipfcc.org/home-1>

²⁷ Geneva Declaration 2019: Building Community for Weather, Climate and Water Actions. Accessed at: https://wmo.int/sites/default/files/2023-08/Geneva_Declaration_2019_en.pdf

civil society seeks to bring awareness to the importance of considering nature-based solutions as one example or pursuing an ecosystems-based approach in climate action. Nevertheless, some research has been undertaken with Indigenous communities and practices, with the landscape open to more valuable research. Progress made in non-economic damages and losses in relation to climate change have also created greater awareness of the place for culture in this discourse.

Notable work being done in centering traditional knowledge include UNESCO's Local and Indigenous Knowledge Systems Programme (LINKS)²⁸ which seeks to build global awareness on how local and Indigenous knowledge can be included in policy, as well as promoting multidisciplinary work with climate scientists and policymakers to better understand climate challenges. A key component of this programme involves the use of methodologies which integrate Indigenous knowledge.

Interesting examples of intersections have occurred between traditional knowledge systems and climate change and disaster risk management in rich and relevant areas of focus such as forest management, weather forecasting, farming practices, and housing design in regions such as Asia, the Pacific and Africa (see research by Abbasimehr, 2016; Ado et al., 2019; Ajibade & Shokemi, 2003; Agarwal & Narain, 1997; Aktürk & Fluck, 2022; Alangui et al., 2018; Alefaio-Tugia et al., 2019; Alhassan et al., 2019; Banda et al., 2015; Baul & McDonald, 2014; Iloka 2016; Nunn et al., 2024).

In Australia, ecosystems management by First Nations People such as the Martu has helped to preserve landscapes and helped scientists to return Indigenous practices in areas impacted by climate change. This has given rise to the establishment of Indigenous Protected Areas,²⁹ and programmes such as the Western Desert Martu Ranger Programme (Van Oosterzee & Hunter, 2023). These also present illustrative templates of collaborative actions which can be developed. This is particularly important for the Caribbean, where the intersections have experienced limitations in their development.

²⁸ UNESCO LINKS <https://www.unesco.org/en/links>

²⁹ Indigenous Protected Areas make up more than 11% of Australia's landmass and were developed under voluntary agreements between First Nations peoples and the Australian government to improve biodiversity conservation. Source: Press Release on Celebrating dedication of Martu Indigenous Protected Area. July 2023. Accessed at: <https://ministers.pmc.gov.au/burney/2023/celebrating-dedication-martu-indigenous-protected-area>

There are also many interesting examples from around the world where solutions that are local in origin, have been applied to mitigating risks and adapting to climate change. In the Netherlands, culture-based solutions are used for local climate action using historical and traditional knowledge systems of old waterways. This was highlighted by Fatorić and Egberts (2020, p. 5) in discussing traditional flood mitigation techniques such as ‘dwelling mounds’ (‘terpen’ or ‘wierde’) made from local materials with buildings, and villages built on top of these mounds. These offer protection from coastal flooding across the coastal northern provinces and today, these dwelling mounds have inspired numerous modern elevated dwellings across the Netherlands³⁰ (see also Nieuwhof et al., 2019; Van Alphen, 2020).

Safeguarding local knowledge for future generations can also be facilitated by returning to some of the traditional methods previously used (see Khakzad & Griffith, 2016; Nanavati, 2018). This is illustrated by an example from Guyana where archaeological data from the Berbice region was shared with coastal farmers, leading to the revitalisation and utilisation of these strategies to build resilience (see Richards et al., 2023). Another example in southwest Madagascar highlights how intergenerational knowledge passed down for two thousand years allowed communities to use various strategies such as diversified methods of food production and procurement to adapt to climate change, with evidence of this reflected in the archaeological record (Pisor et al., 2022, p. 11).

Mercer et al. (2014) also reference traditional knowledge within the context of food security in Atlantic and Indian Ocean small island states when the Solomon Islands were struck by Category Five Cyclone Zoe in 2002. There, the author found no reliable off-island communication systems, and no one died because “people knew the impending signs of a coming storm and how to respond... Some of the traditional housing survived, along with fermented breadfruit buried in the ground in case of cyclones” (Mercer et al., 2014, p. 703).

In Jordan, traditional and local knowledge by Bedouin tribes living within the world heritage site of Petra highlighted the use and value of old Nabataean water management systems in protecting the

³⁰ Room for the River State Management River Programme (2006 - 2015). Accessed at: <https://www.dutchwatersector.com/news/room-for-the-river-programme>

site from flash flooding, a climate vulnerability experienced frequently. In 2022, severe flooding resulted in over one thousand persons being evacuated from the site (Harris, 2022). When these water channels, terraces and dams high above the site's *siq* were kept clear, the incidents of flash flooding were greatly reduced (Abdalhaleem et al., 2024; Comer, 2015). This knowledge proved a powerful and essential climate action resource for managing risks at the site. There are also many other cases where traditional communities are redesigning or inspired to reuse age-old practices to respond to the climate crisis. Some of these projects include rehabilitating the ancient hydraulic network in Cambodia (Hang, 2015), neolithic engineering in China in response to significant seasonal climate shifts,³¹ and ancient water-harvesting systems being used to lessen modern water shortages due to drought in Peru.³²

UNESCO has also facilitated numerous partnerships focused on the use of traditional knowledge for climate action, such as through its 2021 project, which developed case studies on living heritage and climate change in East Africa through the project *Supporting Research and Documentation for Case Studies of Indigenous and Traditional Knowledge Systems for Biodiversity Conservation, Climate Change Adaptation/mitigation and Disaster Risk Reduction*.³³ One of the examples presented highlighted the Ugandan case study which was undertaken with local traditional knowledge bearers, practitioners, and other cultural actors in Eastern Africa, focusing on the intersections between “traditional knowledge systems and the conservation of water bodies and aquatic life in Uganda”. The UNDRR through its 2022 research and subsequent publication on using traditional and Indigenous knowledge for disaster risk reduction,³⁴ also supports the co-existence of traditional and scientific knowledge, outlining ways to use this knowledge, as well as providing a framework or methodology to integrate aspects of traditional knowledge in decision-making. As early as 2013, the UNFCCC was involved in developing best

³¹<https://www.heritagedaily-com.cdn.ampproject.org/c/s/www.heritagedaily.com/2023/08/neolithic-people-were-capable-of-complex-engineering/148243?amp=1>

³²https://www.voanews.com/a/science-health_ancient-peruvian-water-harvesting-system-could-lessen-modern-water-shortages/6170865.html

³³ <https://ich.unesco.org/en/news/unesco-publishes-case-studies-on-living-heritage-and-climate-change-in-east-africa-13364>

³⁴ https://www.undrr.org/sites/default/files/2022-12/11_Traditional%20Knowledges_2022_2.pdf

practices and tools for using traditional knowledge and practices for adaptation to climate change³⁵.

These examples provide useful templates for the development of such research and programming in the Caribbean, where cultural data, specifically traditional ecological knowledge, remains a relatively understudied area compared to other regions. There have nevertheless been some forays in this area albeit unsustainable ones. With the number of projects and publications increasing globally, it seems surprising that this remains an understudied area in the Caribbean, benefiting from little traction. However, as the Caribbean remains one of the most vulnerable regions in the world to climate challenges (Beckford, 2018), there remains many opportunities to use this knowledge in pursuit of multidisciplinary approaches to support climate action.

Layng (1983, p. 3) pointed out that “ethnographic research in the Caribbean [West Indies] has been influenced by two theoretically significant peculiarities of the region. The first being the largely incorrect view that the area is mainly devoid of Indigenous populations and second, that most of the inhabitants are fully incorporated within national and international economies over which they exercise little control.”

The view that the Caribbean is void of Indigenous peoples is a false narrative that has largely been addressed by researchers working in the region, as well as the actual presence of these Indigenous persons and communities. The Indigenous peoples of the region have been collectively subjected to historical processes of genocide, land grab and degradation, and contemporary global processes not of their making, but which have served to sever some of the connection from the deep past to the present by disrupting the transmission of cultural traditions and knowledge systems.

More recently, workshops on mobilizing Indigenous and local knowledge solutions for addressing climate change have been hosted in Guyana in 2019³⁶ and Aruba in 2022. For the former, this was a collaborative event hosted by UNESCO, UNFCCC, the World Meteorological Organization (WMO), and the Caribbean Community Climate Change Centre (5Cs). The latter was organized

³⁵ <https://unfccc.int/resource/docs/2013/tp/11.pdf>

³⁶ <https://unesdoc.unesco.org/ark:/48223/pf0000375025>

under the Islander(s) at the Helm and CaribTRAILS multi-disciplinary projects and will be discussed below. Both events aimed to examine ways to better mobilise Indigenous and local knowledge through supporting the voices of Indigenous communities on climate action issues.

In the case of the Aruba event³⁷, this brought together traditional and local communities, students, archaeologists, anthropologists, and other researchers from or working throughout the Caribbean. The activity focused on how communities felt they were being impacted by the climate crisis and how they could better articulate their voice in this discourse, how the research community could support this action, and knowledge exchange and an initial discussion on how archaeological and traditional knowledge can support the elaboration of solutions and strategies for future climate action in the region. This initial discussion was critical, as this nexus of archaeology and traditional knowledge for climate action is relatively unknown in the region, as previously posited. To better contextualize this relationship, it was necessary to understand where things were at the regional level, and so invitations were sent to traditional communities, researchers, and institutions undertaking relevant research to have at least one researcher and one Indigenous or local community member from each participating country.

The workshop provided an opportunity for the presentation of research concerning traditional knowledge, archaeology, paleoecology, and climate action intersections, support for communities in articulating how they experienced and responded to climate change, discussed adaptation strategies, as well as the challenges preventing the availability and use of this knowledge at a more comprehensive society level or refined scale. Importantly, it discussed the hitherto limited voice and participation of Indigenous and local communities in climate change discourse in the Caribbean and issues with the documentation of this knowledge in a free and informed manner that gives agency to these communities instead of merely pursuing a knowledge-based extractive agenda (Richards et al., 2023).

The *Island(er)s at the Helm* project (2021-2026),³⁸ under which the workshop fell, aims to support the place for traditional knowledge systems in discussions on climate action. This transdisciplinary

³⁷ This event was coordinated with Harold Kelly and hosted at the National Archaeological Museum

³⁸ See Note 3

project aimed to develop “co-created research on sustainable and inclusive solutions for social adaptation to climate challenges in the Caribbean” with a particular focus on the Dutch Caribbean and seeks to “bring together researchers and societal partners (while utilising a mix) of technical, traditional, and contemporary knowledge practices for studying climate change adaptation through a long-term perspective” (Islander(ers)s at the Helm, n.d). This was also the aim of the Caribbean Transdisciplinary Research Archaeology of Indigenous Legacies Spinoza (CaribTRAILS) project (2019 – 2026),³⁹ which focused on placing the “Indigenous Caribbean pre- and post-colonial history in a global perspective and aims to contribute to the debate on decolonisation of [archaeological] practices, human rights of Indigenous peoples and the governance of climate change” (CaribTRAILS, n.d.). This project recognizes climate-induced and other natural hazards as significant threats to the record of the past and the intergenerational knowledge transfer of Indigenous communities.

Also present at the Aruba workshop was the Barbuda Research Complex Project,⁴⁰ which seeks to examine human-environment relationships on the island of Barbuda through multidisciplinary lens. One of its components focused on water resources and subsistence agriculture using various data collection tools (mobile apps, story maps, and interviews) and also developed a water monitoring programme for historic wells, looking at how these sites change above and below ground. A key component saw younger community members connecting and learning from elders, documentation of elder knowledge regarding past sustainable resilience practices, while other students were provided with the opportunity to learn about these practices. Through this project approach, data gathering and observations shifted from researchers to community members (Perdikaris & Boger, 2022).

However, as opined in the section on archaeology, none of these activities have resulted in meaningful actions concerning planning and policy and have largely remained limited at the programming level. The projects previously mentioned are however not complete, and so there is

³⁹ CaribTRAILS – Caribbean Transdisciplinary Research Archaeology of Indigenous Legacies Spinoza,’ accessed 20 May 2024. <https://www.kitlv.nl/research-projects-caribtrails-caribbean-transdisciplinary-research/>

⁴⁰ Barbuda Research Complex (BRC). Accessed 9 March 2023 at <https://www.facebook.com/people/BRC-Barbuda-Research-Complex/100063316234274/>

an opportunity for them to contribute to planning and policy in the region in meaningful ways, particularly within the context of a recent exacerbation of climate-related disasters in the region. There has however been an increase in research elaborating the value of considering traditional knowledge concerning agriculture practices in the region, largely in response to food insecurity caused by droughts, flooding and higher temperatures, but not stated as research in relation to the effects of accelerated climate change.

Adapted frequently to local circumstances, Caribbean traditional knowledge and local knowledge systems can be highly dynamic and are built on generations of application. As such, they are crucial to adaptation processes, being fundamental to comprehending, perceiving, processing, and reacting to climate warming and other environmental stressors (Boger et al., 2019; Bruchac, 2014).

The ongoing effects of accelerated climate change combined with the historical environmental context of the region affects the ecology of the various islands differently. This means that the situation that many Indigenous and local communities find themselves in suggests that as the climate continues to change, so too will come the loss of cultural knowledge, practices and traditions, such as knowledge systems used to predict weather change, which will become more unpredictable or less accurate with severe consequences for areas such as food and water security (Ebhuoma, 2020). This research does not present the relationship between traditional or Indigenous knowledge and Western science as a chasm, but one in which both are rivers running side by side and sometimes intersecting (confluence).

When transposing techniques from the past, such as those related to agriculture, water management, or housing construction, to modern contexts, it is crucial to involve traditional knowledge bearers and communities as much as possible and as early as possible to “ascertain whether physical and socio-cultural circumstances are comparable” (Kaptijn, 2018, p. 1). The example from Guyana shared earlier illustrates that traditional knowledge can shed light on the past and Indigenous populations' choices and responses to these dynamic contexts. To provide culturally acceptable solutions and insights for climate change in contemporary island societies, archaeological data, and traditional knowledge should be combined.

Situating Cultural Heritage in Climate Action and Vice Versa

This section identifies and discusses the various mechanisms which allow for identifying references to climate change in cultural heritage and cultural heritage in climate change. It also analyses avenues for bridging gaps between the two or creating intersections that work.

As highlighted, this research is anchored in the premise that our culture is who we are and defines how we act and contributes to more sustainable or unsustainable actions in how we adapt to the changing climate and undertake climate action as communities pursuing socio-ecological relationships within our islandscapes. Yet, as a starting point, it is critical to acknowledge that cultural intersections in relation to climate action, although important, needed, and theoretically possible, are not robustly evident at the policy, planning or programming levels globally and even less so in the Caribbean. With this assumption, it is deduced that the cultural data to feed into climate action would be poorly articulated in the Caribbean, with the result being that climate change strategies that utilize relevant cultural data or integrate cultural heritage are lacking.

As such, this section sets out to identify these likely pathways, so there is space and opportunity to plan and develop strategies, actions, and frameworks that benefit from this integration and that are more relevant to the islands of the region. As underscored by the United States National Climate Assessment Four (NCA4, 2018 p. 335), “resilience planning that considers cultural heritage and incorporates community-driven values, experiences, and traditional knowledge promotes a human-centred bottom-up approach and equity, representing more holistic adaptation decisions”.

Rockman (2024) also puts forward that established or authorised discourses for heritage (see description in Chapter One) and climate change⁴¹ leave little room for this intersection. Opportunities for integrating culture would be possible if the past was being considered or used to address contemporary issues and in navigating change, and if the climate discourse better incorporated the best and most relevant science, and inclusive participation, particularly of Indigenous communities. With these intersections, society might begin to see overlaps and

⁴¹ Authorized Climate Discourse focuses on climate models and projections, measurement of emissions, impacts, change; energy, water, technology; extreme events; and governance and economics focusing on previous points.

opportunities for culture to have a seat in climate action discourse, planning, policy and programming.

This research takes the position that a review and analysis of the integration of culture into climate action and vice versa, is central to the development of pathways that utilize cultural data for climate action. This analysis was first completed by reviewing the data presented internationally as good practices or examples. To fully engage the space for cultural heritage in climate action and vice versa, a review of the framework in place was undertaken at varying levels and scales. At the Caribbean level, this research examined climate action plans, policies, and reports such as national communication to the UNFCCC, national development documents linked to the sustainable development goals (SDGs), and finally national adaptation and planning documents. It also broadly considered where the region was in utilising cultural heritage in relation to climate action and planning and in broader climate plans.

For the culture sector, the documents examined for intersections with climate action included heritage policies, legislations, and plans specifically developed for cultural heritage, such as site management and conservation plans.

Situating Culture within a Climate Change Framework

Guzman and Daley (2021) write that national documents, policies, plans or strategies can reference cultural heritage directly, such as explicit acknowledgments of its contribution to sustainable development or impacts to cultural heritage directly affecting the tourism product. Indirect references to cultural heritage by these same processes can relate to references about climate change impacting forested areas which could indirectly reference impacts to Indigenous communities, as these spaces serve as important sacred locations for transmitting Indigenous cultural practices and knowledge and are a source for resources important to Indigenous communities. Climate plans can also directly mention cultural heritage through “explicit acknowledgments in climate strategies, the development of different actions, or the inclusion of

culture as part of an analysis to assess climate change impacts or monitor the effects of its actions” (Guzman & Daly, 2021, p.10).

Cultural heritage can also be indirectly referenced in integrated coastal zone management plans, which might include all types of coastal resources. These indirect references were often the case with individual sectors where traditional or local knowledge is mentioned in sectoral plans such as tourism, water, or agriculture, but no connection is made to it as being cultural heritage.

Various national development and climate documents were reviewed, while seeking to identify likely pathways for integrating culture into climate action at the national level. This information is presented utilising data from specific islands within the study area, to engage this discussion at the regional level. In selecting a particular island to discuss a specific viewpoint, it is not the aim of this research to suggest that this is the only island that has such a plan, strategy or policy document in place. A summary of this information is presented in this chapter, with more detailed tabular information provided in the Appendices.

In studying the existing climate change framework in the region, this research acknowledges and draws parallels with the objectives of the *Heritage in Climate Planning (HiCLIP) project* launched by the Climate Heritage Network (CHN) to aid in mainstreaming culture in climate planning. This dissertation however diverges slightly in the methodology pursued and the types of documents consulted.

For the HiCLIP project, nine climate plans from eight different nations were examined at various societal levels to see how cultural resources are treated in governance and what role this gives the cultural sector. The HiCLIP technique uses planning statements per policy discourse analysis to “identify governance entry levels for mobilising culture in adaptation and mitigation” (Guzman & Daly, 2021, p. 4) actions. Its pilot study found several thematic activities that complement adaptation and mitigation measures and are frequently linked to culture across policies. The data suggests that the various climate plans’ strategic vision progressively emphasises the importance of cultural assets for achieving sustainable climate action through nature.

Kohler and Rockman (2020)⁴² in their review of IPCC assessment reports revealed that although references to archaeology and traditional knowledge are limited, there has been some engagement with heritage related data (p. 632). Their review of the references to heritage (see Table 1) also demonstrated an evolution in the IPCC assessments from merely identifying cultural resources and traditional communities that are to be impacted, to recommending the use of traditional and archaeological data as part of solutions for climate action.

⁴² Information table is amended slightly from the original source found in The IPCC: A Primer for Archaeologists by Timothy Kohler and Marcy Rockman, 2020

Table 1. Reference to Cultural Heritage Data in IPCC Reports

Year	Report	Reference to Heritage Data
1990	Climate Change: The IPCC Assessment (or AR1 WGI)	None
	Climate Change: The IPCC Impacts Assessment (AR1 WGII)	Yes
	Climate Change: The IPCC Response Strategies (AR1 WGIII)	Yes
1992	Climate Change: The IPCC 1990 and 1992 Assessments IPCC First Assessment Report Overview and Policymaker Summaries and 1992 IPCC Supplement (AR1 Synthesis)	Yes
	Climate Change 1992: The Supplementary Report to the IPCC Scientific Assessment (WG1 Supplement)	No
	Climate Change 1992: The Supplementary Report to the IPCC Impacts Assessment (WGII Supplement)	Yes
1994	IPCC Technical Guidelines for Assessing Climate Change Impacts and Adaptations	No
1995	Climate Change 1995: The Science of Climate Change (AR2 WGI)	Yes
	Climate Change 1995: Impacts, Adaptations, and Mitigation of Climate Change: Scientific-Technical Analyses (AR2 WGII)	Yes
2001	Climate Change 2001: The Scientific Basis (WGI); Climate Change 2001: Impacts, Adaptation, and Vulnerability (WGII); Climate Change 2001: Synthesis Report	Yes

Table 1 (continued). Reference to cultural heritage data in IPCC Reports

Year	Report	Reference to Heritage
2007	Climate Change 2007: The Physical Science Basis (AR4WG I); Climate Change 2007: Impacts, Adaptation, and Vulnerability (AR4 WG II) Climate Change 2007: Synthesis Report (AR4 SYR)	Indigenous only
2013	Climate Change 2013: The Physical Science Basis (AR5 WGI)	Yes
2014	Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects (AR5 WG2A); Climate Change 2014: Impacts, Adaptation, and Vulnerability Part B: Regional Aspects (AR5 WG2B)	Yes
2018	Global Warming of 1.5°C (SP15)	Indigenous only
2019	IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems (SRCCL) The Ocean and Cryosphere in a Changing Climate	Indigenous only Yes
2023	AR6 Synthesis Report: Climate Change	Yes

Source: Kohler and Rockman (2020) in The IPCC: A Primer for archaeologist. Amended by author for AR6 (2023).

As a component of the data utilized as part of this individual research, National Communications to the UNFCCC were reviewed as being vital for “learning more about the climatic and climate-related vulnerabilities and adaptive capacity” (Robinson, 2018, p. 84) of reporting countries. These communications contain details on the climate change policies of countries, outline the adaptation efforts implemented or being implemented, and are regarded as official government publications and intent. Also included are governments’ comprehensive road maps to coordinate climate action. These systems are often top-down, are against the human-centred approach mentioned earlier in this Chapter and are created largely to integrate local settings with global climate goals. Governments outline in planning papers which actors and sectors oversee the various climate action measures, what is vulnerable to climate change and where resources and activities should be focused (Guzman & Daly, 2021, p. 4).

From the review of submissions of national contributions by the Anglophone Caribbean to the UNFCCC, cultural heritage is poorly referenced or included in these documents (see detailed table in Appendices). The sectors most often prioritized are tourism, coastal zone management, agriculture, etc. in keeping with the sectors that contribute to an island’s gross domestic product (GDP). This priority aligns with Robinson’s (2018) study of national adaptation actions, which, based on the author’s interviews with regional policymakers, highlighted that climate change adaptations were undertaken primarily in the water and agriculture sectors.

Nevertheless, these sectors do offer practical pathways for the integration of cultural data. In the keyword search undertaken for the word *tradition* in these documents, they most often referred to traditional sources of water, energy, and food crops. Cultural resources are often mentioned as being among those impacted by climate change and cultural practices related to fishing and farming. Traditional knowledge is bandied about often, mentioning permaculture, or the value in seeking to include traditional knowledge for adaptation purposes primarily in communicating climate change messages. The loss of access to coastal areas is also mentioned as impacting the culture of persons, particularly in the traditions and practices associated with the use of the sea or beaches in the Caribbean. When traditions are mentioned however, they are normally confined to how they are impacted and not on how they could specifically contribute to climate action.

These references to traditional knowledge or cultural heritage do not suggest that any serious interrogation has taken place in the actual uses for this type of data, such as in the case of Antigua and Barbuda, where water challenges are highlighted as part of its National Communications (NC3, 2016), but no reference to the historical water challenges and the water culture of using historic wells, dams or cisterns that emerged on both islands and are still being used today. Saint Kitts and Nevis (NC2, 2016) was the only country that in some way mentioned cultural heritage in referencing traditional construction techniques as an adaptation solution to climate change.

Although some national documents might contain limited references to climate change due to them being prepared when climate change was a relatively new buzz phrase, they nevertheless carry governments' actions in relation to meeting the sustainable development agenda which has a specific goal in relation to climate change. This means that at some point, national development documents will need to ensure alignment with the SDGs, thus presenting opportunities for cultural heritage in relation to climate action. As a global issue impacting development, climate change should be referenced in these national documents, and so they were also added to this document analysis. These documents were also reviewed to make inter-linkages between development, climate change, and cultural heritage.

National development documents are overarching documents that outline governments' prioritisation and strategy to achieve national development. They are sometimes known as Vision 2030 or Agenda 2030 documents in the Caribbean, as their timelines are intertwined with the United Nations' sustainable development goals timeline of 2030. In most cases, these documents speak broadly to the "improved health of the natural environment and sustained historical and cultural assets"⁴³ (Government of Antigua and Barbuda, 2015, p. 6) as one of its main pillars, often linked to tourism and the economic importance of this industry.

This review found that national documents often promoted the environment and culture as areas of convergence, yet, still, no indicators or targets were established for measuring this convergence or demonstrated a recognition of the transversal role of culture in environment or climate change

⁴³ Antigua and Barbuda's Medium Term Development Strategy (MTDS) 2016 – 2020 provides a roadmap to propel the country towards its development objectives.

issues, as well as cross-cutting for many other sectors. To illustrate this discussion, examples are provided in the upcoming paragraphs from the islands of Jamaica, Grenada and Dominica within the study area.

Jamaica's Vision 2030 National Development Plan (Planning Institute of Jamaica [PIOJ], 2009) is articulated on long-term goals and a national strategic framework that informs sectoral policies and programming for Jamaica. There are four long-term national goals: "Goal 1: Jamaicans are empowered to achieve their fullest potential; Goal 2: The Jamaican society is secure, cohesive, and just; Goal 3: Jamaica's economy is prosperous; and *Goal 4: Jamaica has a healthy natural environment*" (2009, p. xv). This final goal has specific outcomes that could be useful for developing and including cultural pathways.

Outcome thirteen (of Goal 4) speaks to the effective and proactive management of Jamaica's environmental and natural resources and sustainable environmental management as the basis for strong systems, while Outcome fourteen addresses the importance of a comprehensive, integrated approach to these issues in the broader context of "mainstreaming disaster management and climate change into socio-economic decision-making processes to include resilience to all forms of hazards, improving emergency response capability, and developing measures to adapt to climate change" (2009, p. xviii). The Goal's Outcome fifteen speaks to sustainable rural and urban development through creating "a comprehensive and efficient planning system and an appropriate framework for sustainability planning" (2009, p. xviii).

The following paragraphs include an assessment of synergies by reviewing sectoral plans for culture, agriculture, natural resources and the environment, and finally, land-use planning.

Under Jamaica's Vision 2030, there is a Culture, Creative Industries, and Values Sector Plan (2009 – 2030). No explicit connection is made between culture and the environment or climate change in this sector document. However, it acknowledges that culture has been "used positively to motivate community action and encourage persons to participate in nation-building to achieve sustainable development" (2009, p. 22) and "due to lack of a standardised methodology to quantify the impact of culture, policymakers have not had sufficient information to fully recognize the magnitude of the potential the country's culture can have in respect to growth, development

and wealth creation” and mentions explicitly “utilising cultural resources in social and economic development projects”. However, this could have broad meanings within the context of the region, culture, and the environment regarding care and preservation.

Established target actions related to Outcome 7.2 of the Culture Sector Plan include “an environment that protects and preserves Jamaican traditional and modern cultural expressions” and incorporates the “protection of archaeological and heritage sites in land use planning and development systems”. As part of this culture sector component of the national development plan, the potential impact of climate induced loss and damage on tangible and intangible heritage, through Indigenous knowledge central to Jamaica’s identity, is mentioned. In support of attaining a long-term climate resiliency strategy, it also mentions that it will pursue undertaking a comprehensive national inventory of cultural heritage sites and artefacts, vulnerability assessments, risk management plans, mitigation and adaptive measures for sites and artefacts, safeguarding traditional and Indigenous knowledge systems through close collaborations with Ministries and Indigenous communities to identify traditional knowledge and practices.

The Vision 2030 Jamaica Technical Secretariat is embedded within the institutional framework of the Planning Institute of Jamaica (agency responsible for sustainable development in Jamaica) and plays the lead role in coordinating implementation, analyzing data, consolidating sectoral information, maintaining liaison with sectoral focal points and establishing Thematic Working Groups. One such group is the Economic Development Committee, a committee of the Cabinet of the Government of Jamaica that reviews progress and emerging policy implications which could be for example, considering the transversal role of culture and climate change and national development planning and their interconnectedness.

According to the institutional arrangements outlined above, had actions been developed for the culture sector that integrate climate action, opportunities could have existed at the levels of the National Planning Council (NPS), which functioned as a consultative and advisory body for decision-makers in the government, private sector and civil society to accommodate discussions on the Vision 2030 sectoral plans.

The agriculture sector presents one of the best opportunities or entry points to promote the merging of cultural data in climate action practices and strategies. Jamaica's agriculture sector plan⁴⁴ mentions the application of international best practices, but no connection to its own local knowledge. This is despite the numerous studies which have been undertaken in the use of traditional and local knowledge to manage environmental issues in farming by Jamaican researchers (see Beckford & Barker, 2007; Gamble et al., 2010).

A Centre of Excellence for Advance Technology in Agriculture is mentioned as important to carrying out training and coordinating research undertaken by other groups. Although hydroponics is mentioned as one successful water management strategy to be adapted for use outside of seasonal rainfall periods (2009, p. 27), no traditional water management strategies are mentioned, such as may have been practiced by farmers in one of the driest areas of Jamaica yet known as the island's 'breadbasket' in southern Saint Elizabeth parish. Jamaica's Third National Communication (2018, p. 11) however highlighted that farmers in this area of the parish implemented traditional adaptation strategies of managing frequent droughts by proactively introducing a variety of planting methods, employing a range of moisture loss reduction techniques, sacrificing a part of the growing crop in order to enhance survival of the remainder; and various recovery strategies utilized in the past. The agriculture sector plan also mentions new approaches to agricultural research and development but mention only those which focus solely on modernization of the sector as the only solution to climate impacts being experienced.

National agri-environmental programmes are useful entry points due to them promoting for example, sustainable farming practices while working to conserve biodiversity and the natural landscape and its historical features, leading to numerous positive environmental consequences, such as increased soil fertility, carbon sequestration, enhanced water availability, and soil conservation, which can result from these programmes. Delving into the various initiatives which fall under agriculture such as training programmes, organic agricultural policies make it evident that there are enough opportunities for local and Indigenous knowledge, where present, to be investigated, documented in collaboration with knowledge bearers, and operationalised with their

⁴⁴ <https://www.vision2030.gov.jm/vision-2030-jamaica-sector-plans/>

guidance. Regional educational institutions such as the School of Agriculture at the University of the West Indies St. Augustine Campus provide a possible avenue for programming and policy development where students are a part of an educational platform or framework that seeks to solve the issues of the local and regional environment.

Further areas recommended for more focused initiatives in the agriculture sector's action plan include creating networks to spread knowledge about best practices concerning the environment, bolstering collaboration between the public and different actors in the private sector, driving research and academia while anticipating emerging environmental trends for the agricultural sector. Additionally, it involves strengthening farm hazard mitigation measures, such as promoting the installation and provision of wind barriers to protect crops and harvesting and storing crops before the start of the hurricane season, all practices documented as being used by Indigenous communities in the region.

The Natural Resources and Environmental Management and Hazard Risk Reduction and Climate Change Sectoral Plan⁴⁵ speaks to inadequate incorporation of environmental issues into sectoral policies and “relevant agencies do not buy into integrated approaches to environmental management, despite the interdependence between the Jamaican economy and the natural environment” (2009, p. 6). Taken a step further, this interdependence could be defined as a cultural environment or cultural landscape, and there is an unacknowledged tendency to undervalue such cultural data and capital. In its action plan however, it mentions adopting an ecosystems-management approach which includes conducting “ecological, economic, and sociological surveys to provide information, *including Indigenous knowledge* to guide integrated ecosystem management planning and implementation as a key action” (2009, p. 6).

⁴⁵ <https://www.vision2030.gov.jm/vision-2030-jamaica-sector-plans/>

The sector plan also includes facilitating access to biological resources for benefit sharing which includes actions that:

“Protect traditional knowledge and create a traditional knowledge register or library; integrate biodiversity, natural and cultural heritage concerns in all relevant sectors; develop a sustainable community development action plan to guide community engagement in natural resources management; collaborate with industry through a defined framework for the involvement of industry as a partner for solving environmental problems; create mechanisms at the national level and in decision making process to ensure environmental issues are infused in developmental objectives and investment processes (strategies); create mechanisms to enable all government policies and plans fully consider the implementation of climate change; adopt best practices for climate change adaptation through developing sector specific action plans to assist with the mitigation and adaptation of climate change for all sectors” (p. 53,59).

Unlike much of the wider study area, Jamaica has robust policy frameworks governing development and climate change policy. The various policies that form this framework provide an overview of Jamaica's key issues concerning climate change and development, with stated commitments to align sustainable development, through its Vision 2030 document, with the United Nations (UN) Sustainable Development Goals (SDGs). Climate policy is broadly governed by the Climate Change Policy Framework, which sets out roles, responsibilities, and objectives.

In Jamaica, the government approved the island's first Climate Change Policy Framework (CCPF) in 2015 and updated it in 2021 to include the country's obligations as a Party to the Paris Agreement. Jamaica's updated CCPF is also intended to support the goals and outcomes of Vision 2030 (PIOJ, 2009), which promotes consideration of a multi-sectoral approach to addressing climate change through monitoring, knowledge sharing and cooperation among sectors (University of the West Indies, 2022) and utilizing the best available science. Jamaica's Nationally Determined Contributions (NDC) predominantly focus on the energy and land-use change and forestry sectors and seeks to include agriculture and waste but not having quantitative measurements.

The mention of this lack of quantitative measurements would currently pose a challenge for the culture sector with relevant cultural data being more qualitative; however, examples could be drawn from the United States' national climate assessment report (NCA) in which cultural data is

included in significant ways that are not only quantitative. In the development of Jamaica's CCPPF, the culture sector (through the Ministry of Culture) was invited to be a part of the climate change focal point network and the multistakeholder committee for the development of its long-term strategy in relation to low-carbon emissions and climate resiliency. The realized benefits from culture's inclusion in this network are not clearly articulated or well defined yet, however this is likely due to varying issues which will be highlighted in later discussions.

Jamaica's climate change policy framework aims to foster a *culture* whereby citizens are encouraged to be active participants and engage in climate action at all scales. In other words, a bottom-up approach but not fully integrating cultural knowledge and practices. This could be achieved through an approach that prioritizes cultural data which would ensure that strategies are bottom-up instead of top-down. This will include providing citizens with the opportunity to voice concerns, exchange views, contribute ideas, provide feedback, and take ownership of climate action projects being implemented. The policy framework further indicates that the government will further public participation and discourse by establishing platforms for public dialogues, consultations, and invest in community-led initiatives while incentivising through recognition, leading climate champions in the Jamaican community. There will be a special focus on engagements with marginalized groups and vulnerable communities. Although this approach of fostering a culture where islanders are encouraged to be active participants, these documents nevertheless have a top-down approach instead of a grass roots one, as the same persons that are described as central to the plan are poorly reflected in the development of this framework. The development of which would provide excellent entry points for Indigenous and local communities to have a better seat at the table and in the development of these documents.

This is similar to the discussion approach presented earlier in this chapter, which speaks to the inclusion of Indigenous knowledge and consultation with Indigenous communities regarding climate action, when they were not included in any meaningful ways in the steps leading up to adaptation (such as a discussion of the issue and mitigation), but suddenly their knowledge and practices were relevant to the adaptation discourse.

On the island of Grenada, the government has sought to integrate climate change adaptation policies and actions through its various national and sector plans that focus on development. At the programming level, projects and actions such as environmental impact assessments have also served this purpose. Its National Sustainable Development Plan 2020 - 2035 (Government of Grenada National Plan Secretariat, 2019) specifically mentions the protection of its cultural and heritage assets throughout the document and specifies that all threats should be identified, and measures taken to prevent or mitigate negative impacts. It also mentions the use of traditional knowledge and a Climate Smart Cities Programme which includes the preservation of heritage sites and addressing sea-level rise adaptation measures in these areas (2019, p. 89). Under this component, projects are mentioned in relation to dealing with preparation for sea-level rise in historic areas such as the Carenage, and community-based ecosystem restoration.

Its Aligned National Action Programme (Ministry of Agriculture, 2015) has pursued an integrated approach in relation to land degradation and drought mitigation. Here, traditional knowledge is mentioned in relation to improving capacity for data and information management and knowledge sharing systems, as well as in involving community members to prevent and mitigate degradation of land resources. Adaptation integrations were made for various national plans related to agriculture, growth and poverty reduction, and the island's coastal zone policy. In tandem with these actions, capacity-building activities have also been launched which focus on ways to integrate climate change adaptation at the various levels of planning, policy and programming and targeting state and non-state actors. There is however no indication that cultural considerations were factored in these actions.

The Commonwealth of Dominica (or Dominica throughout this research) is included as an island with a significant number of persons identifying as Indigenous. The Government of Dominica has articulated its vision of Dominica being the first climate resilient nation⁴⁶ following the passage of the catastrophic Category Five Hurricane Maria in 2017. Since then, the island has in 2018

⁴⁶ Prime Minister Roosevelt Skerrit at the United Nations General Assembly, September 2017 (Four days after the passage of the catastrophic Category Five Hurricane Maria)

developed its National Resilience Development Strategy (NRDS) – Dominica 2030,⁴⁷ and passed its Climate Resilience Act⁴⁸ that established the Climate Resilience Execution Agency (CREAD), and finally, its Dominica Climate Resilience and Recovery Plan (CRRP, 2020)⁴⁹. In its CRRP, six results areas are defined which speak to having resilient communities and leveraging its natural heritage to “maintain a pristine environment and using it to support a resilience agenda” (2020, p. ii) and “recognizing the value of its culture, history and knowledge of resilience gained through recent (*not past*) events” (2020, p. ii). In this document, the Indigenous Kalinago community is described when referring to Hurricane Maria and offsetting “further social and environmental impacts on an already vulnerable population” (2020, p. 42). No specific references are made in relation to the resilience of this portion of the population in managing severe environmental change over time.

Under the heading of the Kalinago Territory Development Strategy, the CRRP speaks to the need to develop “a climate and gender sensitive Kalinago Territory Development Plan that includes capacity building for the community and the Council, and a community engagement strategy...and there also needs to be training in climate resilient and disaster risk reduction measures, along with the establishment of sustainable and climate resilient agricultural practices” (CRRP, 2020, p. 42). The document does not suggest discourse beyond a vulnerability narrative to one in which knowledge-exchange is promoted as a platform to learn from the community regarding existing knowledge from dealing with a history of environmental instability within the Dominican landscape. Neither are these mentioned in the established outcomes for this section or throughout the document.

Finally, in its Section Ten (CRRP, 2020, p. 88), a museum-hurricane experience is presented and highlighted as documenting the island’s indomitable nature from the time of the Kalinago to the present time where resilience stories are to be developed and promoted in order to become a

⁴⁷ National Resilience Development Strategy Dominica 2030. Accessed at: <https://observatorioplanificacion.cepal.org/sites/default/files/plan/files/Dominica%202030The%20National%20Resilience%20Development%20Strategy.pdf>

⁴⁸ Dominica Climate Resilience Act, 2018. Accessed at: https://climate-laws.org/documents/climate-resilience-act-2018_e4ce?id=climate-resilience-act-2018_5552

⁴⁹ Dominica Climate Resilience and Recovery Plan 2020 – 2030. Accessed at: https://climate-laws.org/documents/dominica-climate-resilience-and-recovery-plan-2020-2030_bda0?id=dominica-climate-resilience-and-recovery-plan-2020-2030_e34a

repository of Dominica's resilience journey. The aims of this activity mention providing an immersive emotional simulation, showing footage of areas devastated by Hurricane Maria as a tourism focus, demonstrating the impact and highlighting what Dominica is doing to address impact. This is perhaps another missed opportunity to highlight and integrate the traditional knowledge of the Kalinago as a source of their indomitable spirit and for future resilience. This component, however, represents the best option to integrate cultural data and would benefit from collaborations or co-design with local communities, their knowledge and practices.

Saint Vincent and the Grenadines National Economic and Social Development Plan (2013 – 2025)⁵⁰ is guided by five goals of which Goals Four and Five, “improving physical infrastructure, preserving the environment, and building resilience to climate change and building national pride, identity and culture” (2013, p. 53) provide the most likely opportunities for linkages under the economic, social, governance, and infrastructural and environmental sectors. Climate change is referenced throughout the document and a need for building resilience. In particular, the document mentions the need to take actions to protect its coastal areas.

National Adaptation Plans are documents which “identify climate change adaptation needs, options, and priorities” (Daly et al., 2022, p. 1429) and like National Communications, are also submitted to the United Nations Framework Convention on Climate Change. These plans infrequently make any reference to cultural heritage although there exists important avenues for this integration to take place.

In their 2022 study, Daly et al. set out to highlight whether and the extent to which select national adaptation plans referenced culture and heritage. The countries from which these plans originated were defined as Lower Middle-Income Countries (LMIC). These references, as highlighted by Daly et al. (2022), have been included as an illustration of how cultural heritage can be included in these documents.

Seventeen countries referenced cultural heritage. Albania mentions cultural heritage preservation concerning tourism; Brazil's heritage is referenced in relation to how archaeological sites and

⁵⁰ <https://observatorioplanificacion.cepal.org/sites/default/files/plan/files/SanVicenteylasgranadinascompleto.pdf>

Indigenous lands might be impacted by climate-induced hazards and includes a section focusing on Indigenous knowledge, while Cameroon's plan stressed the importance of diversification in its tourism sector through making the connection between its heritage and tourism, which should also include its Indigenous knowledge.

Cambodia includes its cultural heritage as part of its ecosystem and specifies that resilience is needed in these areas, which are “closely linked to community-based and ecosystem-based solutions, and ecotourism” (2022, p. 1430). Colombia mentions that “areas of archaeological importance and physical and intangible heritage should be considered in relation to impacts”; while Guatemala mentions its heritage “in connection with tourism, and the constitutional responsibility to protect the natural and cultural heritage of the nation and traditional land use and management of natural resources” (2022, p. 1430).

South Sudan mentions “intangible cultural heritage as both an asset and a barrier to climate change adaptation, and the development of tourism as linked to cultural heritage is included as an opportunity” (2022, p. 1430); Sri Lanka mentions undertaking vulnerability assessments for cultural and archaeological assets under its actions for building the adaptive capacities of communities, and has planned actions to develop collaborative strategies with the department of archaeology, as well as using “traditional knowledge systems on climate and Indigenous forecasting in developing participatory community-based adaptation programmes” (2022, p. 1430). Suriname identifies “adaptation that respects its society and culture and reduces gender and social inequities, including the use of traditional cultural knowledge and integration of Indigenous groups” (2022, p. 1431).

Timor Leste mentions the “use of a unique cultural tradition *Tara Bandu*, a traditional law emphasised as a community-led climate change adaptation solution. Cultural heritage is also mentioned concerning tourism development.” Kuwait highlights a “coastal climate change vulnerability index which aims to include consideration of cultural heritage assets, but the lack of data is mentioned as a problem” (2022, p. 1430); Nepal's plan speaks to its “tourism, cultural, and natural heritage as one priority area, with specific actions to identify and conserve heritage at risk of damage, including archaeology, and to promote archaeological tourism as an economic

development opportunity” (2022, p. 1430). Palestine includes “actions for cultural heritage concerning the tourism sector and vulnerability of cultural heritage, including archaeology to climate extremes such as flooding, the existing condition of cultural heritage to include legal protections, and ongoing conflict which prevents the implementation of adaptation actions” (2022, p. 1430); Paraguay mentions utilizing “traditional and historic cultural knowledge to design buildings” and Peru’s heritage is mentioned in relation to “cultural diversity, traditions, and Indigenous knowledge and the need for equity and inclusion” (2022, p. 1430).

Finally, as the two small islands in the group, Saint Lucia includes “under the loss and damage mechanism, examples of non-economic losses to include Indigenous knowledge, cultural heritage, sense of place, and social cohesion” and Kiribati indicates that “maintaining the sovereignty and unique identity and cultural heritage of Kiribati is one of twelve core strategies under its joint implementation Plan for Climate Change and Disaster Risk Management and includes actions under this heading related to traditional cultural knowledge” (2022, p. 1430).

Wider afield, the United States’ National Climate Assessment Four (NCA4, 2018) most fully recognized culture and heritage in its climate response and includes extensive references to how climate change impacted Indigenous communities, and the strategies developed using their traditional knowledge. This presents one of the most detailed references to culture in a climate assessment report. More recently, its National Climate Assessment Five (NCA5, 2023, p. 54) also highlights that “many deeply ingrained community bonds, pastimes, traditional knowledge, and cultural or spiritual connections to place are at risk when climate change alters landscapes and ecosystems, and impacts on natural ecosystems and the built environment pose a hazard to cultural heritage”, which includes structures, monuments, ways of life, and customs. Damage to historical, cultural, and archaeological sites also lessens the chance of passing on crucial information and cultural identity and memory to next generations. Incorporating local values, Indigenous knowledge, and equality into architecture and planning can help reassert a community’s connection to place, improve social networks, and create new traditions. Cultural heritage can also play a significant part in climate solutions (NCA5, p. 54, 55).

The Kingdom of Lesotho presents a useful example of how culture could be integrated. Its National Climate Change Policy 2017 – 2027⁵¹ has a specific policy statement (Number thirteen) in relation to enhancing “the resilience of natural and cultural heritage, Lesotho’s flora and fauna, the picturesque nature of the land, the fossils in the rocks; rock paintings; the Basotho customs; traditions; crafts; implements; music dances; historical monuments and buildings; are all part of the national heritage which gives Basotho a unique character, pride and identity as a nation. They also encapsulate aesthetic; historical; scientific and economic value which should be sustainably harnessed to ensure that the resources are bequeathed unto future generations.”

The Policy also adds that their “heritage has enabled communities to develop and survive over centuries by mastering the ability to adapt to their natural environment, especially to varying weather and extreme climatic conditions particularly in hot and cold seasons. While Lesotho’s heritage is already threatened by a myriad of challenges, climate change is projected to exacerbate the magnitude of these challenges. This will change the way people relate to and interact with their environment thereby further increasing the vulnerability of communities to climate change. Threats posed by climate change justify the need to implement appropriately tailored measures to particularly increase resilience of heritage resources and communities hence fortifying the cultural fibre of the nation”. Under this policy, a critical component is “*recognizing that cultural heritage is not only an important pillar of sustainable development but can also play a critical role in advancing adaptive capacity of rural communities in Lesotho*” (2017, p.29). However, key challenges are also identified as “lack of the necessary mechanisms to safeguard cultural artefacts and other heritage resources against climate change impacts, lack of integration of climate change into cultural and Indigenous knowledge, constraints in cultural education and practices due to deteriorated natural heritage as a result of climate change i.e. extinct plant species etc., and a resistance in acknowledging culture as contributing to climate-induced change due to cultural and religious beliefs” (2017, p.29).

⁵¹ Kingdom of Lesotho National Climate Change Policy 2017 – 2027. Accessed at: https://climate-laws.org/documents/national-climate-change-policy-2017-2027_33ee?id=national-climate-change-policy-2017-2027_f7e2

In relation to its policy statement on enhancing the resilience of Lesotho’s natural and cultural heritage, its main climate policy objectives are to “preserve and maintain local Indigenous knowledge and community practices in environmental management in relation to building national resilience to climate change; promote climate change mainstreaming and capacity-building in culture at all levels of development of a dynamic cultural and creative sector, specifically also increasing creativity, innovation and entrepreneurship” (2017, p.29).

As such, its main policy actions are to:

“integrate climate change into cultural heritage and policy frameworks for sustainable development; promote climate change knowledge sharing on best practices, in research, communication, education and training, capacity building and networking; preserve and document local indigenous knowledge and community practices in building national resilience to climate change; promote biodiversity conservation; and finally, harmonise science, culture and Indigenous knowledge on issues of climate change” (Kingdom of Lesotho, 2017 p.30).

Many of the islands of the Anglophone Caribbean do not currently have national adaptation plans or they are in varying stages of development. An outline of the status of national adaptation plans across the study area is provided in Table 2. Islands with existing plans⁵² include Grenada (2017 – 2021), Saint Lucia (2018 – 2028), and Saint Vincent and the Grenadines (2018 – 2030). Jamaica’s National Adaptation Plan is stated as being in process through the support of the Green Climate Fund and will comprise adaptation plans for relevant sectors. It is unclear if the culture sector will be included as a standalone sector or mainstreamed throughout other sectors as a cross-cutting or transversal theme or issue.

⁵² Based on submissions made to the UNFCCC up to 22 September 2023

Table 2. References to Cultural Heritage in Caribbean National Adaptation Plans

Island	Period	References to Cultural Heritage in National Adaptation Plans
Grenada ⁵³	2017 - 2021	Technical agriculture officers trained in sustainable agriculture and permaculture; rainwater harvesting is the standard traditional practice for water supply on Carriacou and Petite Martinique; “adapt traditional pest management techniques and improve farmers’ knowledge of them; document traditional knowledge and anecdotal information on climate-related impacts to supplement gaps in the data; Grenada’s 2014 – 2018 growth and poverty reduction strategy” mentions Indigenous knowledge as one area driving this new economy (2017, p. 16)
Saint Lucia ⁵⁴	2018 - 2028	Saint Lucia’s NAP covers “ <i>eight prioritised sectors: water, agriculture, fisheries, infrastructure and spatial planning, natural resource management (terrestrial, coastal, and marine), education, health and tourism</i> ”, and sectoral adaptation plan developed for tourism, water, agriculture, and fisheries. Loss of tours and excursions listed as an impact from climate change and the loss of ecosystems resulting in reduced visitors for eco-tourism, ‘sites’ may be impacted by vectors; under promoting climate resilient crop production - strengthen implementation of good agricultural practices such as permaculture; cultural norms recognized as influencing choice and implementation of adaptation measures; “ <i>Indigenous knowledge and cultural heritage and sense of place and social cohesion</i> ” listed among non-economic losses; loss of culturally and spiritually important landscapes listed as potential loss and damage for the island (2018, p. 128); loss of cultural traditions in relation to potential climate change impacts on fisheries and aquaculture; disruption to cultural activities; Climate Change Adaptation Policy

⁵³ https://www4.unfccc.int/sites/NAPC/Documents/Parties/Grenada_National%20Adaptation%20Plan_%202017-2021.pdf

⁵⁴ <https://www4.unfccc.int/sites/NAPC/Documents/Parties/SLU-NAP-May-2018.pdf>

(2015) mentions that adaptation measures will be supported by existing data sets and traditional knowledge; “*decreased reliability of traditional planting and harvesting schedules based on weather patterns impact*” to agriculture; Indigenous treatments used for pests; Indigenous trees for habitat restoration (2018, p. 77,79)

Saint Vincent
and the
Grenadines⁵⁵

2018 - 2030

Older farmers still utilise their traditional knowledge; traditional knowledge should be used as part of communications tailored to the local context. Saint Vincent and the Grenadines (SVG) National Adaptation Plan mentions using traditional knowledge as a valid entry point to engage audiences regarding climate change as it tailors it to the local context. SVG’s Second National Communication to the UNFCCC (2016) does not explicitly mention cultural heritage or cultural resources when discussing climate change. It mentions, however, that “to adequately address climate change, one needs to go beyond mitigation” and traditional knowledge was used as a vehicle in undertaking vulnerability and adaptability assessment of its five selected sectors (agriculture, coastal zone, health, water, and tourism). Regarding traditional knowledge, only the planting season is referenced.

Source: Compiled by Author.

⁵⁵ Government of St. Vincent and the Grenadines. 2019. National Adaptation Plan. https://www4.unfccc.int/sites/NAPC/Documents/Parties/FINAL%20NAP_SVG_Approved.pdf

The Saint Vincent and the Grenadines National Adaptation Plan⁵⁶ offers a robust opportunity to integrate its upcoming Climate Change Policy and Implementation Strategy into the mainstreaming of climate action, planning and budgeting. The Plan is marketed as the medium- to long-term adaptation component of SVG's Nationally Determined Contribution (NDC), helping to fulfil the goals of the SDGs, the Sendai Framework on Disaster Risk Reduction (SFDRR), the island's own development agenda, and other United Nations frameworks and conventions.

SVGs national adaptation plan mentions using traditional knowledge as a practical entry point to engage audiences regarding climate change as it tailors it to the local context (SVG, 2013, p. 56). The island's Second National Communication to the UNFCCC (2016) does not explicitly mention cultural heritage or cultural resources when discussing climate change. It mentions, however, that “to adequately address climate change, one needs to go beyond mitigation” and traditional knowledge was suggested as a vehicle in undertaking vulnerability and adaptability assessment of its five selected sectors (agriculture, coastal zone, health, water, and tourism). However, when talking about traditional knowledge, only the planting season is specifically referenced.

Grenada presents another interesting study through its Climate Change National Adaptation Plan (NAP), which speaks to “ensuring alignment with ongoing processes such as the development of Grenada's National Communication and the National Sustainable Development Plan 2030”⁵⁷ (2017, p. 6) and its multi-sectoral programmes of action. The goals of the Grenada national adaptation plan process include “not pursuing a short-term approach in dealing with climate change vulnerability and integrating climate change adaptation coherently into relevant new and existing policies, programmes, and activities, in particular, development planning processes and strategies within all relevant sectors and at different levels, as appropriate” (See Footnote 57).

Since 2014, the government of Grenada through its Economic and Technical Cooperation Division has begun collating mitigation and adaptation related data for integration into policies, programmes and plans, highlighting that while it was essential to “implement stand-alone measures to address negative climate impacts and reduce risks, the systematic inclusion of

⁵⁶ National Adaptation Plan for St. Vincent and the Grenadines (page 56)
https://www4.unfccc.int/sites/NAPC/Documents/Parties/FINAL%20NAP_SVG_Approved.pdf

⁵⁷ National Climate Change Adaptation Plan (NAP) for Grenada, Carriacou and Petite Martinique 2017 - 2021

adaptation considerations in planning and decision-making processes provides a means to anticipate and identify risks across an economy, society, or system over time” (2017, p. 30).

Integration, also known as mainstreaming, is a crucial part of resilience building and adaptation planning that employs a sustained strategy and coherence across sectors, documents, policy and programming. Policy guidelines focused on climate action support the entry point idea, which holds that systematic adaptation integration can occur at many stages and levels of planning and decision-making. There is no set list of the best places to start when integrating climate action; instead, there are a lot of possible entry points. Integration can take place, for instance, in several decision-making domains and at the national, sub-national, sectoral, or project levels. Ramsay (2013, p. 16) points out that small islands often “have policies and action plans aimed at coastal zone management, protection of forested areas and the establishment of parks and protected areas, sustainable tourism, hazard mitigation, and sustainable uses of land resources” and so this research posits that these are excellent points of entry for cultural data.

The SOCC Report (CSGM, 2020) has been instrumental in guiding the region to develop actions that improve resilience across islands and sectors, building awareness of climate change, using available data to assess the effects of climate variability, and integrating climate data into development planning and strategies. As highlighted, the SOCC does not include the cultural sector (as it does with other sectors) – a continuing trend with, for example, culture’s ongoing exclusion from national disaster planning. As articulated, this exclusion emanates from two perspectives, a myopic view of the relevance or importance of the culture sector to national development and the limited data that exists for or stems from the sector, which results in nuanced references to culture instead of statements anchored in generated sector data.

While some national development plans or documents are aligned with the sustainable development goals and contain climate change and cultural heritage as separate themes or goals, there is no intersection, again dismissing the transversal nature of cultural heritage. So, the point of entrance most used for culture continues through the tourism sub-component, which as previously stated, is significant to the economies of the region.

This research also extended its analysis to include a review of planning policies, coastal zone management, and land use plans or strategies, that have the potential for significant intersections with heritage in the Caribbean (see Tables 3 and 4). These documents benefit from more frequent updating, presenting opportunities to better integrate contemporary research and terminologies, resulting in a higher likelihood of intersections between climate change and cultural heritage. No reference exists for St. Kitts and Nevis nor St. Lucia and hence these islands have been excluded in Table 3.

Barbados' Town and Country Planning Act, Cap 240 was replaced by its Planning and Development Act, 2019 and represents one of the most comprehensive planning tools in the region mentioning cultural heritage, specifically the protection of cultural and natural heritage in its Chapter Six. Its Physical Development Plan Amendment⁵⁸ (2023) “provides a vision for the sustainable growth and development of the island by setting out policies to guide relationships among land use, built form, natural heritage, cultural heritage, mobility and national infrastructure” (2023, p. 2). It was reviewed as one of the more recent physical development plans in the study area. The Plan lists addressing the climate crisis as one of its overarching goals emerging since its previous 2003 plan. The Plan, in referring to cultural heritage is heavily biased in favour of tangible heritage (aligned to the authorised heritage discourse discussed), and so it was specifically reviewed for other important components. Specific principles of the Plan include:

“a nation in which resilient, sustainable economic and physical growth are balanced with conservation and restoration of irreplaceable resources, rural working landscapes, cultural heritage and natural heritage and the adoption of adaptive planning approaches in all aspects of national and sectoral planning for the consideration of climate variability and climate crisis impacts” (2023, p. 6).

⁵⁸ Barbados Physical Development Plan Amendment (2023). Accessed at: <http://www.townplanning.gov.bb/pdp/Downloads/files/PDP-August-2023.pdf>

Table 3. Select Planning Related Policies and References to Culture and Climate Change

Island/ Name and Type of Document	Reference to Culture in Relation to Climate Change
Antigua and Barbuda	
Sustainable Island Resource Management and Zoning Plan (SIRMZP) 2011	No specific reference to cultural heritage in relation to climate change or disaster risk management. The SIRMZP was prepared with the overarching objective of providing a strategic framework to address development issues. The Plan serves as the country's roadmap to sustainable physical development, providing a framework for the protection of critical ecosystem services to minimise environmental risks, while also advocating for sustainable development of sectors in support of economic growth. The linkage with disaster risk is evident, both directly and indirectly within the Plan which acknowledges that disasters can hinder growth.
Physical Planning Act (2003)	The Physical Planning Act (2003) makes provisions for physical development in Antigua and Barbuda to “preserve and improve the quality of the physical environment” (2003, p. 4.13). It lists tangible heritage as a purpose.
Barbados	
Physical Development Plan (PDP) Planning Act 2019 (replaces Town and Country Act) Integrated Coastal Zone Management Plan (2020 – 2030)	There is a chapter on culture and heritage with specific actions in relation to climate change to include undertaking assessments of cultural resources in relation to climate change Section on culture and heritage but no intersections with climate change The Coastal Zone Management Act has provisions for protecting coastal resources, including wrecks and other items of archaeological and historical importance. Not mentioned in reference to climate change

Table 3 (continued). Select Planning Related Policies and References to Culture and Climate Change

Grenada	
Aligned National Action Programme for Grenada's Commitment under the UN Convention to Combat Desertification and Drought (2015).	Suggested interventions include “integration of traditional knowledge in land degradation actions; actively engage stakeholders to rehabilitate degraded lands using culturally appropriate management practices” (2015, p. 57).
National Physical Development Plan National Climate Policy 2017 ⁵⁹	No reference to cultural heritage, traditional or Indigenous knowledge; mentions that citizens and civil-society organizations possess knowledge about potential climate vulnerabilities/risks.
Jamaica	
National Physical Plan	Plan is outdated, the last being for the period 1970 – 1998. Does not reference cultural heritage, traditional or Indigenous knowledge.
Coastal Zone Management Policy ⁶⁰	Its Action Plan includes institutionalizing the role of traditional ecological knowledge in decision-making; includes activities on preserving cultural and archaeological sites as part of coastal management; mentions the recognition of special environmental roles played by Indigenous people in projects to be implemented

⁵⁹ Grenada National Climate Change Policy www4.unfccc.int/sites/NAPC/Documents/Parties/Grenada_National%20Climate%20Change%20Policy%202017-2021.pdf

⁶⁰ Towards Ocean and Coastal Zone Management Policy in Jamaica (2002). Accessed at: <https://faolex.fao.org/docs/pdf/jam175483.pdf>

Table 3 (continued). Select Planning Related Policies and References to Culture and Climate Change

The Bahamas Climate Resilient Coastal Management and Infrastructure Programme (or Integrated Coastal Zone Management Project)	Integrated Coastal Zone Management Project plans to use traditional and nature-based solutions to build coastal resilience at several sites throughout The Bahamas. Will focus on ecosystem restoration and the management of sites.
Trinidad and Tobago (TTO) National Spatial Development Strategy (2013 – 2023) ⁶¹	Outdated 1984 National Physical Development Plan and Spatial Development Strategy. Vision that by 2033 TTO will be “a nation where people enjoy a high quality of life within a safe, healthy, inclusive and sustainable physical, socio-economic and cultural environment” (2013, p. 15). Mentions TTO’s cultural distinctiveness contributes to quality of life and heritage tourism, and cultural heritage should be included in decision-making (2013:19). Section on Valuing Cultural Heritage and Living Culture (2013:41) under its priority of Strong and Resilient Communities. Regarding climate change, adapt ways in which persons live and build to maximise resilience (2013, p. 19)

⁶¹ National Spatial Development Strategy of Trinidad and Tobago. Accessed at: https://www.planning.gov.tt/OurTnTOurFuture/documents/Core_Strategy_Regional_Guidance_web.pdf

Table 4. All Non-Culture Documents Reviewed

Island	Name and Type of Document
Antigua and Barbuda	Sustainable Island Resource Management and Zoning Plan (SIRMZP) 2011; National Contribution (2016); Physical Planning Act 2003
Barbados	Physical Development Plan (PDP) Amended 2023; Planning and Development Act 2019; Integrated Coastal Zone Management Plan 2020 - 2030; National Contribution (2018)
Dominica	Dominica Climate Resilience and Recovery Plan (CRRP); National Contribution (2020)
Grenada	Aligned National Action Programme for Grenada's Commitment under the UN Convention to Combat Desertification and Drought (2015); National Physical Development Plan 2003 - 2021; National Sustainable Development Plan 2020 - 2035; National Adaptation Plan 2017 - 2021; National Contribution (2019); National Climate Change Policy for Grenada, Carriacou and Petite Martinique (2017 – 2021)
Jamaica	Vision 2030; National Contribution (2020)
Saint Kitts and Nevis	National Contribution 2016
Saint Lucia	National Contribution (2017); National Adaptation Plan 2018 – 2028
Saint Vincent and the Grenadines	National Economic and Social Development Plan (2013 - 2025); National Adaptation Plan 2018 - 2030; National Contributions (2016)
The Bahamas	National Contribution (2015); Climate Resilient Coastal Management and Infrastructure Programme
Trinidad and Tobago	National Contribution (2021); Physical Development Plan; Coastal Zone Management Plan; Vision 2030: The National Developmental Strategy of Trinidad and Tobago 2016 - 2030

Source: Compiled by Author

For the Barbados PDP, cultural heritage was listed as a core asset in relation to the worsening climate crisis (2023, p. 33). It specifically mentions the application of community-based strategies to support climate crisis resilience. Climate actions being undertaken in each area should

understand “historical and future projections for coastal and shoreline change” (2023, p. 54). In relation to climate change and cultural heritage, it includes:

“the government will develop protocols to coordinate actions to be taken by the Director of Planning and Development or designate in situations where cultural heritage assets are threatened by the impacts of the climate crisis; conduct a climate crisis risk analysis to characterize the multi-hazard vulnerabilities (exposure and susceptibility) and attributes of natural hazard/climate crisis risks (intensity, duration, frequency, timing, seasonality, spatial extent) for individual cultural heritage assets and attributes; and develop location and asset specific climate crisis adaptation measures to respond to potential natural hazards and climate crisis impacts” (2023, p. 71).

Barbados recognizes that due to the importance of its coastal areas, integrated coastal zone management should be pursued. This adopts an approach that considers synergies with other areas geared towards holistically dealing with the coastal environment while resolving problems associated with coastal use. The Physical Development Plan further states the need to understand “historical and future projections for coastal and shoreline change” which provides an opportunity for intersections in planning, policy and programming with coastal zone management, archaeology and traditional knowledge systems relevant to the coastline, such as through Barbados’ traditional fishing villages and use of coastal areas to include beaches.

Situating Climate Change within Culture Frameworks

A review of how the culture sector integrates climate change into its policies, planning, and programmes is critical to fully capturing how climate action could be fully embedded within the various cultural heritage frameworks in the study area. This is examined from the perspective of heritage legislation, policies, and management and conservation plans of heritage sites to include world heritage properties in the region (see Appendix II).

Due to the application of cultural data in climate action still being relatively new, limited and understudied in the Caribbean, its use ranges from non-existent for some islands, purely theoretical or abstract (on paper and without application), to tentatively being used.

Fatorić and Biesbroek (2020) acknowledge that intersections between climate change adaptation policies and cultural heritage are increasing in the literature. The literature review for this research suggests that globally, countries where specific actions are being implemented tend to be predominantly those with Indigenous populations and range in use from ecosystem management to weather-forecasting, disaster risk management and climate change adaptation. However, merely saying we wish to use cultural data, does not make it so, and it instead requires more focused work and a process of developing methodologies and good practices for not only engaging with those that are the owners, bearers and practitioners of this knowledge, but determining what this data would look like and how it could be used. All these are required before the use of cultural data attains its full or even partial utilisation.

It is essential to consider that cultural heritage and its tangible and intangible components and landscapes, while displaying vulnerability in many instances, were not, until in recent years, considered part of the discourse on climate change vulnerability or adaptation. Although, as suggested by Harvey and Perry (2015), cultural heritage lens can be broadly used to study various issues, climate change being one of them.

More recently, UNESCO through its World Heritage Convention and the meeting of the General Assembly of States Parties at their twenty-fourth session (2023), adopted its updated policy document on Climate Action for World Heritage⁶² and in 2024, the inter-governmental committee for the 2003 Convention for the Safeguarding of Intangible Cultural Heritage approved its guidance note on climate action for living heritage (LHE/24/19.COM/11).

A pivotal moment for culture and climate change occurred during COP28 in 2023 held in the United Arab Emirates (UAE), when culture was acknowledged as part of the climate change solution through the Emirates Declaration of Culture-based Climate Action.⁶³ Here, the Group of Friends of Culture-based climate action was founded between inter-governmental and civil society partners and government through Ministers of Culture, hopefully leading to an international framework support for this type of action and the climate and scientific community better engaged. This is a

⁶² Policy Document on Climate Action for World Heritage. Accessed at: <https://whc.unesco.org/en/climatechange/#policy-and-strategy>

⁶³ Culture at the Heart of Climate Action. Accessed at: <https://www.climateheritage.org/jwd> and <https://unfccc.int/event/high-level-ministerial-dialogue-for-culture-based-climate-action>

historic step and a positive call for action, highlighting the importance culture plays in achieving an effective and comprehensive response to climate change. During COP28, the UAE Framework for Global Climate Resilience (UFGCR) which guides the achievement of the Global Goal on Adaptation (a commitment under Article seven of the Paris Agreement aiming to improve the world's adaptive capacity) included cultural heritage as one of seven thematic targets:

“By 2030...Protecting cultural heritage from the impacts of climate-related risks by developing adaptive strategies for preserving cultural practices and heritage sites and by designing climate-resilient infrastructure, guided by traditional knowledge, Indigenous peoples' knowledge and local knowledge systems” (UFGCR Cultural Heritage Thematic Target, UAE FGCR Paragraph 9g).

In the years preceding, various actions have occurred such as, at its nineteenth General Assembly⁶⁴, ICOMOS acknowledged that “climate change had become one of the most significant and fastest-growing threats to people and their cultural heritage worldwide” (ICOMOS 19GA 2017/30, p. 18; also see Hambrecht & Rockman, 2017). In the years before and after this acknowledgment, there have been a significant number of interventions in the form of reports, studies, projects, policies, and recommendations seeking to address this exciting intersection of climate change and cultural heritage, as well as the formation of platforms such as the Climate Heritage Network (CHN). With the exception of the CHN, these interventions largely remained on paper until the previously mentioned ICOMOS' HiCLIP study, which sought to assess this integration more deeply. Since then, there has been an increase in projects globally which seek to generate cultural data for climate action.

These projects are in few countries, and the discourse has primarily remained abstract in many countries, and although research has increased as stated, this has not translated into concrete actions beyond strategy documents' guidance notes and the development of tools. Meaningful programming has however occurred in some countries at the local level. This research

⁶⁴ ICOMOS 19th General Assembly Resolution 19GA 2017/30 – Mobilizing ICOMOS and the cultural heritage community to help meet the challenge of climate change. Accessed at: https://www.icomos.org/images/DOCUMENTS/General_Assemblies/19th_Delhi_2017/19th_GA_Outcomes/GA2017_Resolutions_EN_20180206finalcirc.pdf

acknowledges that there remains much to do in the Caribbean regarding documenting how cultural heritage is affected, examining its role in the response and adaptation to the changing climate, and as a method and applied data-driven tool for supporting climate action.

Globally, few countries have invested in developing climate change adaptation plans or strategies for their cultural sector. Examples include Ireland's⁶⁵ archaeological and built heritage strategy, and the United States of America's (USA) National Parks Service Framework for addressing climate change with cultural resources⁶⁶ (Rockman et al., 2016). The United Kingdom's National Trust has also developed a climate change adaptation guidance⁶⁷ which provides options, thresholds and methods for decision-making relating to adaptation pathways. More recently, Antigua and Barbuda through its Department of the Environment took steps to develop a climate change adaptation strategy for its culture sector through first undertaking a survey of sites being impacted by climate-induced hazards (Murphy, 2023). These limited forays by countries indicate a somewhat increasing awareness at the national level of the implications of the threat of climate change and the need to map risks and elaborate a sector-wide response strategy and appropriate climate action for cultural heritage, particularly the archaeological and built heritage.

Unfortunately, the other side to this is that there is still an even more significant number of countries that have not recognized the importance of such planning or taken steps to integrate cultural heritage in national disaster or climate change adaptation mechanisms. Lefèvre (2017, cited in Daly, 2017, p. 3) points out that in Europe, Italy and France “have included cultural heritage in their national climate change adaptation plans”. An approach such as that pursued by Ireland and the United States can ensure that plans that are developed follow a data-driven approach, which can feed into more comprehensive solutions and strategies requiring cultural data, such as integrated coastal zone management plans. Finland's Cultural Environment Strategy⁶⁸ has also been recognized as a tool for landscape awareness and activities and is cited as a good practice in that it incorporates actions of the State in collaboration with communities to mitigate the impact

⁶⁵ Built and Archaeological Heritage Climate Change Sectoral Adaptation Plan, 2019 <https://eprints.lincoln.ac.uk/id/eprint/37929/>

⁶⁶ Cultural Resources Climate Change Strategy. Accessed at: https://www.nps.gov/subjects/climatechange/upload/NPS-2016_Cultural-Resources-Climate-Change-Strategy.pdf

⁶⁷ <https://www.into.org/new-national-trust-climate-change-adaptation-guidance/>

⁶⁸ Cultural Environment Strategy of Finland. Accessed at: <https://ym.fi/en/cultural-environment>

of climate-related disasters. It was not possible to ascertain however if this strategy was still being implemented.

In addition to the actions taken by international organisations such as UNESCO and ICOMOS, the “Pocantico Call to Action on Climate Impacts and Cultural Heritage”⁶⁹ drafted in 2015 by the Union of Concerned Scientists and international and national organizations with headquarters in the United States and the United Kingdom, could be said to be one of the earlier initiatives within the larger scientific community in response to the threat posed by climate-induced hazards. Cultural heritage as a human right was emphasized.

Significant steps were taken in the Caribbean region in 2019 when the Caribbean Disaster Emergency Management Agency (CDEMA) collaborated with the UNESCO Cluster Office for the Caribbean to bring together disaster and heritage actors from the various islands to identify ways in which integrating programming could be actualised in that culture could be better reflected in disaster management and climate change mechanisms and planning at the national level and disaster risk management strategies developed for the culture sector. This ongoing dialogue can be built on as a platform for future initiatives. An important outcome was the development of a draft strategy guideline for the culture sector that benefited from the input of the various islands and the implementation of pilot initiatives for some islands.

Concerning cultural heritage legislation, the reviewed information suggests that in many Caribbean islands, heritage legislation have failed to meet contemporary realities, such as disaster risk, and these existing pieces of legislation address neither climate-induced and other natural hazards nor severe environmental change. These pieces of legislation are largely outdated and are vestiges of the colonial era for these islands, and in no way address contemporary issues such as the impact of climate-induced hazards and disasters, and how these would be addressed within a legislative framework which requires that actions be taken to safeguard heritage.

These frameworks often did not have clear definitions of the cultural heritage that was being valued, and many are still struggling to deal with threats from infrastructural development issues.

⁶⁹ The Pocantico Call to Action on Climate Impacts and Cultural Heritage. Accessed at: <https://www.ucsusa.org/sites/default/files/attach/2016/04/Pocantico-Call-to-Action-on-Climate-Impacts-Cultural-Heritage-4-11-2016.pdf>

These heritage legislations (sometimes known as National Trust Acts) where they exist in the region, mostly speak to tangible or monumental heritage and are also more focused on a description of how the competent national authority should function, with little detail regarding the actual safeguarding of heritage and addressing risks, and mentions of protecting said heritage are broad and undefined (Byer, 2022; Siegel & Richter, 2011).

A good example of an evolving legislative context to address emerging issues such as the effects of natural hazards and disaster risk, is the Heritage New Zealand Pouhere Taonga Act 2014 (version as of December 2023).⁷⁰ Here, a new historic place section was added (s81 [2] [b]) to “promote the conservation and protection of the most significant heritage places from natural disasters” (2023, p. 57; see also Tanner, 2023, p. 12). Although this reference concerned risk management planning for heritage spaces, it is an important progressive step for a heritage legislation.

Physical Planning Acts in the region (such as in Barbados, Grenada and Saint Vincent and the Grenadines) were often found to have purposeful definitions of cultural heritage, albeit with a focus on the tangible or historic built environment. As mentioned, these planning legislations are often updated more frequently and provide a useful entry point for addressing contemporary challenges, such as associated with climate-induced hazards.

Disaster or emergency management acts across the region were observed to be broad and undefined, making no provisions for cultural heritage experiencing emergencies, except in instances where this heritage is connected to a vulnerable area that is specified (leaders can also designate vulnerable areas), and planning legislation tend to recognize emergencies concerning cultural heritage as predominantly impacts from infrastructural development. An important step was taken by the island of Barbados in June 2024, when the Department of Emergency Management included the culture sector for the first time in the audit to develop its country work programme in relation to disaster management. Barbados has also initiated a programme to assess the vulnerability of both tangible and intangible heritage to climate-related hazards, joining Antigua and Barbuda as the only Anglophone Caribbean islands pursuing such actions at this time.

⁷⁰ Heritage New Zealand Pouhere Taonga Act 2014. Accessed at: <https://www.legislation.govt.nz/act/public/2014/0026/latest/whole.html#whole>

This activity on the part of Barbados is also in line with the intersections established between cultural heritage and climate change in the island's updated Physical Development Plan.

At the UNESCO World Conference on Cultural Policies and Sustainable Development (Mondiacult) in 2022, the transversal role of culture was highlighted by the broader Latin America and the Caribbean (LAC) region, and the need for more systematic linkages between culture and other policy areas such as climate action.⁷¹ Recommendations from the LAC consultation confirmed the vital importance of fostering the development of a new paradigm for cultural policies that uphold culture as a public good while underlining its transformative impact on critical areas such as climate action. This agenda was significantly advanced with the hosting of Mondiacult in 2025.

Cultural policies in the Anglophone Caribbean are in varying stages of being updated, and so the review undertaken for this research primarily focused on policies dating from 2010. These policies confirm that there are essential areas for convergence or synergies in relation to climate change. However, these have not been pursued and perhaps will be included in the next iteration of these documents as the culture sector acknowledges and demonstrates a much deeper consciousness in relation to climate change. Including these threats or issues in these documents benefits from an awareness of the impacts of climate-induced hazards and climate-related disasters on cultural heritage and the vital place for heritage in climate action, both of which remain severely lacking at present in the region.

The CARICOM Regional Cultural Policy was developed in 1994, updated in 1996, and finalised in 1997, and is clearly in need of an update to reflect the evolution of culture as a cross-cutting and transformational theme in the Caribbean. As a policy, it does not address many contemporary issues facing cultural heritage in the Caribbean, although it speaks to the development of a Caribbean person who is “aware of the importance of living in harmony with the environment” (CARICOM, 1997, p. 19) and taking “all steps necessary for the preservation and proper management of the environment” (1997, p. 41).

⁷¹ Report of the Regional Consultations in Preparation of the UNESCO World Conference on Cultural Policies and Sustainable Development – Mondiacult 2022

Leading international organizations, as well as numerous university research projects, government, and civil society organizations have published on climate change impacts on heritage and have lobbied for climate change mainstreaming in their work, published policy documents, guidelines, and case studies, and established working groups such as the ICOMOS Climate Change Working Group. UNESCO has also contributed to developing strategies, recommendations, and a policy document on climate change and world heritage (UNESCO, 2008, updated 2023). Additionally, ICOMOS has completed an extensive publication on the Future of Our Pasts, examining how heritage can be addressed and integrated into the climate change discourse and action at multiple levels (ICOMOS, 2019). The reality however is that many countries are implementing few actions, some within the context of limited priority accorded and resources.

Ongoing and accelerated climate warming presents challenges at many different scales. Orlove et al., (2022, p.34) opine that “there is no single knowledge system that is capable of addressing the complexity of the climate change problem...no single form of collaboration that will address each aspect of climate change in the wide ranges of cultures and landscapes around the world” as “scientific research on its own cannot even define the problem of climate change, let alone solve it” (Orlove et al., 2022, p. 20). This was further acknowledged by the IPCC in its most recent Assessment Report (AR6), in articulating that successful climate action “required collaboration amongst diverse knowledge systems” (2022, pp. 51-52). This supports the reference earlier by Adger et al. (2013) that innovative collaborations are needed to localize climate goals, particularly those based on equitable and just transitions, and could be more successful when they are produced by integrative climate strategies that consider cultural resources.

Within such a setting as discussed above, archaeological research and traditional knowledge are cited as the data sources of focus for this research. They are presented not only as points for consideration, but also as valuable data to be appraised from an island perspective and where the challenges posed by climate warming materialize in an accelerated setting.

Heritage as Agency for Climate Action and Climate Justice

As highlighted, the changing climate and the challenges posed are not a new experience for the islands of the Caribbean. Past, and specifically pre-Columbian populations adjusted to their landscapes at varying scales to support their resilience (Castilla-Beltrán, 2018, 2020; Fitzpatrick & Keegan, 2007; Hofman & Hoogland, 2015; Rick et al., 2013). European colonisation over five centuries introduced monoculture, which resulted in the clearing of large tracks of land predominantly for sugar cane, permanently altering the landscape of the islands of the region while introducing other plants and animals (Stancioff, 2018), in addition to forced labour, migration and enslavement of millions of persons over several centuries (Byer, 2022).

As acknowledged by Stancioff (2018), these earlier historical processes have defined contemporary challenges with land use, policies, and resource exploitation in the region, all exacerbating the Caribbean's context as a region vulnerable to the effects of climate change. The same was also highlighted by Hofman et al. (2021) in positing that the islands of the Caribbean are by no means pristine or untouched. Historical landscape modifications, compounded with contemporary issues such as ecosystem degradation from development and sandmining, among other threats (Hofman & Hoogland, 2015), have indelibly defined the environmental vulnerability of the islands of the region, also directly linked to the contemporary exposure of the Caribbean islands to climate-induced hazards and various climate-related disasters.

As this research anchors itself in a framework based on the development of and changes in socio-ecological relationships from the past to the present based on historical ecology and or human ecodynamics (to be discussed further in Chapter Three), the results of these changes are discussed within the context of implications for current and future climate action through policy, planning and programming. There are however other concepts which are referenced in this research, have bearing on it, and are applicable to the place for heritage in climate action and building resilience across the Anglophone Caribbean. These are relevant particularly when discussing the historic challenges of the Caribbean region which have contributed to its susceptibility and other injustices and are introduced here as part of this background discussion.

Within this setting of exposure to climate-induced hazards in the Anglophone Caribbean, is a history of disruptions in socio-ecological relationships and the transmission of relevant knowledge and practices, due to forced relocation and disconnection of Indigenous persons from their land due to a multitude of factors related to conquest, land grab, resource exploitation, and a form of forced relocation in times of natural disasters and has introduced the concepts of *disaster colonialism or the coloniality of disasters and disaster capitalism* (Bonilla, 2020; Jean & Michel, 2023; Perdikaris et al., 2023; Scarlett, 2022; Wallman et al., 2018). In a similar way, the United States' Fifth National Climate Assessment⁷² (NCA5, 2023) emphasized that “land dispossession due to settler colonialism had made Indigenous peoples more vulnerable to climate change (NCASJ5, 2023, p. 45), amplified the crisis for them, and resulted in the loss of traditional knowledge and practices”.

The preceding approach posits that colonial legacies have resulted in systemic long-term vulnerabilities to natural hazards across the region and are today reflected in relationships with the natural environment, land use patterns, and top-down strategies implemented in post-disaster recovery settings, as well as how natural hazards are addressed within the context and space of Indigenous and local communities. These forced relocations undoubtedly created challenges with transmitting ancestral knowledge practiced within landscape settings, resulting in disruptions in the people, place, and story narrative, as well as a disconnection from the land. It also forced a reflection on the human-environment dialogue and the connection between land, traditions, and the resilience of these communities, not only to climate-induced hazards but general research into the region's historical ecological context (Byer, 2022; Quijano, 2007; Siegel et al., 2019; Stancioff, 2018; Wallman et al., 2018).

Underpinning Indigenous knowledge and memory, the land serves as a space for cultural reproduction, and as such, research on the responses of Indigenous communities in the region to severe environmental change, including those caused by climate change, must consider these socio-environmental variables (Burke et al., 2021). The preceding issues also force a reflection of

⁷² <https://nca2023.globalchange.gov/>

matters surrounding environmental and climate justice in contemporary Caribbean societies, as highlighted by Douglass and Cooper (2020).

A lesser-known approach that ties into the place for Indigenous knowledge in human environment and climate interactions in the Caribbean is ethnoecology, anchored in the position that Western centred knowledge tends to underestimate the environmental knowledge of traditional communities when studying human environment interactions, only applying western perspectivism. As an example, traditional practices in agriculture or house building were dismissed and seen as unimportant, primitive or folkloric (Conklin, 1954; Makondo & Thomas, 2018; Nakashima et al., 2018; Rhoades & Nazarea, 1999). This context would have presented itself during the advent of European colonialism in the Caribbean, where the approaches utilized by the pre-Columbian population for interacting with their natural environment were observed but dismissed in most cases as useless.

As such, the ethnoecological approach places a high value on the traditional, environmental, and ecological knowledge that Indigenous peoples and communities have utilised from the deep past. Cooper (2012) suggests that Indigenous Caribbean populations utilized their belief systems and transfer of ecological knowledge and cultural processes over generations to respond to severe environmental changes and build their resilience. The Caribbean's history concerning its Indigenous population calls for focusing on other applicable approaches to studying this socioecological relationship context in the region. As we are taught by the Anthropocene, humans are active participants in ecological change and not passive respondents to external environmental forces (Bellwood et al., 2004; Erickson, 2008). The approaches utilised throughout this research, thus attempt to better highlight humans and their relationship with the natural environment as being an active process and not one based on passivity.

Political ecology is another concept, considered to have evolved from cultural ecology. As a concept, it speaks to historical inequalities and how this legacy affects present socio-ecological interactions (Haenn et al., 2016; Paulson et al., 2005; Robbins, 2012), played out in resilience, vulnerability, and disaster response narratives in the region, and today framed as disaster colonialism, all critical points to be considered in the realization of climate social justice (Bonilla,

2020; Douglass & Cooper, 2020; Jean & Michel, 2023; Perdikaris et al., 2023; Scarlett, 2022; Smith & Rhiney, 2016; Wallman et al., 2018).

Social justice speaks to developing approaches which address how varied factors contribute to knowledge production within Indigenous communities while moving away from extractive frameworks of knowledge production and interpretations which erase Indigenous peoples and their identities, history, culture, and narratives (Hamilakis, 2018; Laluk et al., 2022; Tuck & Yang, 2012). Laluk et al. (2022, p. 661) suggest that “to date, most approaches to social justice have been built on Western conceptualizations of fairness, equity, individualism, well-being, and sustainability, which are protected through laws” and Unal (2018, p. 263) writing before noted that “such models assume that all members of society share these social values and definitions”.

This research speaks to the importance of considering a decolonized framework that includes the co-production of Indigenous knowledge through various approaches which focus on the world view and value systems of these communities, rather than preconceived notions or expectations which emanate for example, from processes of colonialism and are perpetuated in research frameworks being implemented throughout the region. This applies to both archaeological and ethnographical research centred around Indigenous communities, and which bring in to focus themes such as how collaborations are pursued with these communities.

Engagement and collaboration with Indigenous peoples in the Caribbean means that value is placed on promoting and recognizing their rights, worldview, culture and interaction with their natural environment and the knowledge and practices that are derived. Here, these communities must be seen as *rights holders instead of stakeholders*. In so doing, we support the agency of these communities and their voice in this dialogue and strengthen the resilience of their knowledge and practices. Additionally, it fosters a deeper regard for, comprehension of, and awareness of the traditional knowledge systems of Indigenous and local people. This acknowledges that to contribute to the best available research (science) as outlined by the Paris Agreement, platforms and spaces must be established for dialogue, experience and knowledge sharing and learning, and enabling greater participation of Indigenous and local knowledge systems in policy-making processes.

This approach of collaboration drastically reduces reliance on extractive research or knowledge exchange models, in which the knowledge of Indigenous peoples is taken out of its holistic context and used by others and allows these traditional communities to share in ways that are consistent with their ways of transmitting knowledge and their worldviews. This should particularly be considered when pursuing research programmes in the islands of the Caribbean with remaining Indigenous populations, as well as all communities in general to ensure that they remain at the centre of climate action.

Raising awareness of the importance of Indigenous and local knowledge may also require the development of an inventory which speaks to how Indigenous peoples' participatory mechanisms are being used by regional and international processes, conventions, and institutions related to climate change, in their decision-making processes. This will allow Indigenous and local knowledge to contribute to the 'best available science' as encouraged by the Paris Agreement and ensure that climate interventions are decided upon in consultation with Indigenous peoples and local communities from the outset and that they are able to share in the benefits of these interventions.

Also applicable is the concept of Resilience Theory, or the Theory of Adaptive Change (TAC), which posits that processes in human and environmental systems are interlinked and linked across many geographical and historical scales through adaptive cycles, and focuses on the restructuring of the system (Rosen & Rivera-Collazo, 2012; Sarkar & Kulkarni, 2017). Van de Noort (2013, p. 2) suggests that "the concept of resilience evolved from its origins within ecology to encompass the resilience of social institutions, with socioecological resilience being defined as the ability of communities to cope with the impacts of external environmental change, including climate-driven environmental and sea level change" and to restructure following these changes. However, the methods and procedures that control planning in the Caribbean are deeply ingrained in structures that encourage unsustainable behavior that could exacerbate inequality and other forms of injustice. Here, the power dynamics which have been promoted through time as a result of colonialism have led to the erosion of ecological knowledge, removal from ancestral lands, and also served to displace communities and disrupt their knowledge transmission. These processes

continue to be perpetuated in contemporary systems and have had, and continue to have, a profound impact on the resilience of Indigenous and local communities in the Caribbean. As such, the ability of historically marginalized Indigenous groups to absorb and adjust to environmental change is impacted by these entrenched issues (Bender, 2018; Harrison, 2009; Rodman, 2003).

As a result, resilience calls for the removal of injustices and the adoption of sustainable resource use, and resilience within the context of climate-related disasters is not just about recovering from the past but also about moving forward into new, equity-focused from the bottom-up sustainable systems for the future. Systems that communities are best positioned to inform.

Beel and colleagues (2017, p. 43) identify culture as being “critical to the development of resilient communities [simply] by mobilising the past into the present”. A community or place's identity and sense of place are shaped by its cultural heritage, or as suggested by Ingold (1993), its intergenerational skills and knowledge transfer and ways of existing within a changing environment, and critical for developing socioecological dynamics. When these networks and ties within communities and with the landscape are disrupted, communities can be cut off from accessing pathways that are vital to pursuing their adaptation.

It would be naive to believe that Indigenous or local knowledge bearers and practitioners present the only solution. As suggested earlier, these knowledge and practices are not a panacea. Various strategies that work in harmony with nature and can be implemented to lessen the effects of the climate crisis, such as updating urban and land-use planning, building codes and construction techniques, as well as defending coastlines through integrated coastal zone management planning can emanate from Indigenous and local communities and their knowledge and practices passed down through generations.

In the Caribbean, the annual tropical cyclone season has contributed to cycles of vulnerability, particularly for the large number of coastal communities in the region, and for some islands, the entire island is essentially the coastal zone. This cycle of vulnerability has now unfortunately become linked to the increasingly used concept of disaster capitalism, which is the “practice by which disasters such as the destruction caused by hurricanes have become profitable for several

individuals, companies and multinationals” (Klein, 2007, cited in MacDonald & Ferdinand, 2023, p. 233), or even governments.

One of the most recent cases of this in the region has been the island of Barbuda, where, following the passage of Hurricane Irma in 2017, actions on the part of the government have resulted in disruptions to the connections with their land nurtured over hundreds of years (Moulton & Machado, 2019), and research emanating from this emergency highlighted that the uncertain conditions created by Irma threatened Barbudan culture, identity, and belonging (Boger & Perdikaris, 2019; Gould & Lewis, 2018; Rhiney, 2020), as well as the symbiotic relationship embedded in social resilience that Barbudans had with their land-and seascapes.

One of the tools used to dismantle this communal land ownership system and relationship was the repealing of the island’s [Barbuda] Land Act in 2018 that was in existence for four hundred years and served to safeguard traditional relationships with the natural environment (Rhiney, 2020), and as suggested by Rivera-Collazo and Perdikaris (2023), there is now widespread destruction of heritage in its varying forms, which impacts the island’s capacity to be resilient to future hazards such as ongoing and accelerated climate change.

To better delve into the climate heritage justice narrative in the Caribbean, a fuller discussion on the coloniality of disasters must be pursued in tandem with disaster capitalism due to the environmental impact of colonialism on the landscapes of the region, in addition to other legacies, which “continue to shape modern social and environmental challenges...and in explaining what efforts are made or are not made and by whom to mitigate the ecological crisis the region faces” (MacDonald & Ferdinand, 2023, p. 232).

For Indigenous and local communities, adapting to the effects of accelerated climate change has brought to the fore many deep-seated issues (Boger et al., 2019; Bonilla, 2020; Wallman et al., 2018), such as the historical and continued relocation of Kalinago communities in post-disaster situations (Baptiste & Rhiney, 2019; Scarlett, 2022). Scarlett (2022) and Palmer and Fraser (2021) stress the importance of land to the Indigenous communities in Saint Vincent giving rise to questions in relation to relocation post-disaster whether from volcanic eruptions or tropical cyclones, and how lands were selected for this relocation process, which has been a historical

challenge with injustices repeated each time a disaster is declared. This earlier dislocation of Indigenous communities was also connected to lands being seized for use in the plantation economy which developed in the fifteenth century onwards.

In the case of Maroon communities throughout the Caribbean, they have experienced threats to their relationship with their landscape and disruptions of cultural practices through issues such as bauxite and other forms of resource extraction, which threaten to contribute to the vulnerability of these communities to ongoing climate change and exacerbate long-standing issues on sovereignty such as the case of the Maroons in Jamaica. In Suriname, Lobach (2023) posits that ecological stereotypes persist that suggest that the Maroons had a destructive relationship with nature while the Amerindian populations were seen as stewards of this environment. In the case of these Maroons, such unjustified perceptions were used to dispossess Maroons of their ancestral lands over time.

In writing about the Maroon communities in Jamaica and the potential impact of mining on Maroon culture, Connell (2019) highlights that the Cockpit Country was vital to their history and spirituality, as the land was identified as the protector. According to their worldview, “the first Maroons were like nomads, and did not just live in one place while using all the bushes and herbs...practices were carried from Africa to the bush [Jamaica]” (Connell, 2019, p. 11). Bauxite mining was seen by these communities as a threat to this socioecological relationship, Indigenous flora and fauna as well as to the water environment. The Cockpit Country’s importance as a water source for the future was considered a critical component in actions to support and protect the environment and by extension their farming so it would in turn sustain them in periods of drought.

Due to the vital role of culture in building social resilience (Beel et al., 2017), the changing climate also presents many critical opportunities to position culture as central to developing relevant actions to increase climate awareness and build heritage-climate action (Miller et al., 2024). As such, this research also highlights strategies that can be utilized through archaeology and traditional knowledge to strengthen climate literacy and opportunities for climate action, primarily through two channels.

Firstly, for Indigenous societies worldwide, there is an innate connection between their cultural history and their way of life. Actions that support a climate-heritage awareness narrative include building awareness around how these communities experience the loss of their sites and how this contributes to the loss of the national heritage of the island. Alternately, actions can also focus on a mapping of the response to severe weather events through oral traditions and specific objects of these communities or through story mapping.

Secondly, the ongoing erosion of the archaeological record and vulnerability assessments undertaken provide an opportunity or a platform to involve communities in monitoring and protecting these sites (Miller et al., 2024) and for archaeology to be used as a tool for building resilience. Many examples have been elaborated through projects such as the Coastal and Intertidal Zone Archaeological Network (CITiZAN)⁷³ in England, work on Scotland's coastal heritage at risk (SCHARP),⁷⁴ the Descendants United for Nature Adaptation and Sustainability (DUNAS⁷⁵) project in Puerto Rico, *Archéologie Littorale Outre-Atlantique* (ALOA) in Guadeloupe (Motte et al., 2022) or the Heritage Monitoring Scouts programme⁷⁶ of the Florida Public Archaeology Network.

Against the traditional grain of how communities and individuals become involved in heritage action in the study area of the Caribbean, through these projects, local communities can be engaged in climate action initiatives to build awareness around at-risk sites, climate-induced hazards and the community's role in monitoring and safeguarding. These projects can focus on iconic sites which may have a wider national appeal and broader awareness base, or sites with specific value ascribed to them by local communities. While these projects are not commonplace in the Anglophone Caribbean sub-region due to the resources required for their mobilisation and limited climate heritage awareness, there are opportunities to engage communities meaningfully in these community-based initiatives. This is possible through the work of national trusts and archaeological and historical societies throughout the region and creates a context where

⁷³ CITiZAN. Accessed at <https://citizan.org.uk/>

⁷⁴ Coastal Heritage at Risk Project (SCHARP), accessed 9 March 2023, [SCHARP - The SCAPE Trust](#)

⁷⁵ See Note #1

⁷⁶ <https://www.fpan.us/training-courses/hms-florida/>

partnerships are being built at varying levels of society in support of culturally supported climate action. The cultural pathway to climate action posed by this research also provides opportunities for communities to become more involved in relevant initiatives through multi-disciplinary programming for climate action through citizen science or community-focused initiatives.

Citizen science is best described as “a democratic approach to science involving citizens in collecting, classifying, and interpreting data to influence policy and assist decision processes, including issues relevant to the environment” (Kullenberg & Kasperowski, 2016, p. 1407). Silvertown (2009, p. 1408) suggests that this type of activity “has flourished in recent years due to readily available technical tools for collecting and disseminating information (e.g., cell phone-based apps, cloud-based services, ground sensors, drone imagery, and others), recognition of its free source of labour, and requirements of funding agencies for project-related outreach”.

In recent years there has been many notable projects which pursue this approach of engaging communities in support of activities such as coastline monitoring and documenting changes to archaeological sites and the historic built environment. Very often though, while these projects seek to engage communities, they do not collaborate with them in designing methodologies in relation to the work that is to be done as well as how local knowledge can be better integrated in these endeavours with implications for sustainability and building climate awareness.

Promoting a more citizen-science or community-focused approach in the Caribbean would not be without its challenges, particularly in achieving sustainability in project aims after external project funds are no longer available, as these activities are not specifically embedded in local or national heritage management frameworks. Nevertheless, there are opportunities to deploy smaller more cost-effective projects which benefit from the use of information and communication technologies to better engage local communities in meaningful ways.

CHAPTER THREE

METHODOLOGIES

The changing climate serves as a powerful connector between humans and their environment through time and calls for a deep analysis of this two-way relationship. This chapter presents and discusses the theoretical approaches, frameworks, and methods considered and applied to studying this relationship from a cultural perspective within the context of the Caribbean, framing a deliberation on cultural pathways to climate action through the lens of socio-ecological interactions.

Van de Noort (2013) suggests that the adaptation of past populations has implications for future sustainability. Studying the past through the lens of societies' social memory and the past's archaeological and historical context allows us to better understand how climate change operates. This interaction is examined over time by interrogating how humans adapted from the past to the present, what this response looked like, and what can be learned about this adaptation from the archaeological and ethnographical record.

Theoretical Approaches

Theoretically, this research is anchored within a dynamic interlinkage of the human and the environment through a socio-ecological system. Undertaking an examination of climate action through cultural lens requires dynamic research methods and theories, and multidisciplinary approaches to make sense of environmental disruptions such as the ongoing and accelerated climate crisis and culture's place in this interrogation.

In undertaking this interrogation, the term Anthropocene is often referenced when considering this global environmental challenge occurring in this human-environment dimension, in order to frame climate change discourse (Berkes, 2017). The term is now commonly utilised by the scientific research community to highlight our existence in an era where human activity is seen as the most dominant and profound cause of climate warming and impacts on the environment, or human

domination of earth systems and specifically its ecosystems (Crutzen, 2006; Crutzen & Stoermer, 2000; Fitzpatrick et al., 2015; Maher & Harrison, 2014; Zalasiewicz et al., 2017).

Antagonists of the concept of anthropogenic-*led* climate warming argue that the concept of the Anthropocene communicates a homogenization of past complexities in its idea of a new human-dominated geological epoch (Porr & Matthews, 2019) and does not fully consider the thousands of years of human influences on the changing climate and in contributing to our present era of climate change (Ellis 2023; Ellis et al., 2016). While the research stance taken by this dissertation agrees with this latter approach, it acknowledges that climate change also occurs naturally. Thus, references to the Anthropocene in this research acknowledge that the actions of humans in this recent era have played a central role in accelerating and exacerbating current climatic challenges.

As human-environment processes and relationships are posited as central to any study of climate change, approaches and frameworks applied to this study are ecologically focused, hence the use of the term socio (human)-ecological (environment) systems or relationships, as ecology studies the processes that define the relationship between the environment and its various organisms (Odum & Barret, 1971). Ecological anthropology has also been used as an umbrella term for various ecological approaches (Haenn et al., 2016; Kottak, 1999; Paulson et al., 2003, 2005).

Earlier studies on the human relationship with the natural environment and, by extension, the changing climate, were often one-sided, perceiving humans as either being separate from the environment or superior to it or only focusing on environmental change as being the cause of human response (Maher & Harrison, 2014).

With an increase in discourse and scholarship on this relationship being a two-way process, approaches such as cultural ecology emerged as a concept for studying the processes by which a society adapts to its environment or the ecological context for understanding cultural change (Steward, 1968, 2005), highlighting that the environment both influenced human response and climate action, as well as is impacted by humans. This approach was however seen as being limited to a cause-and-effect relationship (Maher & Harrison, 2014). The interactive socio-ecological context of climate change therefore makes this a cultural process and part of our cultural identity in how we respond and adapt moving forward within this socio-ecological context,

as human understanding of climate change is a part of our culture and culture is an adaptation mechanism (Burke et al., 2021). The cultural ecology approach nevertheless highlights the importance of considering an interdisciplinary approach in deeper analyses of this human environment relationship (Crumley, 1994).

Within this context, this research aligns itself with aspects of the cultural ecology approach as the basis for the analysis between culture and the environment, where the environment is extended to mean the changing climate among other components such as biodiversity and animal life, recognizing that there may be parallels or similar patterns in how humans in different cultural settings responded to climate change.

The proposed interdisciplinary perspective and the need for a deeper study of this culture-environment interaction and the importance of considering various sciences and data evolved into historical ecology, which remains the most well-ventilated approach, and is the primary reason for its consideration within the parameters of this research and its objectives and interrogations.

Framing Historical Ecology and Human Ecodynamics

Historical ecology considers the history of interrelation, environmental change, human history, and the complex history between humans and the planet (Crumley, 1994). It suggests a continuous dynamic cycle of humans impacting their environment and *vice versa* through varying processes (such as anthropogenic climate change), impacting how humans respond. This theoretical approach was first used by Deevey (1964), and since then, it has been used in varying contexts to study archaeology and environmental challenges. It, therefore, presents a useful framework to interrogate the place for archaeology and traditional ecological knowledge systems in how climate change is experienced and addressed in the Caribbean through climate action.

Within the region, historical ecology could be applied to reflections on landscapes' historical, cultural, and evolutionary nature, transformations, and interaction with societies over space and time. One such study on the Caribbean, *Landscape, Land-change, and Well-being in the Lesser Antilles* (Stancioff, 2018), highlights this perspective and approach, as well as Siegel (2018) for

select islands in the Caribbean in applying the historical ecology approach for guiding multidisciplinary research on past environmental change.

As historical ecology serves as the lens for viewing this long-term change to environments across space and time and the resulting modifications that may have occurred because of human response, it utilises multiple ways of interpreting data to understand the past and offers ways of considering future models (Balée, 1998, 2006; Fitzpatrick, 2018b; Kirch, 2007; McGlade, 1995).

A particular benefit of this approach is that it considers this socio-ecological relationship over the long term. This is key when considering climate change, humans, their communities, environmental change, and human interaction over time, as evidenced by the archaeological record. It is also viewed as a more holistic and practical perspective on environmental change and gives place to traditional ecological knowledge and what it contributes. Proponents of historical ecology often focus on recognising the reciprocal relationships inherent in human cultural and environmental co-evolution as a vital principle of this approach (Fitzhugh et al., 2019). This means humans are active agents in ecological change, and ecosystems are dynamic.

Stancioff (2018) posited in her research in Dominica and Saint Kitts and Nevis, that a discussion on historical ecology should begin with the term “landscape, as a template of all past human interaction with nature” (p. 50). Landscapes also represent a meeting point between humans and the environment. Crumley (1994) also suggested that the relationship between humans and their environment is materially manifested in the concept of landscape, made evident in historical ecology (see also Kolen & Renes, 2015). Fitzhugh et al. (2019) further identified ecosystems as dynamic spaces and processes, requiring a knowledge of their prior state and variables to understand their contemporary state. This directly ties into the position of using past response to guide future strategies. From the perspective of this research, there is agreement that this is key when seeking to understand the impacts of climate change on human systems and processes and vice versa.

Discourse on historical ecology gave rise to another yet similar concept known as human ecodynamics. Maher and Harrison (2014) writing then highlighted human ecodynamics as a relatively new framework used to analyze humans and their environment, a similar description to

historical ecology. Others (Crumley 1994, 2016; Kirch, 2007; McGlade, 1995) see it not so much as a new framework but a sharper focus within archaeology to better understand the synergy and the respective effects that these two - humans and their environment - have on each other. As such, this research views human ecodynamics as an amped up or more robust form of historical ecology.

The human ecodynamics approach is particularly relevant because it reaches beyond the resulting environmental challenges to ventilate human responses or relationships due to this change by interrogating what this means for future responses. It thus advances the narrative to guide past and present interactions and actions as the human response to the environmental impacts being experienced. This approach particularly applies to this research, as ongoing interactions shape landscapes as cultural landscapes, and past actions are imprinted on them for us to learn for the future through the archaeological record, traditional ecological knowledge and practices, and social memory.

McGlade (1995) described human ecodynamics as the productive relationship “of human-modified landscapes set within a long-term perspective, viewed as a non-linear dynamic(al) system, (and defined by) the co-evolution of socio-historical and natural processes” (1995, p. 126). It focused on this long-term study by analyzing past and present interactions of humans with their environment utilizing data from various scientific fields (Fitzhugh et al., 2019). It thus helps to understand the relationship forged between people and their environment in the Caribbean from the past to the present and for the future, through archaeology and traditional ecological knowledge, as the changing climate affected populations in the past and continues to do so today, albeit at a much more accelerated rate. As the climate crisis will remain an issue for the future, human ecodynamics allows a pathway discussion on how Caribbean populations have been affected by environmental variables around them since their earliest inhabitation of the region. Archaeologists conducting regional research are particularly well-placed to link culture and nature as the discipline discerns thriving sociocultural and biological traditions.

From the viewpoint of the islands of the Caribbean, this approach is brought into sharp focus when one considers the role of the Anthropocene in climate change dialogue and the role of humans as

integral components of the environment. Following on from the historical ecology perspective, human ecodynamics further considers the relationship between people and their environment, in how they impact and are, in turn, impacted by environmental variables and resulting responses (Fitzhugh et al., 2019). From this research's perspective, the space for the involvement of local and traditional communities is more defined within the human ecodynamics framework than under historical ecology. Proponents of human ecodynamics put forward this opinion as it stresses the importance of engaging traditional knowledge bearers to ensure more in-depth perspectives (Fitzhugh et al., 2019). This results from these communities' intimate ecosystem knowledge and awareness accumulated through observations and actions over generations, some successful and others based on trial and error or maladaptation.

A human ecodynamics approach is of significant relevance to the Caribbean, given the importance placed on traditional communities and centred on an approach which validates the vital importance of traditional knowledge in guiding climate action in regions such as the Pacific and Africa (Hale et al., 2022; Iloka, 2016; Nakashima et al., 2018; Nyong et al., 2007; UNESCO Links Programme, n.d.). LeFebvre et al. (2019, p. 3) note that through the human ecodynamics approach, environmental data has contributed to "broader understandings of anthropogenic landscapes and cultural responses to climatic variability through time and responses".

The historical ecology and human ecodynamics theoretical frameworks mentioned throughout this chapter anchor this research's examination of human environment relationships and processes throughout its contents. Both are relevant within the context of studying the impact of climate change on small islands through the lens of culture and its data and processes.

A review of existing scholarship demonstrates that, in some instances, historical ecology and human ecodynamics are used interchangeably (Kirch, 2007; Perdikaris, 2011). However, Fitzhugh et al. (2019) point to the fact that although the conceptual histories of historical ecology and human ecodynamics differ academically, they have come to share common ground in relation to concerns and objectives, such as the study of long-term ecological change in human/non-human dynamics. As an illustration, the Barbuda Research Project mentioned in this research utilises historical ecology and human ecodynamics terminologies. As such, this research focuses its attention on

where there is convergence in the examination of how varying evidence can guide our research and understanding of climate action within the context of how humans interact with their environment from the past to the present and for the future, and what can be learned from these interactions.

Archaeological, palaeoecological, historical, and ethnographic data are brought together under an interdisciplinary umbrella to examine how humans in the Caribbean interact and continue to interact with their environment, and its implication for the future in a changing climate and the actions that are needed. The human ecodynamics approach can thus be utilised as a framework for using archaeology and traditional ecological knowledge to address some of our pressing adaptation issues by utilising the creativity of cultural pathways to help with future climate action. This recognises that culture can indeed serve society during times of climatic change and other emergencies. Within the Caribbean, human ecodynamics is presented as the framework for this analysis, considering the examination and use of archaeology and traditional ecological knowledge in this research to give agency to past human responses and articulate present and future action.

Archaeological research on climate change recognizes the value of pursuing a multi-or interdisciplinary approach in utilizing varying data sets or disciplines such as paleoecology, geology, geography, and landscape studies (Beets et al., 2006; Malaizé et al., 2011). Current archaeological research is clear on the role that archaeology and other paleoenvironmental evidence can play in informing how communities responded and adapted in the past, what lessons can be applied today in considering future impacts on human communities, and the importance of archaeological data being included in climate action and discourse (Boger et al., 2019; Cooper & Peros, 2010; Douglass & Cooper, 2020; Hofman & Hoogland, 2015; Hofman et al., 2020; Hofman et al., 2021a; Rivera-Collazo, 2011; Samson et al., 2015). As such, the insights provided by archaeology offer data and new perspectives for consideration on the successes, shortcomings, and maladaptation of past communities or populations to the changing climate.

The human ecodynamics approach acknowledges that studying our past through interactions with the natural environment will not provide all the solutions necessary for resilience and adaptation (Van de Noort, 2013). Understanding how conditions have changed over time and what steps societies have taken to respond and adapt to hazards during this time, studying deep-time

landscape and human dynamics from the perspectives of archaeology and traditional knowledge help contextualize the risk posed by the climate crisis. It may however be feasible to look into these processes to gain a more nuanced knowledge of resilience as suggested by Rivera-Collazo and Perdikaris (2023) and Rivera-Collazo (2022). A central tenet of this research is that it pursues an examination of how communities from the past to the present restructured following climate-related disasters, how this reveals itself in the archaeological and traditional ecological knowledge record, and its applicability to future adaptation or restructuring.

Within this context, this research agrees with Fitzpatrick and Keegan (2007, p. 40) in their assessment that with the “increase in archaeological, paleoenvironmental, historical, and ecological research in the Caribbean, it has now become *even more* necessary to combine the various areas of expertise to discuss issues of human adaptations and impacts in the region.” A decade later, Siegel (2018) highlighted that fully interdisciplinary human-environment studies in the Caribbean were still relatively new. There is much scope for continued studies in the region as it seeks newer, more advanced, and more comprehensive ways of addressing current and future climate risks and human response.

Yet another entry point for considering cultural pathways to climate action is found in the value and increasing use of decolonized archaeological research and practice as a tool for climate social justice, and its place in this research methodology will be highlighted later.

Data and Methodologies

To better articulate the place for archaeological data and traditional knowledge in climate action in the Anglophone Caribbean, various methods were utilised. This research pursued data collection and analysis through archaeology, heritage, ethnohistory, and ethnography. The data presented and analysed as such seeks to stimulate insightful reflection on what future climate action could look like within a framework that integrates cultural data in developing relevant climate action pathways, as well as inform Caribbean heritage practitioners, researchers, and the broader civil society on the relevance of considering and applying these cultural heritage focused pathways to climate action.

Varying source materials were consulted, referenced, and utilised for this research. These included academic publications, historical maps, letters and reports, newspaper articles, photographs, semi-structured interviews, and informal discussions. Data gathering consisted of desk review of research materials and field research.

Desk review of Archaeological Research

A key data source for this research was a review of past and present archaeological research in the region that documents the effects of climate-induced hazards or climate-related disasters on cultural heritage and demonstrates adaptation in the archaeological record. This included reviewing academic publications on archaeology, traditional knowledge, and climate change in the Caribbean. The work of a significant number of archaeologists who have researched and published on these topics was reviewed and serves as the basis for the second data chapter presented in this research (Chapter Five) and its discussion.

Vulnerability Assessments

The first component of this dissertation's field research involved a comprehensive review of critical data sources from vulnerability assessments and observations of coastal archaeological sites on four islands: Antigua, Barbados, Jamaica, and Saint Lucia. To ensure the thoroughness of these assessments, a meticulous desk review of existing site inventories for the selected case study islands was conducted. This was done to establish the full extent of or as best as possible the record of coastal archaeological sites. The review revealed varying states of inventories, recognizing that in most cases, these were incomplete, GPS locations were missing or unknown, or multiple inventories and sources had to be combined to construct a more complete picture of the location of sites. These multiple inventories were then compiled to establish this as complete as possible inventory.

In cases of multiple inventories, this desk review was supplemented by Bright's inventory in the Lesser Antilles (Barbados and Saint Lucia), Barbados' Physical Development Plan List of Cultural heritage sites, and Peter Drewetts's archaeological survey in the 1980s (Barbados), a 2022-2023

survey by Dr. Arthur Reginald Murphy⁷⁷ (Antigua), and surveys undertaken by the Archaeological Society of Jamaica (1960s – 1970s), the Jamaica National Heritage Trust’s national inventory, and inventories compiled by Drs Phillip Allsworth-Jones⁷⁸ and Lesley-Gail Atkinson⁷⁹ of pre-Columbian sites in Jamaica.

In all case study islands, a field reconnaissance visit was undertaken to map portions of the coastline, randomly check and make observations of selected sites and historic towns detailed in existing inventories. A nearly complete coastal survey was undertaken where the size of the island permitted, documenting impacts and coastline changes relevant to safeguarding and developing climate action strategies for these sites, as well as discerning adaptive capacity. Within this context, observations were made concerning the level of deterioration of the site where possible, as well as the level of coastal development and ecosystem loss or degradation, the utilisation of any strategies to protect coastlines, existing frameworks for the protection of sites, examination of past vulnerabilities where they were known, as well as other data and observations from informal interviews with experts and local communities. A review of the internal management response framework for archaeological sites was also considered in determining the adaptive capacity of a particular site to address threats from climate phenomena being experienced.

Photographs were also taken to document observations. GPS readings were obtained through an android map application, even if these were present or absent from the inventories consulted, as well as the distance from the visible coastline and elevation above and below sea level when possible. In some cases, such as Jamaica, sites had not been surveyed since initial surveys were undertaken in the 1960s – 1990s. Sites selected were also representative of pre-Columbian, colonial, and post-colonial periods and on all coasts of each island. A list of sites for each case study is presented in Chapter Four under the island data presented.

These assessments were augmented with freely available satellite imagery where they existed, looking at coastal changes in these selected locations, topographic surveys, observations, and the use of geographic information systems to further assess historic changes. Predictive modelling,

⁷⁷ Unpublished Antigua and Barbuda Sectoral Adaptation Plan: Tangible Cultural Heritage. February 2023

⁷⁸ Database of Sites in Pre-Columbian Jamaica. Allsworth-Jones 2008

⁷⁹ Map produced as part of her 2019 PhD dissertation: Burens, Cooking Pots, and Water Jars: a Comparative Analysis of Jamaican Prehistory

although not the focus of this research, was only considered within the context of the data available and projections of 1m SLR through to the year 2100 and beyond. Sea-level rise projection maps were developed using Climate Central's Surging Seas Global Risk Zone Map (CCSS)⁸⁰ which "provides the ability to explore inundation risk up to 30 meters across the world's coastlines as well as local sea level rise projections at over 1,000 tide gauges on six continents" (CCSS, n.d., n.p). Mapped areas below the selected water level are displayed as satellite imagery shaded in blue, indicating vulnerability to flooding from combined sea level rise, storm surge, and tides or to permanent submergence by long-term sea level rise (CCSS, n.d., n.p).

While this research focuses on specific islands in the Anglophone Caribbean, it is important to highlight that this does not preclude the inclusion and use of relevant and applicable data from any island or sub-region of the Caribbean or globally as part of the broader discussion, and where specific data is not available for the island being discussed.

This first step of gathering data through site inventories informed the application of the vulnerability assessment at several sites on each island. These sites were randomly selected in collaboration with national culture partners to ensure that selected sites reflect varying typologies and geographic locations and available data on coastal changes. Those selected are only for the purpose of highlighting how sites or the coastline, in general, are impacted and not due to a particular preference of this researcher. The four islands selected to be presented as case studies were deemed first to provide good geographic coverage of the focus of this research in the Caribbean region while representing varying degrees of climate change impacts, geophysical features, exposure to climate-induced hazards, varying heritage management arrangements and where a technical support framework to obtain relevant data and the potential to co-create community focused climate action initiatives existed for future research steps.

Informal discussions with individuals, particularly beach users, and communities near coastal sites and coastal zone management agencies provided valuable qualitative and contextual data concerning sites, perceived changes, or the coastline's capacity to manage various climate-

⁸⁰ Climate Central's Surging Seas Global Risk Zone Map

induced hazards and its adaptive capacity. This was considered critical for future actions related to this study, as climate action initiatives must be embedded in local community strategies and the social context of activities within the coastal zone to be sustainable. As portions of the coastline were mapped and assessed for each island, an estimation of the measure of vulnerability was provided for the portion of the mapped coastline or three to four selected individual sites on each case study island.

Vulnerability Assessment Approach and Framework

For the selected case studies of Antigua, Barbados, Jamaica, and Saint Lucia, and according to Mimura et al. (2007, p. 689), many of these islands exhibit several “characteristics that make them vulnerable to climate change and other extreme hydro-meteorological events. These characteristics include relative geographical location, small physical size, concentrations of population and infrastructure in narrow coastal areas, restricted economic base, and reliance on natural resources, combined with inadequate technical and institutional capacity for adaptation” (see also Alleyne, 2019; Hay et al., 2013; Mycoo, 2014; Ramsay, 2013; Robinson, 2018).

In recent years, various framework have been developed to assess vulnerability, particularly at archaeological and built heritage sites. The vulnerability assessment approach utilised in this research integrates elements of the six-step vulnerability framework adapted for cultural heritage by Daly (2014) and tested at Brú na Bóinne and Skellig Michael in Ireland. The six steps identified by Daly (2014, p. 272) being “(1) defining heritage values to be assessed, (2) understanding the exposure, sensitivity and adaptive capacity of these values over time, (3) identifying likely hazards for each value under the future climate using the matrix of impacts, (4) developing indicators for the elements of vulnerability, (5) assessing vulnerability by entering values for exposure, sensitivity and adaptive capacity in to the causal model, and (6) using stakeholder feedback to refine and communicate results.” Consultation with key actors was considered vital for every component.

Daly (2014) also utilised the IPCC-elaborated approach concerning *exposure, sensitivity, and adaptive capacity* in articulating the measure of vulnerability. This research also integrates the

IPCC-inspired UNESCO climate vulnerability index (CVI) framework,⁸¹ a rapid assessment tool applied to world heritage properties based on site values, in this case outstanding universal value, and community vulnerability, making it a tool that is values-based, science-driven and community focused (Daly et al., 2014; Heron et al., 2022). However, this research made specific amendments to better capture adaptive capacity within the context of the Caribbean. These amendments will be elaborated on later in this research.

Daly (2014) notes that vulnerability assessments were not so prevalent until the IPCC's Third Assessment Report, which recommended vulnerability assessments as a vital part of the process of climate action. Vulnerability can be approached from different perspectives. The IPCC determines vulnerability and exposure by assessing these contexts: *physical*, which can include for example exposure to floods, drought, erosion; *biological* for ecosystems, biological productivity, or biodiversity; and *human*, including food production, health, livelihoods, economy (Douglass & Cooper, 2020, p. 8254). Within the parameters of this research, the coastal archaeological record is used as a vehicle to examine the vulnerability of the physical system with applicability to the biological system.

Ford and Smit (2004) identified the *biophysical and social* as two approaches to studying vulnerability. The *biophysical* approach is where vulnerability is conceptualised “as a pre-existing condition determined by exposure and sensitivity to hazard and in the *social* approach, vulnerability depends on the social, political, and economic determinants that control resistance and recovery, i.e., adaptive capacity” (2004, p. 392). Due to the socio-ecological focus pursued in this research and the Caribbean context, this research is anchored in a combination of both approaches, referred to as a coupled human-environment system (Daly, 2014; Ford & Smit, 2004).

As such, “vulnerability is a function of *exposure, sensitivity, and adaptive capacity*” (Daly, 2014, p. 270) and the relationship between all, highlighted in the IPCC's definition (IPCC, 2001; McCarthy et al., 2001) and amended by Daly (2014) to include heritage. In reading the definitions provided here, *plain text in italics* refers to the original IPCC text, ***italicized bold text*** indicates amendments

⁸¹ Climate Vulnerability Index (CVI): cvi-heritage.org

by Daly (2014) to reflect the integration of heritage text, and **bold text** reflects additions made for this research (see Table 5).

Daly (2017, p. 35) also cites the Department of Environment, Community and Local Government in highlighting that adaptation concerning culture targets includes “moderating harm through the management of and response to risks from climate change.” This is combined with Phillips’ (2015, as cited in Daly, 2017, p. 35-36)⁸² six critical determinants for the adaptive capacity of cultural heritage being *resources, authority, access to information, learning capacity, leadership, and cognitive factor*.

Table 5. Vulnerability, Exposure, Sensitivity and Adaptive Capacity

Definition of Vulnerability: *the degree to which ~~a system~~ an identified cultural heritage value [the archaeological record] is susceptible to, ~~or unable to cope with,~~ or will be adversely affected by, ~~adverse~~ effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity (McCarthy et al., 2001; Daley, 2014).*

Turvey (2007 cited in Alleyne 2019, p. 13) regards vulnerability as a multidimensional term that implies potential loss from exposure to causal factors such as biophysical, socio-economic, political, and environmental risks and hazards.

Definition of Exposure: *the ~~nature and~~ degree to which a system [an identified heritage value] [the archaeological record] is exposed to climatic variations [and their related impacts]. It is determined by environmental conditions (physical and atmospheric).*

⁸² Phillips 2015 cited in Daly 2017:36 ‘Resources (technological, financial, human); Authority (plans and policy instruments), political will; Access to Information (monitoring, guidance and information, future thinking); Learning Capacity (institutional memory, heritage as a learning resource, double and single loop learning); Leadership (commitment at senior level, champions, creation of a vision, communication and collaboration, holistic management); Cognitive Factors (individual perception – view of risk and openness to uncertainty)’

Definition of Sensitivity: *the ~~nature and~~ degree to which ~~a system an identified heritage value~~ [archaeological record] ~~is exposed to significant climatic variations~~ is affected, either adversely or beneficially, by [climate-related] stimuli. **The effect may occur at the artefact, assemblage, or system level.***

Adaptive capacity: *The ability of a system [the archaeological site] to adjust to climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.*

(McCarthy et al., 2001; Daly, 2014; Richards 2025).

The framework used by this research for defining the *adaptive capacity* of a system combines that of the United Nations Development Programme's (UNDP) four strategic areas as identified by the GEF Global Support Programme (2005) presented next, and the six determinants of adaptive capacity relevant to cultural heritage elaborated by Phillips (2015, cited in Daly, 2017, p.35-36)) and previously presented:

1. *Policies and Programmes* for example management structures, visitor management, legislative protections
2. *Information and Knowledge* in relation to climate change, human resources, population
3. *Implementation* through conservation and maintenance programmes
4. *Monitoring and Feedback*, not included as part of this adaptive capacity framework, but is acknowledged that vulnerability assessments need a cycle that integrates monitoring.

In line with the human-environment dynamic parameters of this study, this research also considers that the extent to which a system may be vulnerable is attributable to its socio-historical and economic context to include historical processes such as colonialism, economic drivers, policy and institutional framework and development as being critical to its adaptive capacity. The adaptive capacity component was further expanded by this research to consider the existence of

supportive frameworks to adapt or reduce vulnerability, the level of coastal development (LCD) and the level of coastal ecosystem degradation (LCED).

As such, this research proposes an amendment in how adaptive capacity is examined in the Anglophone Caribbean to now reflect the level of coastal development in proximity to the heritage value (LCD); the level of ecosystem degradation in proximity to the heritage value (LCED) to include historical processes of degradation; management response (MR) through policies and programmes, institutional capacity, resources, leadership, monitoring, guidance, and available information; and existing climate action (CA) based on an awareness of climate change impacts, level of site degradation, and cognitive factors such as perceptions of risk.

The adaptive capacity component's average of all ranked areas (*1 – Low, 2 – Moderate, 3 – High, 4 and above – Very High*) is used as the score for Adaptive Capacity (AC). The Measure of Vulnerability (V or MV, see Table 6) is then a function of Exposure (E), Sensitivity (S), and Adaptive Capacity (AC) leading to the equation: $MV = (E + S) - AC$.

Table 6. Illustration of the Measure of Vulnerability

Climate Hazard and Phenomena	Heritage Value	Impact	Sensitivity	Exposure	Adaptive Capacity				Measure of Vulnerability
					LCD	LCED	CA	MR	
		Coastal							
	i.e.,	Erosion,							
Sea level Rise	Exposed	Storm surge,	1 - 4	1 - 4	1-4	1-4	1 - 4	1 - 4	MV = (E + S) - AC
	remains	Coastal							
		inundation							

Note: AC is an average of LCD, LCED, CA, and MR. **Key:** LCD – Level of Coastal Development; LCED – Level of Coastal Ecosystem Degradation; CA – Climate Action; MR – Management Response.

A simple vulnerability assessment was applied to assess case studies, focusing on the scaling proposed in Table 6 concerning the identification of crucial climate stressors, scaling for exposure, likelihood, or sensitivity to exposure and within the context of proximity to the coastline, elevation, observations based on the level of deterioration of the surrounding landscape or environment from anthropogenic influences, and an examination of coastal change. Although historical processes are not included in the indicators provided for adaptive capacity, the position of this research is that it is captured across and manifested in all the indicators provided. Regarding vulnerability assessments for select sites, this research utilised the climate change phenomenon (CCP) of sea-level rise (SLR) and the attending hazards of coastal inundation, coastal erosion, and storm surges.

As a strategy for future actions, field exercises and the selection of sites for the vulnerability assessment were undertaken with heritage experts or organizations on each island.⁸³ This also provided the opportunity to discuss the long-term use of data and the applicability of vulnerability assessments as a management response and a tool for generating data on the predisposition of sites to climate-induced hazards and for developing climate action.

Through this assessment, this research aims to support the development of recommendations that highlight the interrelations between humans and their environment expressed through cultural heritage. This assessment also positions itself to assist with understanding past and current climate impacts and adaptation to inform future climate action and strategies. Understanding how this awareness of vulnerability and how past populations experienced and adapted to severe environmental change can guide the development of relevant actions in tune with our island contexts that will also benefit cultural heritage. It, therefore, pulls on an understanding of vulnerability as a guide for climate action.

Through the participatory processes developed and tools utilised with focus groups and stakeholders in case study islands, this research contributes to developing sustainable models for integrating culturally derived data in national and local strategies.

⁸³ Antigua: Dr. R Murphy and the Department of Environment; Barbados: Kevin Farmer and the Barbados Museum and Historical Society, with inputs from the Coastal Zone Management Department; Jamaica: The Jamaica National Heritage Trust, individual experts, and the Archaeological Society of Jamaica (ASJ); Saint Lucia: Germaine Joseph, Miguel Trim (drone mapping), Dr. Winston Phulgence and Jean Pierre of the Saint Lucia Archaeological and Historical Society (SLAHS).

Pulling from the vulnerability assessment and using geographic information systems (GIS), maps highlighting sites at risk were created for case study islands indicating known sites threatened by climate-induced hazards. Maps such as these can also be combined with site predictive modelling to identify unknown archaeological resources that might become threatened or inform community initiatives or planning processes mentioned previously (De Waal et al., 2019; Richards, 2022).

Although those researching and managing the Caribbean's archaeological record have noted and started to implement some actions concerning the impacts of climate-induced hazards on the coastal archaeological record, these are, unfortunately, minimal actions that promote predictive modelling and other vulnerability studies over an extended period. This is partly a matter of resources be it human, financial, or technological. As such, visuals developed from this research will be shared with heritage and non-heritage actors and partners on specified islands as a tool for building dialogue and developing projects through the availability of cultural data and building initiatives that are community focused and led, as well as developing partnerships with civil society organizations. Although the data landscape is always evolving and the data presented here likely outdated by the time this research is complete, the tools and graphics produced are meant to aid in the visualisation of the types of data that can be produced and how they can serve the safeguarding of threatened heritage.

Ethnohistorical and Ethnographical Research

From the perspective of this research, a study of ethnohistorical and ethnographic data is vital to understanding how the past can guide future climate action in the Caribbean. In the case of ethnographic data, this was supported by a process of collaborating with Indigenous communities through various qualitative sources such as general observations and participatory surveys in specified Indigenous communities throughout the Caribbean. The aim being to contribute to the identification of inter-generational practices and knowledge developed and utilised in the past and transmitted over time in these communities in response to the changing climate and other natural hazards common to the region. This activity also sought to identify the evolution of perceptions in relation to climate phenomena. This field component was supported or contextualised by written

historical and ethnohistorical sources and studies of Indigenous worldviews concerning severe environmental change in the Caribbean where available.

Although this activity focused generally on recording the varying perspectives, knowledge and practices relevant to the changing climate, this research also specifically targeted data in relation to water and food management, settlement placement, and housing construction in relation to climate-related events. An analysis of this information supports an identification of how and the ways in which traditional knowledge systems can help to identify sustainable solutions for climate action in the region.

Ethnographic Field Research of Traditional Knowledge, Practices and Systems

Ethnographic field research undertaken reviewed the ways in which climate-induced hazards and related disasters are perceived by these communities. It also examined how traditional knowledge systems were used to understand climate change, mitigate and adapt, understand how impact is perceived, what strategies have been put in place for climate action and finally, identify, based on the past, what are the vital considerations for future climate action. In completing these areas identified. As such, this field component sought to highlight case studies for integration with climate science at multiple levels while identifying new data and perspectives which exist within these communities. This field research also served to assist with the identification of adaptation strategies that may be or become evident in the archaeological record.

Traditional ecological knowledge has always played an important role in Caribbean society. This importance has been most evident in the traditional uses of plants as medicinal sources. Recognizing the vital role of traditional ecological knowledge and the anchoring of this research in a historical ecology or human ecodynamics framework, the Kalinago in Saint Vincent and the Grenadines and the Commonwealth of Dominica, the Garinagu (Garifuna) in Saint Vincent and the Grenadines, and the Moore Town and Charles Town Maroon communities in Portland, Jamaica, were approached as part of this collaborative field research programme (see Table 7).

Table 7. Indigenous Communities Collaborating with this Ethnographic Research

Caribbean Indigenous Community	Communities (Study Areas)
Maroons of Jamaica	Windward Maroon communities: <i>Moore Town and Charles Town</i>
Kalinagos, Commonwealth of Dominica	Kalinago Territory: Hamlets of <i>Sineku, Mahaut River, St. Cyr, Bataka, Salybia, Concord, Crayfish River</i>
Kalinagos and Garifuna of Saint Vincent and the Grenadines	<i>Sandy Bay (New Sandy Bay) and Greiggs</i>

Source: Author compiled

As Hofman and Antczak (2019, p. 21) highlighted, “humans are not passive adaptors to their environment but rather they creatively shape their landscape and islandscape while simultaneously being moulded by dynamic biological, sociocultural and environmental feedback.” These communities exist in the Anglophone Caribbean and were identified for varying reasons. The primary being their long historical and sometimes well-documented relationship with their natural environment which has resulted in these communities bearing witness to the impacts of climate warming and other severe environmental challenges over the long term, resulting in perspectives on changes in these socio-ecological relationships. This relationship is approached from the perspective of *oneness or harmony* with their natural environment, placing them in a unique position to share how their ancestors and wider communities have utilized this intergenerational knowledge.

Second, a significant platform of community engagement and research developed in partnership with these communities contributes to building a more complete understanding of their worldviews concerning environmental challenges and severe change. The Caribbean region has numerous traditional groups, including its Indigenous peoples, and while the identified communities are in the selected geographic focus area of the study area, they are also the most known and referenced Indigenous groups in the Anglophone Caribbean with the exception of Guyana and Belize.

A collaborative research programme was developed in partnership with these communities, which supported a more profound discussion and analysis of socio-ecological relationships at the micro level within these communities, and at the macro level on these islands and the region, within the context of climate change and manifestations of adaptation over several generations. Through carefully organized discussion sessions with these communities, this research studied how this traditional knowledge can potentially help us better understand the changing climate and landscape changes within this context, how past changes were addressed, and coping strategies and adaptations made, as well as those that are still embedded in contemporary ways of living and being.

This research utilized structured and non-structured interviews and focus group sessions comprising open-ended questions to encourage dialogue. Within the context of this collaborative approach, communities were consulted regarding the design of questions and the ways of capturing data, and their feedback incorporated. A list of eighteen questions (see Appendix III) was prepared to capture community perceptions, traditional knowledge and practices, and threats to transmitting these knowledge and practices in relation to severe environmental change. This list of eighteen questions was also used to guide initial community engagement sessions.

This original list of questions was also discussed with the Caribbean Amerindian Organization (CAO) and representatives from the various communities participating in this study. The feedback allowed a whittling down, eliminating, or merging of questions into five central questions:

1. *What do you think climate change is and how does it impact you and your community?*
2. *Are there any knowledge, practices, and strategies that you recall your ancestors using to deal with these changes (communities were further prompted in relation to the chosen areas after giving initial responses)*
3. *Are any of these still being practiced by you or your community today?*
4. *Are any [knowledge, practices and strategies] relevant if there is an increase in these challenges for the future?*
5. *Do you believe traditional knowledge is useful for adjusting to climate change?*

Data emanating from interviews and group sessions were qualitatively analysed and presented in Chapter Six. While data is summarised and presented, original transcriptions are not included in this document. Responses presented are relevant to the researcher's chosen areas of focus, which are, *knowledge of agriculture (drought-resistant crops, how water is used and conserved, flood control, types of crops and diversification, planting schedules, etc.), housing construction (materials, techniques, and processes), and water management, as well as general observations concerning severe environmental change* and challenges regarding adaptation in an increasingly severe climate variability context.

At times, questions led to a discussion on other relevant issues. For example, in Saint Vincent, members of the [New] Sandy Bay community always referenced the eruptions of La Soufriere as part of their cycle of natural hazards in that the eruptions built up the coastal areas, and the hurricanes, coastal inundation and storm surges, in turn, eroded these areas.

Individual interview participants were randomly selected but with a preference for elders over the age of seventy. The interviews expressed this bias for older community members, as it aimed to capture as many knowledge and practices as possible that were still present in the social memory of community members over a longer span, to better capture possible narratives about social memories, knowledge and cultural practices concerning adjusting to severe environmental challenges and change over time.

Younger community members were, however, not excluded and formed a part of group discussions. Approximately ninety percent of interviews and group discussions were completed during the Coronavirus Pandemic, which also impacted older community members' access to spaces and willingness to participate. In all instances, the researcher discussed with interviewees how they wished to participate in interviews. In all cases, free and informed permissions and consent were sought, received, and recorded. Interviews also utilised open-ended questions, where collaborators could freely express their thoughts. This approach was identified as a valuable way to capture additional information that was not a part of the list of questions. A group session was organised at the beginning and end (where possible) of each field research session, in which the research and data documented were shared and presented, and an opportunity provided for

persons to query, qualify or disqualify the information documented. This served as a form of data validation process. Interviews were held with those comprising the community's governance structure, those with no formal role, and researchers and organizations conducting research in the area, as well as reviewing relevant projects being implemented in these communities.

As this study focused on community knowledge generation, participants were engaged as empowered actors within a free and informed consent and qualitative data framework. Communities indicated that those who came before them, meaning their ancestors, were intimately connected with and knew the landscape well. This was often acknowledged within the context of a reflection of cultural traditions and knowledge practices that have been lost and the severe disruptions to their connection with this landscape evolving over centuries of interaction and disruption.

Prior to the commencement of individual interviews or focus group sessions (see Table 8), discussions were held with community leaders regarding the proposed research, and an informal community session was held with the Kalinago, Garifuna, and Maroons, with invitations open to all interested in hearing about the research and participating. Invitations were shared through community governance mechanisms such as through councils, and community leaders were responsible for bringing groups together. In instances where the researcher was traveling through the community, community members would be engaged informally about the research and given the opportunity to speak if it was desired.

This initial research session allowed a frank discussion of community perceptions regarding climate change, its perceived impacts, and what impacts looked like at the individual, community, and island levels.

Table 8. Research Sample by Community

Indigenous Community	Participatory Methods
Charles Town, Jamaica	2 group interviews and discussions; 5 individual and expert interviews
Moore Town, Jamaica	2 group interviews and discussions; 5 expert interviews
Kalinago Territory, Dominica	2 group sessions; 12 individual interviews
Sandy Bay, Saint Vincent	1 group session; 6 individual interviews
Greiggs, Saint Vincent	1 group session; 3 expert interviews

Source: Author compiled

Individual interviews were conducted culturally and respectfully, with the informed consent of individuals and groups in individual and collective sessions organized with community leaders. Presentations were made to these individuals and groups on the intended research, and feedback was received within the context of capturing and understanding community and individual perceptions concerning the changing climate. All interviews and group discussions were undertaken between Summer 2022 and Summer 2023.

Dialogue with Indigenous communities is an ongoing activity concerning general perspectives on climate and other environmental changes. Research data was shared with communities at every step, including during group discussions. Specific data validation sessions were organised to share this research and facilitate broader discussions on perceptions, applicability of data, and use, in addition to plans to co-design a post research visual output to document information shared by communities and which communicated their own stories concerning the changing climate.

Discussions were also had with persons undertaking research related to agricultural or water management projects in these communities to further contextualise data and broaden research. These were referred to as expert interviews. The purpose being to capture considerations for including traditional ecological knowledge in their work. In these cases, these discussion points are included in the broader narrative used to introduce and summarise these community case

studies. Photographs were used, where allowed, to document visible practices and adaptations where they exist.

These references illustrate how traditional ecological knowledge from these communities has contributed to social adaptation strategies and what we can learn in the wider Caribbean to address this ongoing environmental change while moving towards complementarity in climate science and traditional ecological knowledge.

The communities collaborating in this research component also have documentary information concerning broader responses to natural hazards and their experiences with climate challenges, particularly its overall impact on lives and livelihoods. In some instances, these communities had also previously participated in projects with researchers from Leiden University, establishing a preexisting relationship going back to the 1980s (see Ariese, 2019; Auguiste & Hofman, 2022; Con Aguiler, 2020; Sankatsing Nava & Hofman, 2018; Stancioff, 2018). The researcher, however, participated in informal interviews and discussions with any person expressing an interest in the research activity, with the hope that communities will find the sharing of their stories and the co-creation of this dialogue valuable, as well as reflect on the reintroduction of strategies from the past that may have ‘died out’ but could still be valuable within the context of ongoing and accelerated climate change.

The ethnographic field research undertaken did not seek to conclude whether adaptation strategies or communities’ resilience to current or future climate challenges were successful or not. Instead, it focused on knowledge and practices from the past that have been used over time in pursuit of adaptation to ongoing and accelerated climate change and could be valuable for future climate action from the perspective of Indigenous communities, and play a role in managing this risk.

Ethnohistoric Research

Interviews and group discussions were augmented through a desk review of accessible literature concerning how Indigenous communities perceived environmental change or recorded coping or adaptation strategies. The studies selected for context focused on the relationship between

Indigenous communities and their natural environment, how they experienced environmental changes, and how knowledge was and is generated concerning the natural environment. The review included published and unpublished sources.

Bright (2011, p. 308) points out that “ethnohistorical accounts of [Lesser Antillean] Amerindian society were extremely sparse until the beginning of the seventeenth century.” This sentiment was echoed earlier by Peterson et al. (2004, p. 17) in noting that “these [ethnohistorical accounts] were scarce for virtually all areas of the circum-Caribbean and coastal South America because of the rapid and poorly recorded disruption of Indigenous cultures regionally.” This research also reviewed previous land-use and climate change-related studies undertaken in these communities, in addition to reviewing ethnohistorical studies, to develop these ethnographic case studies on the Kalinago, Garifuna, and Maroons. These documents were reviewed primarily to contextualise and augment ethnographic research undertaken.

The use of ethnohistoric sources is not new to Caribbean archaeologists, who have demonstrated their value in providing context for archaeological research within Indigenous communities. Both can be used separately or in tandem. Wilson (1994) raised issues regarding archaeologists’ use of this source primarily because of the aims of both ethnohistory and archaeology. Ethnohistory records events and people and gives glimpses of the structure of relations, while archaeology addresses human behaviour on a larger scale. This divergence is, however, not so critical to this research because of its nature, and is considered a positive, as although individuals might have slight variations in their adaptation strategies (identified in ethnohistorical accounts), they were likely to be a part of the whole in group decisions made to relocate or place settlements, construct dwellings a certain way which would be captured under human behaviour at a larger scale. This is, nevertheless, in the context of poor and limited observations and accounts.

Due to the significant disruption to the lives of Indigenous peoples throughout the entire period of European colonisation, a combination of archaeology, ethnohistorical, and ethnographical studies present a valuable trifecta effect to assist in having a clearer picture of climate action over time. Within the Caribbean region, various studies of the Indigenous peoples have been undertaken concerning observations in relation to their interaction with severe environmental changes and

their worldviews concerning these changes. As these communities had no known written expression of their history and daily life, these written studies commenced during European colonisation and continue to the present day. These earlier studies by Europeans were done from the perspective of external persons or observers and not by Indigenous persons. In some instances, these earlier observations have been analysed by later researchers. Ramirez (2011) suggests that around two hundred chroniclers are recognized by modern scholars, and only a few focus on the Caribbean. There is, however, a dearth of research on responses to severe environmental challenges by contemporary Indigenous communities in the region, and specifically the Anglophone Caribbean.

Although written observations of Indigenous communities sometimes contributed detailed context in relation to how these communities experienced environmental challenges, they nevertheless contained biased or inaccurate observations from the dominant research position of the chronicler or the dynamics of colonial power or mandates at the time. Mignolo (1992) writes that the image of the Amerindian in the sixteenth and seventeenth centuries was elaborated as barbaric, flesh-eating, lacking clothing, and having no alphabet writing. The earliest writers include those from the sixteenth and seventeenth centuries, such as *Anonymous of Carpentras*, *Du Tertre*, *Rocheport*, and *priests such as Breton and Labat*, who documented their observations as well as created various visuals to document daily life (Bright, 2011; Hofman & Van Duijvenbode, 2011; Peterson et al., 2004).

Anthropological research in the twentieth century suffered from this issue as well, where studies maintained a bias or viewed Indigenous communities in a discriminatory light where their knowledge and practices were often looked down on, dismissed as folkloric, or romanticized in some instances. Regardless of the opinions presented by these earlier researchers, they nevertheless provide some record of society, and it is up to the researcher to use these accounts discriminately to determine how best to utilise their information. This dissertation recognises their value in presenting a version of society that existed at that time from their perspective. So, their observations are carefully considered in the narrative to contextualise this research.

Beckford and Barker (2007, p. 1) highlight that local Caribbean knowledge is “valuable, adaptable, and necessary in coping with risks and uncertainty.” This knowledge was often orally transmitted and context-specific, be it environmental, geographical or cultural. It has been generated specifically for use in a particular setting and is usually adaptable based on the need. Though the value of local knowledge in relation to Western science was often questioned, it was always positioned within environmental, political, economic, and social contexts, providing the opportunity to evaluate it rigorously. As stressed previously, local knowledge is not a panacea to all our issues with climate change; however, it should be seen as a complementary knowledge system that operates within its limitations, just as Western science does, and that evolved as valuable adaptation to local realities.

Briggs (2005) in discussing how transferable and valuable Indigenous knowledge was, questioned whether it was really Indigenous. This study offers examples of Indigenous and local knowledge principles rather than advocating the transfer of specific knowledge to situations in which it was not produced initially. It also looks for locally relevant examples that may be applicable to island life and cannot be separated from its cultural setting. It, therefore, should not be portrayed as perfect knowledge and practices devoid of errors.

This section of the research also benefited from a review of land use and agricultural research that were previously conducted within selected communities and included a traditional knowledge component.

Desk-review of Non-culture Documents

In focusing specifically on the cultural pathways that can be perused in relation to climate action, other documents were examined in relation to the integration of cultural data in broader national plans be they development or climate. In so doing, it also looks at integrations made by the culture sector through its sectoral plans or various cultural heritage management plans and policies. The documents analysed for this research present a sample of the study area within the Caribbean to provide a regional state of practice and allow the identification of trends, themes, and opportunities for synergies.

These culture and non-culture documents (see Table 9) were reviewed through desk research. The review of these documents aimed to communicate the possibility of elaborating a framework that was specific to the region, and utilized different data sources beyond traditional ones, to better integrate climate action and culture in planning, policy, and programming. Essentially, a framework that pursued interdisciplinary collaboration as the best approach to climate action in the region. This approach was utilised through several separate but related actions. Keywords were identified to be used when searching through documents, with the next step being to determine, from these keywords, the extent of the inclusion of that information in the text.

Cultural documents reviewed included cultural heritage legislation, cultural policies, site management plans and specifically world heritage site management plans, and culture sector plans or strategies. World Heritage property management plans were included in recognition of attempts to use world heritage properties as observatories or laboratories in relation to observing climate change and spaces for climate action. This was connected to various climate change and world heritage pilot projects that have been implemented in the region. The objective of reviewing these culture documents was to identify how much these documents addressed issues such as climate change, environmental change, and disaster risk management.

For non-culture specific documents, the objective was to review those documents predominantly within the climate change and development domain, which included national development documents and its various sector components, national communications to the UNFCCC, national adaptation plans, disaster-risk management plans and legislation, land-use, coastal zone management, and physical development documents and plans, and finally, climate policies and plans where they existed. The aim being to identify the extent to which these documents referenced culture to identify a workable pathway for culture into national climate change planning and policy. For each document type, such as national development documents, the discussion was approached randomly from the perspective of one island, with information integrated from other islands to provide further context.

Table 9. Culture and Non-culture Documents by Country Reviewed for Research

Antigua and Barbuda

Sustainable Island Resource Management and Zoning Plan (SIRMZP) 2011; National Contribution (2016); Nelsons Dockyard World Heritage Property Management Plan; The National Parks Act, Cap. 290 (1984); The National Parks (Amendment) Act, No. 11 (2004); Disaster Management Act, No. 13 (2002); Physical Planning Act, No. 6 (2003); Environmental Protection and Management Act, No. 11 (2015); The Cultural Heritage (Protection) Bill, (2016).

Barbados

Physical Development Plan (PDP) Amended 2022; Planning and Development Act 2019; Integrated Coastal Zone Management Plan 2020 - 2030; National Contribution (2018); Historic Bridgetown and its Garrison Management Plan; Coastal Zone Management Act, Cap. 394 (1998); National Conservation Commission Act, Cap. 393 (2000); Emergency Management Act (2006); Cultural Industries Development Act, No. 100 (2013).

Dominica

Dominica Climate Resilience and Recovery Plan 2020 – 2030 (CRRP); National Contribution (2020); Morne Trois Pitons Management Plan; Development and Planning Corporation Act, Chap. 84:01 (1972); National Parks and Protected Areas Act, Chap. 42:02 (1975); National Trust Bill (1983); Emergency Powers (Disasters) Act, Chap. 15:03 (1987); Physical Planning Act, No. 5 (2002).

Grenada

Aligned National Action Programme for Grenada's Commitment under the UN Convention to Combat Desertification and Drought (2015); National Physical Development Plan 2003 - 2021; National Sustainable Development Plan 2020 - 2035; National Adaptation Plan 2017 - 2021; National Contribution (2019); National Climate Change Policy for Grenada, Carriacou and Petite Martinique (2017 – 2021); Grenada National Trust Ordinance, No. 20 (1967); Emergency Powers Act, No. 17 (1987); National Heritage Protection Act, No. 18 (1990); National Parks and Protected Areas Act, No. 42 (1990); Physical Planning and Development Control Act, No. 25 (2002).

Jamaica

Vision 2030 and Sectoral Plans for Culture, Agriculture, Urban and Regional Planning and Natural Resources and Climate Change; National Contribution (2020); Management Plan for Blue and John Crow Mountains National Park; Treaty with Maroon Community, Act 120 (1738); Jamaica National Heritage Trust Act, No. 8 (1985) (*update in process*); Natural Resources Conservation Authority Act, no. 9 (1991); Town and Country Planning Act, No. 3 (1999); Institute of Jamaica Act, No. 33 (2010); Disaster Risk Management Act, no. 1 (2015).

Saint Kitts and Nevis

National Contribution (2016); Brimstone Hill Fortress National Park Management Plan; Saint Christopher and Nevis National Conservation and Environment Protection Act, Cap. 11.03 (1987); Development Control and Planning Act, Cap. 20.07 (2002); Saint Christopher National Trust Act, No. 12 (2009).

Saint Lucia

National Contribution (2017); National Adaptation Plan 2018 – 2028; Pitons Management Plan; Saint Lucia National Trust Act, No. 16 (1975); Saint Lucia National Trust Rules, No. 27 (1984); Physical Planning and Development Act, Cap. 5.12 (2005).

Saint Vincent and the Grenadines

National Economic and Social Development Plan (2013 - 2025); National Adaptation Plan 2018 - 2030; National Contribution (2016); National Culture Policy; Saint Vincent and the Grenadines National Trust Act, Cap. 329 (1990); Preservation of Historic Buildings and Antiquities Act, Cap. 247 (1990); Town and Country Planning Act, no. 45 (1992); National Parks Act, no. 33 (2002).

The Bahamas

National Contribution (2015); Climate Resilient Coastal Management and Infrastructure Programme; Coast Protection Act, Cap. 204 (1968); Antiquities, Monuments and Museum Act, Cap. 51 (1998); The Bahamas National Trust Act, Cap. 391 (2001); Disaster Preparedness and Response Act, Cap. 34A (2006); Planning and Subdivision Act, No. 4 (2010); Antiquities, Monuments and Museum (Amendment) Act, No. 63 (2011); Antiquities, Monuments and Museum (Underwater Cultural Heritage) Regulations, Cap. 51 (2012).

Trinidad and Tobago

National Contribution (2021); Physical Development Plan; Coastal Zone Management Plan; Vision 2030: The National Developmental Strategy of Trinidad and Tobago 2016 – 2030; Disaster Measures Act, Chap. 16:50 of 1978; National Trust Act of Trinidad and Tobago Act, Chap. 40:53 of 1991 Protection of Wrecks Act, Chap. 37:04 of 1994; The Environmental Management Act, Chap. 35:05 of 2000; Planning and Facilitation Development Act No. 10 of 2014 .

General

Regional [CARICOM] Culture Policy (1997)

Source: Author compiled

For culture documents, the keywords utilized for the systematic literature review included *climat, climate change, disaster risk management, disaster, global warming, risk, natural hazard, environment, and threats.*

For non-culture documents, the keywords used for the literature review included ‘*cultur (this search always brought up references to agriculture), tradition, indigen, heritage, local knowledge, archaeol, archeol, prehist, cultural+resources.*

These terms were searched in item, title, abstract, and keywords, and only publications in English were reviewed. These references were subjected to a two-step screening process to gauge relevance and suitability to the review aims. For example, during this research, searches for ‘*culture*’ always brought up references to agriculture, so these references were individually checked or screened.

Data and Methodology Limitations

Certain data limitations were evident throughout this research programme. As an acknowledgment, this research does not set out to explain or delve deeply into the complexities of

human-environment relations in the Caribbean from the past to the present. Neither does it seek to explore how feedback in socioecological systems impact how humans respond to related changes over the long term.

As an overarching methodological issue, this research recognises that in many cases, presentations concerning Indigenous persons in documents or articles displayed limitations in terms of biases in how these persons were written about or presented. So, these records were reviewed carefully in terms of the information presented.

As highlighted, community interviews took place during the coronavirus pandemic, and the exigencies of this situation meant that some persons were uncomfortable with visitors to their homes even with appropriate social distancing. This would impact the sample size in that some persons did not wish to participate. To manage this limitation, this research widened the net in terms of a review of previous studies. It also included expert knowledge in the form of researchers who had previously undertaken extensive studies in these communities and with a traditional knowledge element.

In the Garifuna and Maroon communities of Charles and Moore Towns, persons preferred group sessions, so these locations had predominantly mixed group and individual interviews. This is not necessarily a limitation, as the researcher recognised that an interesting dynamic was created in group settings that encouraged more examples to be presented or shared. The Kalinago of Dominica and Saint Vincent and Grenadines preferred individual or family interviews. The researcher always deferred to the preferences of the community or individual.

Although this research chose to focus on the areas of housing construction, water management, and food procurement adaptation strategies, this does not mean that what is presented is exhaustive or that adaptation did not occur in other areas. Conclusions about the effectiveness of adaptation strategies or communities' capacity to withstand future climate shocks were not the focus of the ethnographic field research. Rather than concentrating on this risk, it attempted to highlight knowledge and practices that have endured over time and may be useful for future climate action from the standpoint of Indigenous peoples, with applicability for the wider society.

In relation to vulnerability assessments and observations made in relation to coastal sites being impacted by climate-induced hazards, this research found that the most common limitations concerned the availability of comprehensive data sets due to these not existing with islands. This limitation is not unique to sites being impacted by climate-induced hazards but was more pervasive generally with the absence of complete inventories. In many cases, sites had also not been checked since initial surveys were undertaken in earlier decades. This resulted in the status of these sites being largely unknown. Added to this was the challenge of surveying extensive coastlines of larger islands.

While it was possible to deploy a more detailed vulnerability assessment and produce more detailed tools and visuals, this research assessed that the best approach was to utilise a methodology of monitoring that would be easy to deploy at the community and national levels and within the context of limited resources and capacities. Even the data and tools produced, such as Heritage at Risk Maps would require ongoing updating to remain valid and useful. Recommendations regarding strategies for climate action at the sites surveyed were also not pursued, as this research recognises that for these strategies to be useful, effective and sustainable, they would require ongoing observation of climate-induced hazards affecting sites over a period and data-driven solutions unique to that site developed.

The data provided in this research is, however, useful in supporting the development of a culture sector strategy for archaeological or built heritage or wider climate change risk plans, as well as informing the development of community-centred initiatives.

Although intangible cultural heritage through traditional knowledge and practices is an important component of this research, the implemented vulnerability assessment did not robustly pursue this form of heritage.

A final limitation stems from the use of terminologies. In earlier records, the words climate change or close variations would not be common. This meant that an extensive and careful search had to be undertaken to determine how environmental changes were referenced in documentary evidence. Connected to this is the use of the term 'local knowledge,' which most persons did not

define as a form of cultural knowledge and so not seen as relevant to these persons for cultural considerations in relation to the pathways being considered for climate action in the region.

CHAPTER FOUR

CARIBBEAN COASTAL ARCHAEOLOGICAL VULNERABILITY ASSESSMENTS

This chapter presents data from vulnerability assessments and observations of the coastal archaeological record on the islands of Antigua, Barbados, Jamaica, and Saint Lucia in the Anglophone Caribbean. The data is presented as a guide for applied archaeology and the utilisation of contemporary archaeological research, through vulnerability assessments of this record. The aim being to contribute to a framework that utilises varied data sources, with cultural heritage being one, for studying current climate impacts, examining and determining coastal health, facilitating planning, and developing relevant climate action for future impacts, as well as building coastal resilience in the region.

It also serves as an opportunity for the wider public to become involved in heritage programming that monitors coastlines and can be applied throughout the Caribbean at the local and national levels. The premise of this chapter, as such, is anchored in the applicability of using cultural data from archaeological sites for integration into broader strategies, plans, programmes, policies, or forming a part of data for decision-making. Documenting the present effects of climate-induced hazards and related disasters being experienced by coastal sites also supports the importance of climate action in coastal areas (Miller et al., 2024).

Studies focusing on coastal areas at risk have highlighted the strong correlation between environmental degradation and coastal vulnerability to hazards (Beck, 2014). Small islands are exposed to varying climate-induced hazards due to myriad factors, and in the Caribbean's specific context, its physical vulnerability often stems from its geophysical characteristics (Strauss & Kulp, 2018). The socio-ecological relationships in the region are also heavily rooted in and influenced by their historical context (Baptiste & Devonish, 2019; Douglass & Cooper, 2020; Stancioff, 2018; von Meding, 2019), which has further implications for vulnerability, specifically as it relates to landscape relationships, and these processes of environmental degradation.

Although the region does not present as a monolith in terms of its experiences with vulnerability, there are nevertheless similarities in its historical and environmental background and context, how it pursues coastal planning, and how it approaches this human-environment dynamic in the present day and within the existing legislative, policy, planning, and programming framework considered for this research. Specific similarities exist in the significant development of the region's coastal spaces, particularly tourism infrastructure, and a high level of coastal ecosystem degradation, and encroachments into hazard-prone and environmentally sensitive areas, resulting in susceptibility to the damaging effects of climate-induced and other natural hazards (Cashman & Nagdee, 2017; Lewsey et al., 2004; UNISDR, 2009).

In the 2014 Coasts at Risk report (Beck, 2014), it was highlighted that the Caribbean had risen in its risk and vulnerability ranking, with Haiti being the most vulnerable nation in the region, St. Kitts and Nevis the island state most exposed to coastal hazards, and Antigua and Barbuda at the greatest overall risk when exposure and vulnerability were combined. Subsequent reports on coastal cities at risk have suggested that Caribbean cities might lose up to *five percent* of these coastal spaces by the end of the century.

Concerning the management and protection of archaeological and built heritage, the existing legislative context in the Anglophone Caribbean contributes to the vulnerability of heritage, as legislation is often not robust or being implemented in ways that do not address or support protecting heritage from risks (Byer, 2022; Scobie, 2019; Siegel et al., 2013; Siegel & Righter, 2011). Legal frameworks for heritage in the region often focus on defining categories of cultural heritage (objects or structures), listing heritage resources, and mandating who should do what, but in reality offer very little protection to heritage, are static, and do not sufficiently evolve to address contemporary challenges with protecting heritage in the region such as from the impact of natural hazards or specifically climate-induced hazards. This challenge is perhaps also linked to the limitations of heritage policy and legislation in the region, which can be perceived as siloed and not in line with a landscape management approach in relation to heritage.

Existing legislation has not been made relevant or current to present and constantly evolving natural hazards. However, for sites that are listed as world heritage properties, site managers are

required to consider climate-related risks and issues as part of their programming. There is some hope that this approach would eventually trickle down to wider national heritage sites from a programming perspective. Chapter Two provided a more comprehensive discussion of heritage legislation issues in the Caribbean.

Archaeological research in the region in the most recent decades has produced a more comprehensive awareness of large numbers of sites that have been and are being lost due to sea-level fluctuations and tropical cyclones contributing to exacerbated coastal inundation and erosion and dangerous storm surges along the region's coastline (Fitzpatrick, 2012; Hofman & Hoogland, 2016; Peterson et al., 2004; Richards, 2022). Although a fuller discussion on the significance of the loss of our heritage as a region is not the research focus of this dissertation, the destruction of this heritage will nevertheless serve as the platform to discuss approaches to addressing this loss and the general health of our coastline, which has undergone significant land-use transformations from the earliest occupation of the region (Castilla-Beltrán et al., 2018, 2020; Stancioff, 2018; Siegel et al., 2018) to its current residential, commercial, and tourism-oriented and focused context (Cashman & Nagdee, 2017).

Coastal areas provide the opportunity for exploring transformational resilience when management approaches utilise multidisciplinary data. Mycoo et al. (2021, p. 1), in discussing human adaptation to coastal hazards in Bridgetown, Barbados, highlight that “as risks associated with the changing climate increase and evolve, it is important to broaden our understanding of climate vulnerabilities in coastal cities or areas.” One way of broadening this understanding is through the elaboration of an integrated coastal zone management framework that integrates considerations of the archaeological record, its data, and its vulnerability as vital components.

This integrated approach to tackling the challenges presented by climate change is necessary due to the large numbers of people and infrastructure living and working in the region's coastal areas. When undertaken, vulnerability assessments or risk analyses can serve as a useful tool in developing climate action, and individuals and communities can participate in them as localised actions and also at the national level.

When applied to heritage, they can guide the development of a sector-wide strategy in relation to natural hazards and risk, as well as assist practitioners, communities, civil society organizations, and government actors involved with cultural heritage in developing targeted and appropriate data-driven actions, to support community-based monitoring and the management and protection of sites. This will also allow prioritisation of sites at the highest risk as suggested by Daly (2014). These assessments also support the development of climate change narratives, where sites are used as the foci for exploring climate change, and laboratories for climate action, such as through the monitoring of coastlines, and as spaces for the identification of past human climate change adaptation solutions as well as the reintroduction of same. This research posits that an approach that integrates the coastal archaeological record will, by extension, protect coastal areas generally.

Vulnerability Context of the Caribbean's Archaeological Record

The Caribbean's archaeological record is exposed to a variety of risks, including ongoing infrastructural development generally and specifically in coastal areas, natural and other anthropogenic hazards such as sand mining and other extractive industries, and the emerging threat of sites impacted by conflict. These threats are often exacerbated within the context of a broader framework of poor maintenance, limited safeguarding of heritage, non-existent site inventories, which in most cases cannot provide basic information on threatened sites, varied capacities and resources available to government agencies and non-governmental or civil society organizations responsible for heritage, and finally, a limited legislative and policy framework as mentioned previously (Byer, 2022; Hofman & Hoogland, 2016; Siegel & Richter, 2011). Heritage management in the Caribbean has also not extensively or sustainably benefited from the use of innovative tools and solutions in the sector, except in circumstances where an externally funded project is being implemented.

Although other climate-induced hazards are discussed throughout this research, the vulnerability assessment approach and data presented in this chapter are based on a qualitative survey and

focus on an exploration of the climate phenomenon of sea level rise and the related impacts of coastal erosion and coastal flooding, and stronger storm surges due to SLR on the Caribbean's archaeological record. It is then discussed within the context of existing threats to this record as highlighted in the vulnerability schema presented in Table 10, which also serves as a wider context in examining threats in general to coastal settlements and coastal resilience.

In relation to coastal settlements, research in these areas suggests that SLR should be considered as a key factor when pursuing vulnerability assessments, as its impacts of storm surges and coastal inundation affect lives, critical infrastructure and economic activities (Alleyne, 2019; Cashman & Nagdee, 2017; Hay et al., 2013; Hay, 2013; Mycoo et al., 2021; Mycoo & Donavon, 2017), in addition to the previously mentioned impacts to the coastal archaeological record of the islands of the region (Fitzpatrick, 2012; Hofman & Hoogland, 2016; Siegel et al., 2013).

Table 10. Vulnerability Schema for the Caribbean's Coastal Archaeological Record

Climate Change Phenomena	Accelerated by	Impacts
Rising sea level	Coastal mining (i.e., sand); storm surges from storm activity	Erosion of coastal sites (visible and buried); inundation of coastal heritage sites
Increasing temperatures	Coastal development	Inundation of sites; storm surges; conservation issues; thermal stress to historic building materials
Wet and dry weather extremes	Loss of coastal ecosystem and natural barriers	Biodiversity loss at natural sites; damage to water systems; physical damage to historic built environment and building materials and structures due to damp and mold, damage to stone structures; loss of unsupported walls of historic structures
Intense tropical cyclone activity	Poor maintenance of sites; no protective	Structural damage to historic structures and towns; inundation and erosion of coastal sites from storm surges

	framework; human-induced hazards	

Source: Author compiled

Coastal erosion and inundation can be exacerbated by numerous activities, such as the extent to which coastlines have been transformed by development, coastal geomorphology, the state of reef ecosystems, and whether mangroves, coastal dunes, or other natural ecosystem barriers have been destroyed, among others that can provide natural mitigation solutions to climate-related disasters (Cashman & Nagdee, 2017). As we have seen in the case of the archaeological record, sand mining in coastal areas has been detrimental to accelerating coastal erosion (Fitzpatrick, 2012; Hofman & Hoogland, 2016). The disappearance of these sites contributes to the loss of physical evidence of Indigenous knowledge, adaptation strategies, artefacts, landscape modifications, and markers, in addition to social memories and lost stories.

The extent of coastal archaeological site loss provides a valuable indicator of coastal retreat, erosion, and loss. Archaeologists have mapped these impacts on sites and responded accordingly through rescue archaeology or, in some cases, through the utilisation of sandbags as one example of temporary mitigation actions, such as was used at the Seaview pre-Columbian site in Barbuda (A. Murphy, personal communication, June 17, 2022).

While it may be possible to relocate some historical structures, this is an expensive process and not seen as a worthwhile one, and a solution which impacts the archaeological context of the site. This action has, however, been most suggested in relation to development works, such as the removal of aqueducts or parts of historic walls. Other actions, such as the elevation of historic structures, are attempted in some islands, however, there is no specific evidence that suggests this is being done at an extensive scale or as a targeted strategy.

The impacts from rising sea levels have already presented themselves as critical issues for the region, with projected continued loss, as highlighted by this sample in Table 11, which provides compiled information on some studies that have detailed projected land loss due to rising sea

levels and its attendant effects. The studies indicated are however not exhaustive and are based on a desk survey of various regional projects, undertaken as part of this research.

Table 11. SLR Studies and Estimated and Projected Land Loss throughout the Caribbean

Country	Projected Loss	Study/Author (s)
Antigua and Barbuda	40 – 49% (Barbuda 90% less than 10ft ASL); coastal erosion of 0.9m per year	IADB 2018
Saint Kitts and Nevis	25 – 54% beach loss	IADB 2018
Barbados	73% loss of beach resources in Holetown	IADB 2018
The Bahamas	69% loss of beach resources	IADB 2018
Jamaica	Severe coastal erosion	IADB 2018
Antigua, Nevis	1m SLR = 940 and 340 hectares of land respectively	Project: Undertaking Synthesis and Up-scaling of Sea Level Rise Vulnerability Assessment Studies (SURVAS), Davis et al. 2010
Jamaica	1m SLR = 400km sq.	Richards 2008
Cuba	1m SLR = Submersion of 98 coastal communities; lives of 50,000 persons threatened	Davis <i>et al.</i> 2010
Barbados	1m SLR = Beach width losses between 5 and 30m	Caribbean Planning for Adaptation to Climate Change (CPACC) 1997 – 2001 Project (CCCCC 2005)

Source: Compiled from various sources by Author

Table 11 (continued). SLR Studies and Estimated and Projected Land Loss throughout the Caribbean

Country	Projected Loss	Study/Author (s)
Grenada	0.5m SLR = Disappearance of 60% of beaches	Modelling Application of Bruun rule in Haites <i>et al.</i> 2002
Guyana	Shoreline retreat of approximately 10m for every 0.1 m of SLR	Modelling Application of Bruun rule in Haites <i>et al.</i> 2002
CARICOM countries	Shoreline retreat of 1 m per 0.1 m of sea level rise in the low scenario and 1.5 m per 0.1 m of sea level rise in the high scenario. By 2080, that represents about 3% and 21% of the total land area of most CARICOM countries in the low scenario and high scenario, respectively.	Assessment of the impact of climate change on CARICOM Haites <i>et al.</i> 2002
Carriacou (Grenada)	Beach recession estimated at 1m year Generally, Caribbean SIDS beaches are estimated as eroding at rates of 0.25 – 9m per year.	Fitzpatrick, Kappers, and Kaye 2006 Agard <i>et al.</i> 2007
Eastern Caribbean	For each cm of sea level rise, a shoreline retreat of up to several meters horizontally could occur.	Udika 2009
Suriname, Guyana, French Guiana, and the Bahamas	With a projected 1 m sea level rise scenario (within the 21st century), 7.0%, 6.3%, 5.4% and 4.5% of the populations respectively 30% in Suriname and 25% in Guyana for a projected 3 m sea level rise scenario for the 21st century	Dasgupta <i>et al.</i> 2009
Suriname and Guyana	50% of the population of Suriname and Guyana would be under threat with a projected 5 m sea level rise scenario (21st century)	Dasgupta <i>et al.</i> 2009

Table 11 (continued). SLR Studies and Estimated and Projected Land Loss throughout the Caribbean

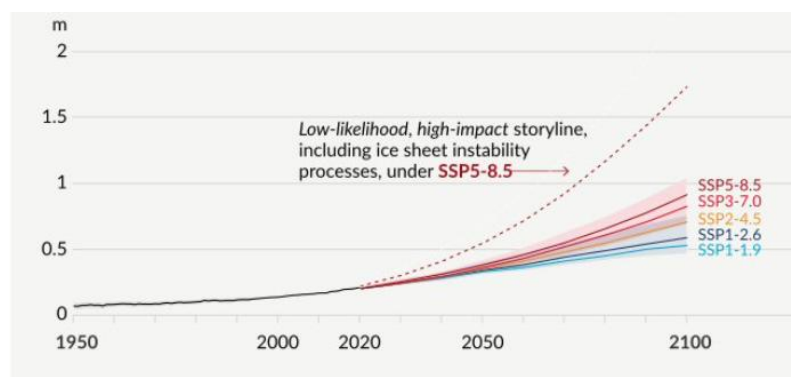
Country	Projected Loss	Study/Author(s)
Jamaica and Belize	1m SLR scenario: approximately 30% of wetlands	Dasgupta <i>et al.</i> 2009
Bahamas and Cuba	Projected 5m SLR scenario: most of the wetlands affected + more than half of Cuba's wetlands	Dasgupta <i>et al.</i> 2009
Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, Nevis, and Saint Kitts	0.5m years with elevated rates in countries that experience hurricanes	Coast and Beach Stability in the Caribbean (COSALC) Eastern Caribbean Beach Monitoring Programme: 1985 – 2000 Cambers (2009)
Saint Kitts	Net Shoreline Movement (2006–2015) of coastal villages in Saint Kitts up to 89.55m	Stancioff (2018)

Although not presenting as a uniformity throughout the region, sea levels have been rising and amounted to 1.8mm per year from 1950 to 2009. Palanisamy et al. (2012, p. 130) indicate that “interannual sea level variability was higher in the northern Caribbean than the southern, while the eastern shows greater interannual variability.” Since SLR is layered on top of storm-driven sea surges and tidal ranges, the intensification of hurricanes resulted in more significant destruction to coastal communities (Cashman & Nagdee, 2017; see also Cazenave & Llovel, 2010; Church & White, 2011).

Based on the IADB’s 2018 study on sea-level rise in the region (Strauss & Kulp, 2018), most islands were projected to have between 0.13 to 0.6m of sea-level rise by the year 2100, based on unabated climate pollution. The most recent IPCC Assessment Report, AR6, highlighted that “inland flooding and flood and storm damages in coastal areas” were likely to be the most common impacts on small islands cities and settlements (Pörtner et al., 2022, p. 47).

This research acknowledges that relative SLR is not uniformed across the region but assumes a 1m rise in sea levels by 2100 (IADB, 2018) in line with global projections for SLR by the IPCC (2022) of up to 0.74m by 2100. Church et al. (2013) previously noted that estimations could be ten to twenty percent higher in equatorial regions, due to a warming of the oceans, resulting in the melting of glacial ice and the rushing of water away from some polar regions and toward the Equator. Figure 7 highlights the extent to which the global sea level has changed significantly relative to the 1900s.

Figure 7. Global Mean Sea Level Change Relative to 1900⁸⁴



Source: Figure SPM.8 in IPCC, 2021 (Summary for Policymakers)

Summary of Vulnerability Assessment Approach

Chapter Three detailed the vulnerability assessment approach utilised for this research. However, for illustrative purposes, the key elements of that section will be included here in a summary of the vulnerability assessment approach utilised in case study islands as an introduction to the concepts and methodology used.

Vulnerability assessments are a critical component of any activity seeking to have a comprehensive understanding of threats. These are also required for climate action involving cultural heritage. Specifically, as it relates to cultural heritage, a key consideration for this process includes knowing the type of cultural heritage that will be assessed. In this case, it is important to include as much information about the archaeological site as possible, including its size and function. Other important information include threats being experienced, information on the rate of loss, and value to local communities. Knowing whether the site has a priority ranking in terms of importance at the island's national level is also useful.

⁸⁴ The historical changes are observed (from tide gauges before 1992 and altimeters afterwards), and the future changes are assessed consistently with observational constraints

Although vulnerability assessments have become commonplace in many sectors throughout the region, this is hardly the case in the cultural heritage sector. Numerous factors contribute to this, as discussed in earlier chapters. Cultural resources are also often overlooked in coastal studies or assessments by other sectors, even when the intersections are clear.

The vulnerability assessment, therefore, provides the opportunity to create a broad overall understanding among varied actors such as for example, local communities, heritage, and disaster management and coastal zone management agencies. Regarding localised climate action strategies, vulnerability assessments also provide unique opportunities for local communities to become involved, as well as the creation of spin-off monitoring activities, which increase the voice and actions of these communities in safeguarding their heritage (Miller et al., 2024). On a broader national scale, vulnerability assessments allow the evidenced-based prioritisation of heritage at risk and the development of targeted actions. The application of heritage or even coastal heritage vulnerability assessments is virtually unheard of or practiced in many of the islands of the Caribbean and specifically the Anglophone Caribbean, largely due to limitations on the resources available to undertake these as well as to develop and implement follow-up actions.

The assessment approach utilized in this research integrated the vulnerability framework adapted for cultural heritage by Daly (2014), which utilises the IPCC-elaborated approach in relation to exposure, sensitivity, and adaptive capacity in articulating the measure of vulnerability and incorporates elements of the IPCC inspired UNESCO climate vulnerability index (CVI) framework which serves as a rapid assessment tool applied at world heritage properties (Daly et al., 2019).

As mentioned in Chapter Three, slight amendments were made in relation to defining the adaptive capacity of sites to better capture what this research perceives to be the reality for the Anglophone Caribbean. This includes historical processes, economic drivers, policy and institutional framework and sustainable development as being critical to adaptive capacity. As such, the adaptive capacity component is further expanded to consider the existence of supportive frameworks to adapt or reduce vulnerability contributions to the level of coastal development and ecosystem degradation. In reality, the factors impacting the adaptive capacity of a site are

numerous, and so this research prioritises specific components considered to be the most relevant within the Caribbean context.

The Vulnerability Assessment Framework approach, therefore, considers exposure (E), sensitivity (S), and the defined adaptive capacity (AC) as central to measuring the vulnerability of a specific archaeological or built heritage site. Each criterion is ranked from low (1) to very high (4).

For each island case study, portions of the coastline were mapped and assessed, and an estimation of the measure of vulnerability was provided for the portion of the mapped coastline and one to three individual sites on each island. The data available for each island and site vary significantly. So, in most cases, this disparity is evident, such as an abundance of information available for Antigua, limited for Saint Lucia, and a point in between for Jamaica and Barbados. This is largely due to disparities in inventories and archaeological survey work undertaken in each country in relation to sites impacted by climate-induced hazards.

Data from Case Studies

Antigua

Introduction

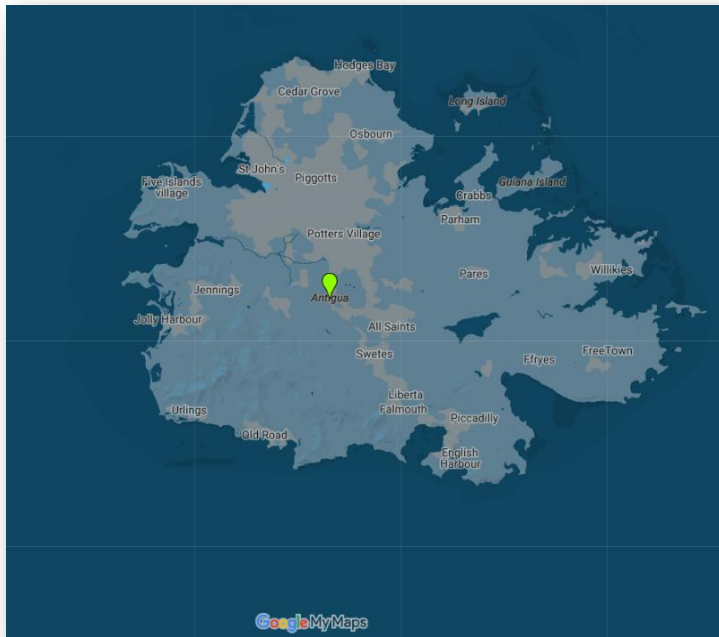
Antigua is a dry tropical island of 281 square kilometres, rising to a height of 402 m. It has a mixed geological formation of ancient rocks, comprising both volcanic and limestone, with a flat central plain of clay and sedimentary rocks, coralline and volcanic in origin. Antigua is one-half of the twin-island state of Antigua and Barbuda.

The island has long been recognised as one of the drier islands in the region and among the most water-scarce islands globally (Food and Agriculture Organization and Caribbean Institute for Meteorology and Hydrology, 2016; Trotman et al., 2017; WHO, 2020⁸⁵). The island has experienced severe and frequent droughts and has in the past experienced loss of life as a result. It has also had

⁸⁵ WHO Country Health and Climate Change Profile 2020: Antigua and Barbuda. Accessed at: <https://iris.who.int/bitstream/handle/10665/336273/WHO-HEP-ECH-CCH-20.01.06-eng.pdf>

to purchase water from neighbouring islands. As a small island, Antigua has a high vulnerability to climate change, with high temperatures in relation to the sea surface. The island continues to experience risks associated with sea-level rise, flooding, droughts, and increased tropical cyclone activity (Antigua and Barbuda National Communication NC3, 2017).

Figure 8. Map of the Island of Antigua in the Lesser Antilles of the Caribbean



Source: Author generated from Googlemaps.com

Climate Trends and Modelling Projections

Antigua and Barbuda's National Communications highlight that due to the island's small size and limitations in the downscaling of climate models it is not easy to make projections with a high level of certainty for the island. There, however, is concurrence that the coastal zone of Antigua, like many islands of the Caribbean, is susceptible to SLR, coastal erosion, storm surges, and flooding. Antigua is particularly exposed to rising sea levels and storm surges, given the low-lying and flat

terrain (USAID, 2021, p. 2).⁸⁶ The island also lies in the Atlantic tropical cyclone belt, and the mean annual temperature in Antigua has increased by around 0.6 °C since 1960 (Caribbean Community Climate Change Centre, 2012; Government of Antigua and Barbuda National Communication NC3, 2015; UNDRR, 2022).

Studies conducted by Simpson et al., 2012 suggest that with 1m of sea-level rise, ten percent of major tourism will be impacted, twelve percent of sea turtle nesting sites, two percent of major road networks, and one hundred percent of seaport lands. With a 2m sea-level rise, the percentages for major tourism, sea turtle nesting sites, and major road networks increase by eight percent, and one hundred percent of airport lands are also included. Areas identified as being at greatest risk include Dickenson Bay, Fort Bay, and Runaway Bay (Government of Antigua and Barbuda NC3 2015).

Similar to other islands of the region, strong winds, storm events, and other climate-induced hazards pose significant risks to the archaeological and historic built and natural environment. Climate modelling projections for Antigua⁸⁷ (CARIBSAVE 2012) indicate that the mean annual temperature is projected to increase by 0.4 - 2.1 °C by the 2060s and 0.9 – 3.5 °C by the 2090s, and the range of projections by the 2090s under any one emission scenario is around 1 to 2 °C. Projections of mean annual rainfall from different models are consistent in indicating decreases in rainfall by 45.7 mm (-277.2 mm to 101.2 mm) by 2040 - 2059 or thirty to fifty percent by 2090 (see also Antigua and Barbuda NC3, 2015; O'Marde, 2017).

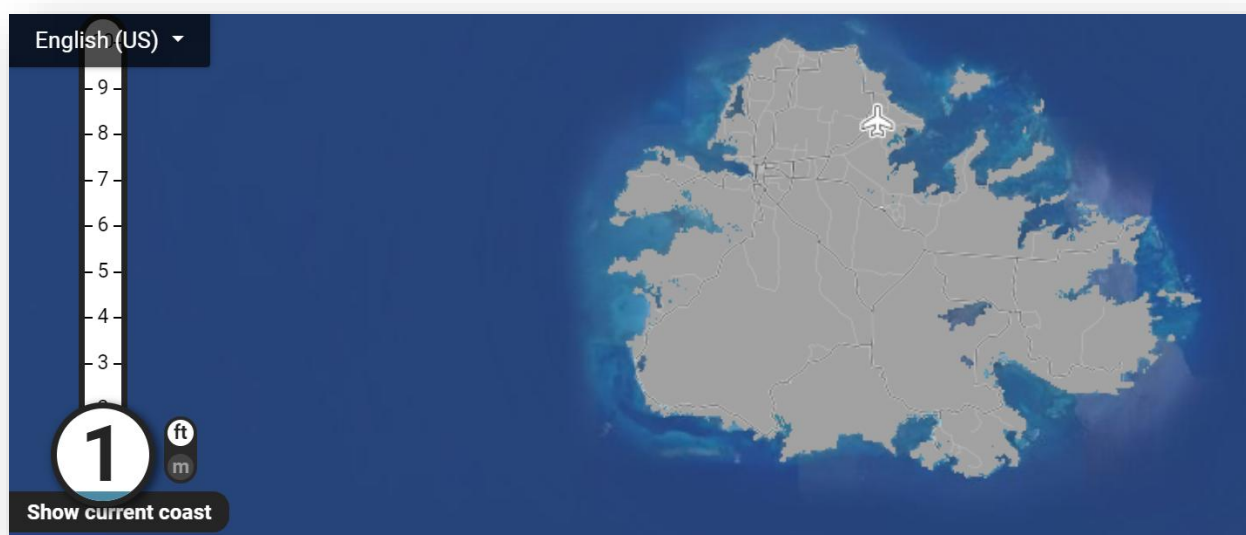
In relation to Sea Surface Temperatures (SST), projections indicate increases throughout the year, with projected increases ranging from +0.8 °C and +3.0 °C by the 2080s across all three emissions scenarios. For tropical cyclones, North Atlantic hurricanes and tropical storms appear to have increased in intensity over the last thirty years. Observed and projected increases in SST indicate the potential for continuing increases in hurricane activity, and model projections indicate that this may occur through increases in the intensity of events but not necessarily through increases in the frequency of storms. The mean annual temperature will also rise by 1.3°C (range of 0.9°C to 1.9°C),

⁸⁶ Antigua and Barbuda Resilience Profile. USAID 2021. Accessed at <https://www.readkong.com/page/antigua-and-barbuda-resilience-profile-may-2021-3634928>

⁸⁷ CARIBSAVE 2012 Climate Change Risk Atlas (CCCRA) - Antigua and Barbuda.

and annual precipitation will also increase (CARIBSAVE, 2012). Figure 9 identifies likely areas along Antigua's coastline that are projected to be submerged under one meter in sea level rise by the year 2100.

Figure 9. Antigua Coastal Areas to be Submerged under 1m Sea Level Rise



Source: Climate Central's Surging Seas Global Risk Zone Map <http://sealevel.climatecentral.org/>

Overview of the impact of climate-induced hazards on select Antiguan sites

Archaeological research and observations⁸⁸ over the years in Antigua (and Barbuda) noted an abrupt acceleration of detrimental effects to its archaeological heritage that go well beyond normal impacts (see Murphy, 2011). When studies at coastal sites over the past fifty years are reviewed, they allow a comparative analysis of how climate-induced change is advancing, pointing to the need for immediate response strategies. This comparative analysis of change over fifty years is unique to Antigua and is not widely practiced across the Caribbean due to the varying factors

⁸⁸ A. Murphy, personal communication, June 17, 2022

elucidated throughout this research. These observations highlighted the catastrophic impacts of cyclone activity, with the Shirley Heights extant historical structures being highlighted as destroyed by hurricanes between 1989 and 1999. More recently, there has been significant erosion that has caused Black Point Fort and Fort William to collapse into the sea. There has also been a significant recording of the loss of pre-Columbian sites, which are noted as having lost meters.⁸⁹

Data Collection and Vulnerability Assessment of Archaeological sites in Antigua

Winthorpe's Bay Sites

Winthorpe's Bay has experienced significant coastal development over the decades to the present day. The Bay is also home to a series of archaeological sites. Sites mapped and surveyed archaeologically include one small colonial cemetery, one coastal battery known as Fort Byam, two archaic age sites (see Figure 12 for a map of archaic sites located on Antigua), one multi-component site known as GE-01, one Ceramic Age site known as GE-06 or Winthorpe's West (Murphy, 2023). One of these archaic sites known as GE-10, was located on the eastern end of the runway at the international airport. This once substantial site was lost to repeated episodes of land clearing, and during archaeological surveys of 1997 to 2003, the waterfront archaic age midden was exposed and subsequently eroded into the sea. Since that time, the exposed waterfront has been covered with large boulders as a strategy to halt the coastal erosion of the site, and this has greatly assisted in mitigating erosion but undoubtedly contributes to coastal erosion in other areas.

Murphy (2023) suggests that the site of GE-01 was initially occupied during the archaic age, subsequently abandoned for several hundred years, and reoccupied in the Late Ceramic Age between AD 1000 and 1400. The site sits on an elevated point west over the marina, in an area that is slowly eroding, and cultural materials can be observed on the eroded waterfront, as well as postholes and evidence for the settlement being larger. This information also suggests the necessity of further studies to identify climate change adaptation strategies, which may be evident

⁸⁹ Antigua and Barbuda Sectoral Adaptation Plan: Culture, Arthur Reginald Murphy (2023)

in the archaeological record. The presence of adaptation strategies are discussed further in Chapter Five.

Site GE-06 is of a lower elevation and is a large site that radiocarbon dates suggest had an occupation period beginning around AD 555 to 1390. It begins on the waterfront and extends beneath the coastal road. This site has benefited from ongoing monitoring over the past twenty-five years and has provided the opportunity to observe coastal erosion and changes to the coastline. It was also selected as one of the sample sites for the vulnerability assessment, being located on a low-energy beach and due to its long period of monitoring. Murphy (2023) notes that cultural materials can be clearly observed eroding into the sea along a one-hundred-meter strip of coastline. The site was last excavated in 2004, and today, those excavation areas are now submerged. Some areas along the waterfront were filled with concrete slabs to halt erosion and protect the nearby main road, and comparisons now show that the protected areas remain stable. In contrast, the unprotected areas have continued to erode inland.

A case study of this site could provide interesting data on monitoring and adaptation practices for the wider region over a specific timeframe, not just for those working in the cultural heritage field but also for non-culture actors working to manage coastal retreat.

Nelson's Dockyard National Park (NDNP) World Heritage Property

Around fifty forts and defence platforms, as well as arsenals, barracks, and hospitals were constructed on Antigua. A fort was placed every two miles along the coast in an attempt to safeguard the island's profitable sugar business. By 1795, the island was being used as a navy dockyard and military staging area with support structures built in English Harbour (Murphy, 2011).

Nelson's Dockyard was established as a British Naval Dockyard, and today, it is the primary and largest heritage site in Antigua, and currently its only world heritage property inscribed to the World Heritage List in 2016. The Dockyard is, however, presently experiencing major challenges due to climate-induced hazards, with projections for future impacts. This is due primarily to the site being coastal and partially built on reclaimed land, and it is less than one meter in elevation above sea level at its highest point. The site has benefited from studies that have mapped the site and

established elevations and other critical information, such as mapping the property's most flood-prone areas in relation to planned sea-level rise (see Figure 10; and Friedman, 2013).

These results are said to be contributing to the development of climate action to manage the threat. Drains have had to be placed beneath the road, and sump pumps have been installed. However, while roads, lawns, and parking areas can be raised, the original floors in the buildings cannot be raised, and today, the ground floor levels of some structures are now below sea-level. The vulnerability assessment observations for Nelson's Dockyard were considered for the entire site while specifically being applied to its coastal components.

Figure 10. Flood Hazard Likelihood in Nelson's Dockyard



Note: Adapted from *Sustainability Challenged: Assessing the impact of sea-level rise on Antigua's coastal economy and infrastructure* by E. Friedman, 2013 [Unpublished master's thesis] Hunter College, CUNY Department of Geography and Environmental Science).

Fort Berkeley

Fort Berkeley is located at the entrance to English Harbour and is the oldest fortification in the Harbour, dating back to 1704. Increasing storm surges and hurricanes have eroded the walls of the fort, and major undercuts have been filled over the past ten years. Despite this limited and costly activity, the erosion continues to accelerate, and a section of the wall and cut-stone floor have now fallen into the sea (see Figure 11). Underpinning the stone walls, repairs to the fort's drainage system, and the placement of boulders to create a breakwater to reduce wave energy will be essential as erosion increases.

Figure 11. Missing Wall and Eroding Components at Fort Berkeley



Source: Author.

Other Sites Not Included in Vulnerability Assessment⁹⁰

Across the bay on the eastern side, the lower section of **Fort Charlotte** no longer exists. Only a small section of the gun-platform wall that guarded the harbour entry opposite Fort Berkeley remains to mark the position of the lower defence platform. At Pigeon Point Beach's southernmost point, **Black Point Fort** is situated near the eastern entrance to Falmouth Harbour. Constructed on a raised stretch of land along the coastline, the fort served as defence for the ships anchored in the harbour and the commercial town of Falmouth. Landowners have reported that the sea has started to erode the land and encroach on its boundary lines within the last ten years. When the historic site was examined in 2005 as part of a regular inspection of National Park sites, the western wall of the waterfront along the low-energy shallow sea was still intact. Since then, further surveys have shown that the sea has weakened the fort, and the fence is now in the sea.

Within English Harbour, at Freeman's Bay, is **Galleon Beach**. Major flooding episodes have occurred at the location due to tropical cyclones that have worn away and uncovered unmarked and previously hidden graves on the beach. The water at the waterfront resort has in the past reached four feet deep, flooding automobiles and structures. A portion of the dune was also devastated by floodwater, revealing human bones from an unidentified cemetery. Severe landslides have also damaged other structures.

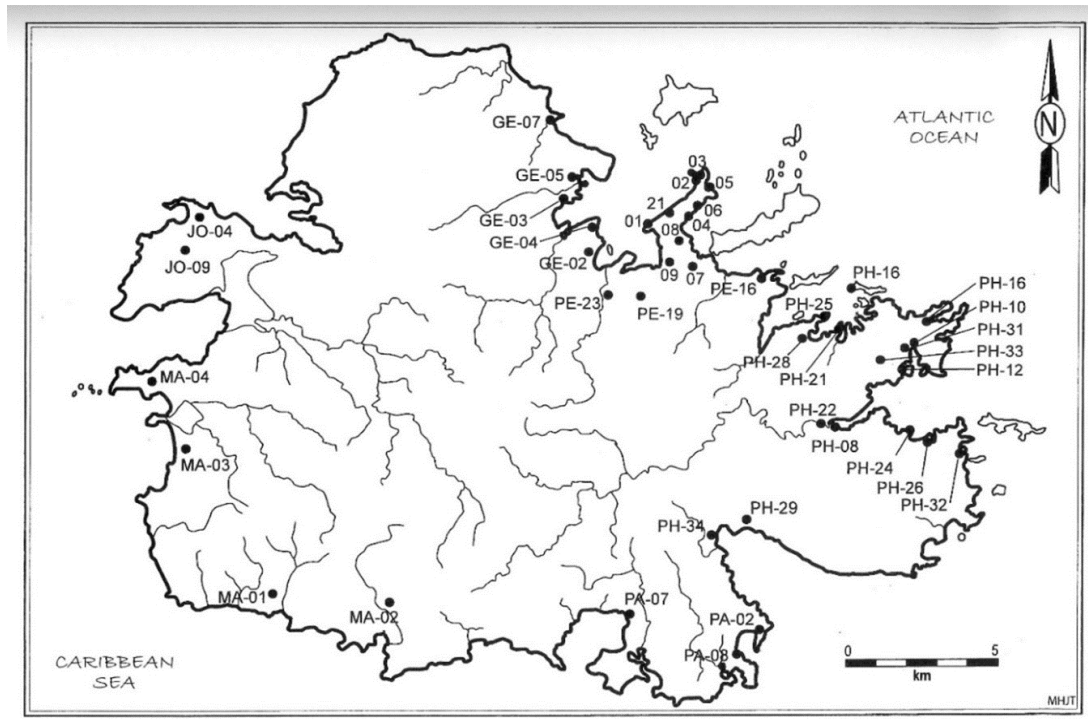
Mostly shielded by a barrier reef system that stretches from Mamora Bay in the south to the northern highland at the bay's entrance (St. Phillip's), **Willoughby Bay** is an open and vast bay on Antigua's east coast. During the colonial era, the region did not receive enough rainfall to generate significant amounts of sugar. In the middle of the seventeenth century, poor white Barbados residents founded a small village known as Bridgetown on a sheltered stretch of the bay's northeastern waterfront. The settlers eventually moved uphill to higher land to the village of St. Phillips, and by 1855 the town lay in ruins. Locals ascribe this relocation to a nineteenth-century tsunami that devastated the region and resulted in significant erosion.

⁹⁰ Based on the Sectoral Adaptation Plan: Culture (Murphy 2023) and Field assessment (Richards and Murphy 2022)

Midway through the seventeenth century, **Fort James** was constructed to guard St. John's, a recently founded settlement. The location experienced damage from fire, hurricanes, droughts, unauthorised brick removal, and erosion of the coastline. On the eastern-facing slope where a wooden pier once stood, there has been major erosion that has washed out the roots of the trees that stabilised the waterfront and under the corner of the stone wall of the fort. This corner section is now collapsing into the sea, and major structural cracks have developed. The erosion has also undermined the old concrete stairs down to the waterfront. Undercutting and erosion of the seawall face on the west side of the fort has become a major issue that threatens the gun platform above. All the buildings within the fort are in an extremely fragile condition.

Multiple sources were used to compile an inventory of coastal sites. These include the report *Sectoral Adaptation Plan: Culture* (Murphy, 2023), a desk review of smaller studies on archaeological sites in Antigua and Barbuda, and a pre-existing map of archaic sites in Antigua (see Figure 12). This was followed by site visits to randomly selected coastal sites to facilitate obtaining GPS coordinates and making site and coastal observations as part of the vulnerability assessment. Murphy (2023) records 180 pre-Columbian sites, over 170 sugar estates, 54 fortifications, and an estimated 300 shipwrecks split between the islands of Antigua and Barbuda.

Figure 12. Archaic Archaeological Sites on Antigua



Source: A.R Murphy. Used with permission.

Table 12. Vulnerability Assessment of Selected Sites in Antigua

Climate Hazard Phenomena	Heritage Value	Impact	Sensitivity	Exposure	Adaptive Capacity				Measure of Vulnerability
					LCD	LCED	CA	MR	MV = (E + S) - AC
					1-4	1-4	1-4	1-4	
SEA LEVEL RISE	Withrope Bay	Coastal							
	G-06 Pre-Columbian site cultural materials	erosion; Storm surge	3	4	2	1	3	1	4 (5.25)
	Fort Berkeley	Coastal erosion; Wave action	4	3	1	1	3	3	4 (5)
	Nelson's Dockyard built heritage	Coastal Erosion, Coastal Inundation	2	3	2	2	3	3	3 (2.50)

Key: 1 – Low; 2 – Moderate; 3 – High; 4+ – Extremely High. LCD – Level of Coastal Development; LCED – Level of Coastal Ecosystem Degradation; CA – Climate Action; MR – Management Response. Note: Adaptive Capacity = Average of LCD, LCED, CA, and MR

Summary of Assessment and Results

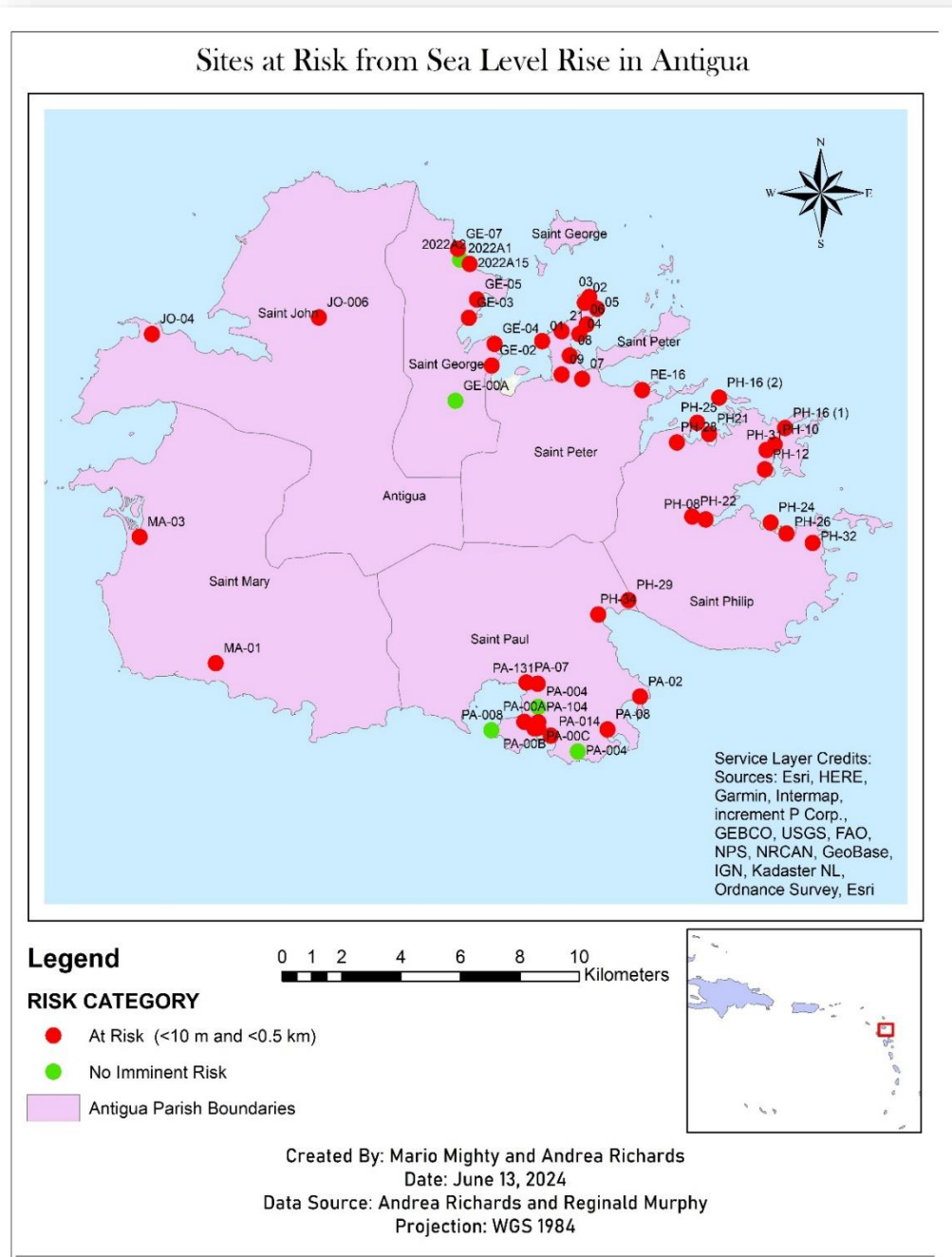
The documentation reviewed and field survey, suggests that archaeological sites in Antigua have experienced significant impacts from climate-induced hazards in the past and continue to do so in the present time with extremely detrimental effects. For the sites identified in Table 13, site GPS locations have been excluded. Figure 13 highlights all sites observed during the field assessment, identifying those at particular risk from climate-induced hazards.

Table 13. Sites Visited as part of Field Vulnerability Assessment

Site Code	Name of Site	Distance from Water	Elevation M.A.S.L or M.B.S. L
GE-0B	Winthrop Bay Historic Bunkers	< 0.5 km	+8
PA-004	Shirley Heights Officers Complex	< 0.5 km	+138
	Lookout Cistern		
PA-131	Shirley Heights Water Catchment	< 0.5 km	+5
	System and Lookout		
PA-00B	Mast Shed/Joiners Lodge (Nelsons Dockyard)	< 0.5 km	+4
PA-00C	Pay Office Nelsons Dockyard	< 0.5 km	+4
PA-004	Indian Creek	< 0.5 km	+23
PA-014	Fort Charlotte	< 0.5 km	+8
JO-006	Fort James	< 0.5 km	+8
PA-008	Black Point Fort	< 0.5 km	+13
PA-00A	Saint Paul 1700s Water Catchment	< 0.5 km	+2
PA-104	Fort Berkley	< 0.5 km	0
GE-00A	Saint George Water Well	< 0.5 km	+14

Note: In relation to the site codes provided, letters indicate established parish codes used as part of the national inventory, with the number identifying the number the site was allocated in that parish. Codes with a '0' following parish letters are sites that were mapped during the 2022 field exercise and did not have pre-existing codes or might be a sub-component of a wider site that was specifically observed.

Figure 13. Some sites at risk due to climate-induced hazards in Antigua



Source: Author compiled from various sources highlighted throughout research

The seawall in the Dockyard illustrates an example of critical actions that will be needed to protect archaeological sites in Antigua. In 2003, the eastern wharf or seawall in the dockyard began to sag, and a section eventually slumped into the sea. The wall had taken a pounding from the active decade of hurricanes in the 1990s, so a major restoration programme was planned and implemented by the National Parks Authority, with partial assistance from external sources. Under the supervision of the Park's archaeological team, which was responsible for documenting the construction methods of the ancient wall, the original wall was removed, and the upper layers of stones were marked and kept for reuse in their original positions. These actions aimed to build resilience at the site.

At high tide, the seawall is only 20 to 40 cm above the water, which is its original height. In certain places, the sea rises above the top of the wall during exceptionally high tides. Although the wall was built to modern specifications, many questions arise regarding its future and what actions will be required to protect the property, when due to rising sea-levels, high tides become normal height. Inspired by the results of the Friedman initial study (2013), a new project with computer simulations was proposed to better understand the threats to the World Heritage property and the nearby communities. In addition, discussions to establish methods for systematic monitoring were planned, as well as meetings with experts to develop and explore options and develop a long-term plan for the site and its community are on the agenda.

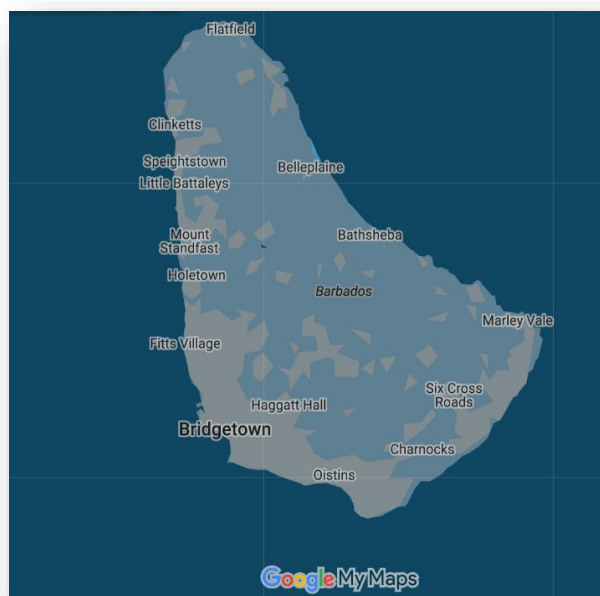
In summary, a comprehensive approach is essential for planning, mitigation, and adaptation in relation to the new exigencies of climate change. The development of Antigua's cultural heritage sectoral climate change adaptation plan is a good, evidence-based platform from which initiatives can be built and has already commenced with comprehensive documentation of the status of archaeological and built heritage in relation to climate-induced hazards.

Barbados

Introduction

Barbados⁹¹ is the easternmost island in the geographic sub-region known as the Lesser Antilles. Although other islands in this chain are volcanic and mountainous, Barbados is relatively flat, with the highest point at 334m, and a total land area of approximately 432 km² and 92 km of coastline (Alleyne, 2019; Mycoo et al., 2021). The local geology is largely comprised of non-volcanic sedimentary rocks such as limestone coral (Mycoo et al., 2021; UNDRR, 2023⁹²). These geophysical characteristics contribute to varying levels of coastal susceptibility (Fitzpatrick, 2011) with, for example, the east coast's Scotland District displaying high levels of coastal erosion (Evanson and Department of Emergency Management, 2014).⁹³ Various studies estimate that the island has been rising about a foot every one-thousand year but sinking in some areas (Krajick, 2018).

Figure 14. Map of Barbados



Source: Author generated from
Googlemaps.com

⁹¹ Components of the Barbados case study were presented at the 2022 Session of the International Association of Caribbean Archaeology by Andrea Richards

⁹² Disaster Risk Reduction, United Nations Office for Disaster Risk Reduction (UNDRR) 2023

⁹³ Country Document for Disaster Risk Reduction: Barbados 2014. Accessed at <https://dipecholac.net/docs/files/784-documento-pais-barbados-web.pdf>

Climate Trends and Modelling Projections

Barbados exhibits specific “geographic, topographic, historical, economic, and political characteristics that make it vulnerable to the effects of severe climate change” (Alleyne, 2019, p. 1) and other extreme hydro-meteorological events (UNDRR, 2023). Its coastal zone is particularly vulnerable to SLR, flooding, and storm surges have been estimated to extend over 150 to 300m inland (Nurse, 2011; Mycoo et al., 2021).

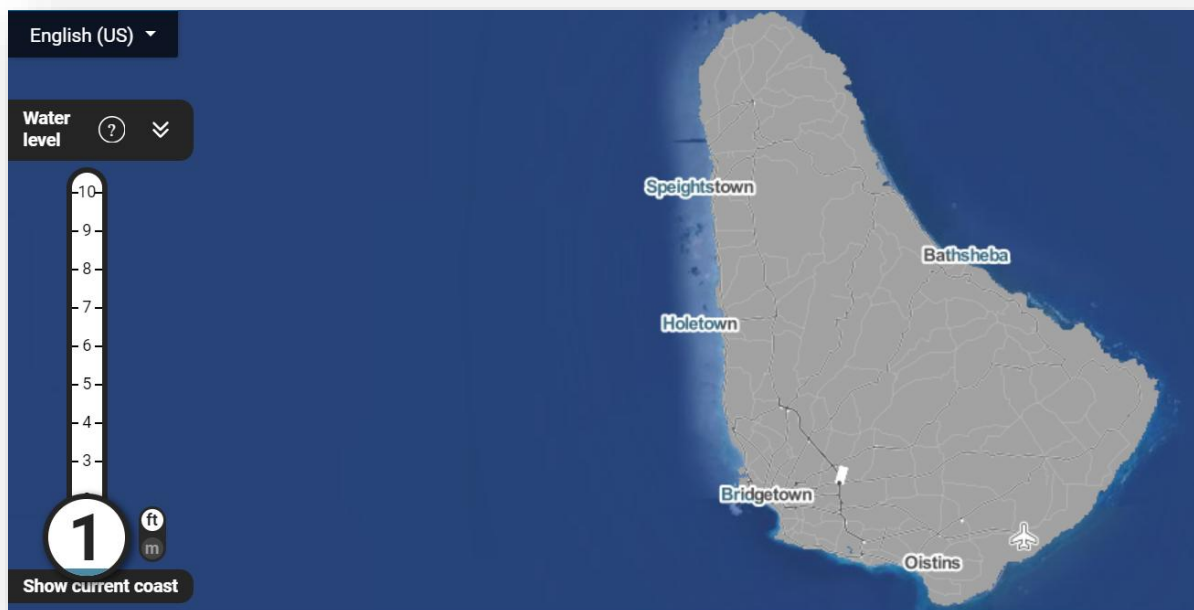
Through damages from catastrophic weather systems and other occurrences, as well as more subtle changes in rainfall patterns and temperatures, the island is already feeling some of the effects of climate variability and change. Climate modelling projections for Barbados (CARIBSAVE, 2012) predicted an increase in mean annual temperatures between 2.4° to 3.2° C by 2080s in higher emissions scenarios. The General Circulation Model (GCM) projections for precipitation span both overall increases and decreases, ranging from -36 to +12 mm per month by 2080 under the high emissions scenario. Most projections however, trend toward decreases. SSTs are projected to increase throughout the year ranging from +0.8° C and +3.0° C by the 2080s across all three emissions scenarios.

In relation to tropical cyclone activity, these have increased in intensity in recent decades. Observed and projected increases in SST indicate the potential for continuing increases in hurricane activity, and model projections indicate that this may occur through increases in the intensity of events but not necessarily through increases in the frequency of storms.

According to Barbados’ Second National Communications (2018), extrapolation of historical data projected SLR of 0.28m by 2100, however this was later adjusted to 0.5m to 1.4m by 2100 (Barbados Second NC, 2018, p. 40). In some studies, such as in the Holetown historic town and urban corridor, relative SLR has been projected at 1.6m to 2100 (Alleyne, 2019).

Mycoo et al. (2021, p. 2) suggest that whatever projections have been made in relation to higher sea levels and increased tropical storm activity are likely to increase storm surge frequency and intensity. The main impact of storm surge is flooding because of Barbados' generally low-lying topography. This situation was evidenced in June 2024 when Hurricane Beryl resulted in significant impacts on the island's port and coastal roads during its passage with twenty-foot storm surges in some areas. According to Mycoo et al. (2021, p.3), and aligned to data presented earlier, a significant portion of Barbados' population, coastal infrastructure, and human settlements are in the area defined as the Low Elevation Coastal Zone (LECZ), "which is the land area that is contiguous to the coastline up to a 10m rise elevation" (also see Udika, 2009). Highlights of coastal areas projected to be submerged under 1m sea-level rise by the year 2100 based on Climate Central's Surging Seas Risk Map are shown in Figure 15.

Figure 15. Barbados Coastal areas projected to be submerged under 1m Sea-Level Rise



Source: Climate Central's Surging Seas Global Risk Zone Map <http://sealevel.climatecentral.org/>

Overview of the impact of climate-induced hazards on select Barbadian sites

The impact of climate-induced hazards on archaeological and built heritage has received small mentions in studies undertaken in historic towns such as Holetown and Speightstown on Barbados' west coast (see Alleyne, 2019). Climate warming was also highlighted as a threat in the world heritage nomination dossier for Historic Bridgetown and its Garrison.⁹⁴ Research by Drewett (2007) also suggests erosion impacting the site at Heywoods.

Records of flooding events in Barbados suggest that while impacts on different types of infrastructure, such as schools and churches, are noted (Alleyne, 2019), there is very little reference made regarding the heritage values of those spaces that are recorded. Neither is cultural heritage mentioned in these assessments, except in the cases mentioned above where these structures also have some historic value. Notwithstanding the very limited documentation in relation to how climate-induced hazards impact sites, many archaeological sites are to be found in this coastal strip, including portions of the World Heritage Property of Historic Bridgetown and its Garrison. Barring these extremely limited references, no comprehensive study of the impact of climate-induced hazards on Barbados' built and archaeological heritage has been undertaken. The available information on various sites is, therefore, extremely limited. In 2024, the island initiated an assessment to understand how climate-induced hazards were impacting tangible and intangible heritage. This activity is ongoing and is aligned to requirements of the Physical Development Plan of Barbados.

Data Collection and Vulnerability Assessment of Select Archaeological Sites in Barbados

To undertake this study, the methodology for Barbados focused on desk-based review studies on (a) prior research on Barbados' archaeological heritage, with references to the natural environment and environmental impacts at sites, (b) climate change research specific to Barbados and (c) various archaeological site surveys and inventories of Barbados' archaeological record. These surveys and inventories include those undertaken for Barbados' Physical Development Plan (2017,

⁹⁴ Historic Bridgetown and its Garrison World Heritage Nomination document. Accessed at: <https://whc.unesco.org/en/list/1376/documents/>

updated 2023), Bright (2011), and Drewett (2000) of University College London in partnership with the Barbados Museum and Historical Society's baseline study of coastal sites conducted in the early 1990s. This review was then anchored within a field and vulnerability assessment of randomly selected coastal sites along the north, south, east, and west coasts of Barbados.⁹⁵ These assessments were undertaken throughout 2022 and made observations in relation to climate stressors and human-induced contributions to these stressors. The sites selected highlighted in Table 14 also represented both pre-Colombian and colonial-era sites. They were primarily extracted from Peter Drewett's survey of pre-Colombian sites in collaboration with the Barbados Museum and Historical Society (BMHS) as the first inventory of such sites, along with other site research reports and publications where available.

In keeping with the climate challenges identified in this research, sites were also selected due to their proximity to the coastline and representing the variety in Barbados' geophysical characteristics. The compilation of coastal sites was followed by field visits to obtain GPS coordinates and site observations to facilitate the vulnerability assessment (Table 14). GPS coordinates have not been presented in this research. This information was then input into Table 15 to support calculations of the measure of vulnerability of each site. Figure 16 highlights all sites observed during the field assessment.

Table 14. Barbados Field and Vulnerability Assessment Sites

Parish	Name of Site	Distance from Visible Coast	Elevation M.A.S.L or M.B.S. L
	Bethel Methodist	< 0.5 km	11
	Bay Street	< 0.5 km	4
St. Michael	Bridgetown Car Park Bond	< 0.5 km	0
	Pierhead/Cavans Lane Warehouses	< 0.5 km	0
	Cavans Lane Bonds	< 0.5 km	0

⁹⁵ Field and Vulnerability Assessment by Richards and Farmer 2022. Selected sites: West coast - Holetown and Speightstown, Folkstone; South coast - Silver Sands, Oistins, Chancery Lane Swamp, Historic Bridgetown, Carlisle Bay; East coast – along former railway; North – Maycocks Fort

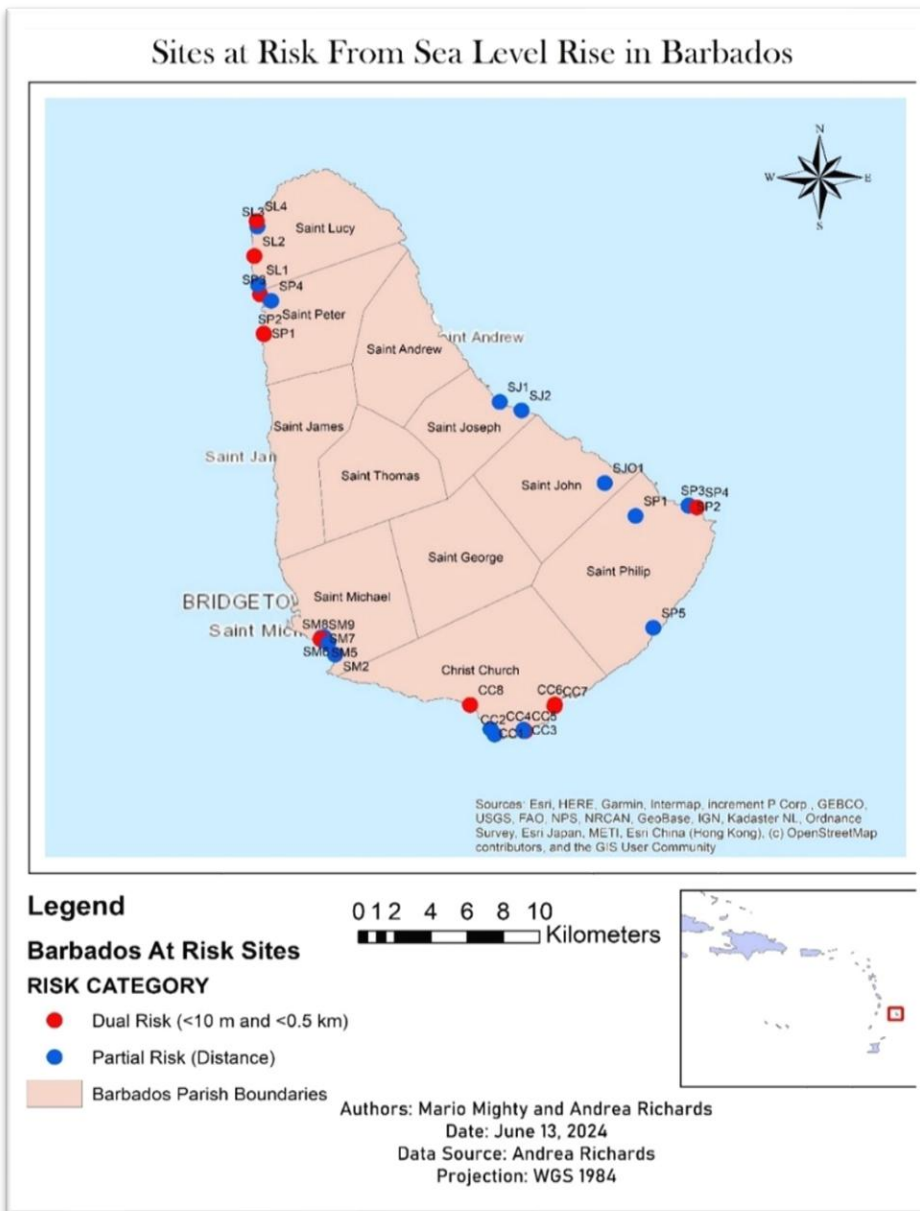
	Barbados Parliament	< 0.5 km	12
	Spirit Bond	< 0.5 km	10
	Dry Dock (Cavans Lane)	< 0.5 km	0
	Blackwood's Screw Dock (Pier Head Lane)	< 0.5 km	0
	Possible Royal Barracoön Burial Ground	< 0.5 km	0
	Former Harbour Police Station Arch (Hyatt Hotel)	< 0.5 km	11
St. Joseph	Joe's River (Ermy Bourne Highway/Trail Way))	< 0.5 km	20
	Hillcrest Pre-Columbian Site (Tent Bay)	< 0.5 km	23
St. John	Codrington Amerindian site and 17th-century factory yard	< 0.5 km	91
St. Phillip	Three Houses Pre-Columbian site (Highway 7)	< 0.5 km	53
	East Point Lighthouse Old Privy	< 0.5 km	30
	East Point Lighthouse	< 0.5 km	30
	Cloud Station	< 0.5 km	0
St. Phillip	Foul Bay Shell Midden (Foul Bay Road)	< 0.5 km	18
Christ Church	Spring Road Mill Tower (Pearl Avenue)	< 0.5 km	16
	South Point Lighthouse	< 0.5 km	17
	Silver Sands Amerindian Site ⁹⁶	< 0.5 km	11
	Chancery Lane Amerindian Site	< 0.5 km	6
	Remnants of Oistins Fort	< 0.5 km	9
St. Peter	Old Two Storey Historic Structure Next to Bakery (Queen's Street)	< 0.5 km	0
	Formerly Fort Denmark (Queen's Street)	< 0.5 km	0
	Fort Rupert	< 0.5 km	0

⁹⁶ Site is protected by a sand dune and is likely at risk although recorded as 11m ASL

	Six Men's Fort	< 0.5 km	29
	Old Fort Cannons (Sherman Hall Moon Fort)	< 0.5 km	11
St. Lucy	Maycock's Fort	< 0.5 km	0
	Mill (near Harrison's Point)	< 0.5 km	39
	Harrison's Point/North Point Lighthouse	< 0.5 km	0

Source: Author compiled. Based on Field and Vulnerability Assessment by Richards and Farmer 2022.

Figure 16. Mapped sites at risk due to climate-induced hazards



Source: Based on Field and Vulnerability Assessment by Richards and Farmer 2022.

Table 15. Field and Vulnerability Assessment of select Barbadian Sites

Climate Hazard Phenomena	Heritage Value	Impact	Sensitivity	Exposure	Adaptive Capacity				Measure of Vulnerability
					LCD	LCED	CA	MR	MV = (E + S) - AC
			1 - 4	1 - 4	1-4	1-4	1 - 4	1 - 4	
SEA LEVEL RISE	Maycock's Fort (St. Lucy): exposed remains of Fort Warehouse District – Historic Bridgetown: extant structures ⁹⁷	Coastal erosion, Storm surge, Coastal Inundation	3	3	1	2	1	1	4 (4.75)
		Storm surges; Coastal inundation	2	3	4	1	2	1	3

⁹⁷ In 2024, a portion of the Warehouse District was demolished to make way for commercial development

Table 15 (continued). Field and Vulnerability Assessment of select Barbadian Sites

SEA LEVEL RISE	Chancery Lane	Storm surges;							
	Pre-Columbian site	Coastal inundation	3	3	2	2	3	1	4
SEA LEVEL RISE	Speightstown, St. Peter	Coastal erosion, Storm surge, Coastal Inundation							
	historical town and urban centre		2	3	3	2	2	2	3 (2.75)

Note: Adaptive Capacity = average of LCD, LCED, CA, and MR. Key: 1 – Low; 2 – Moderate; 3 – High; 4+ – Extremely high

Summary of Assessment and Results

The assessment reveals a high level of vulnerability in Barbados' coastal archaeological record, requiring urgent action. Sea-level rise over thousands of years may have also resulted in the submersion or erosion of archaic coastal sites in Barbados. In addition to archaeological sites at risk along the coast of Barbados, historic towns such as Bridgetown, Speightstown, and Holetown are prone to impacts from storm surges and coastal inundation, with added risk due to their low elevations or being at sea level.

Concerning Barbados' coastal ecosystem, high levels of tourism and other development, low-lying areas, and proximity to the coast, have severely compromised the adaptive capacity of coastal heritage. Over sixty percent of the island's population lives in the coastal zone (Alleyne, 2019), and according to Udika (2009), a history of land use policy provided the momentum for development along coastal areas. This resulted in the clearance of the coastal ecosystem such as mangroves, and specifically wetlands along the west and south coasts notably in Heywoods, Holetown, Bridgetown, Accra, Oistins, and Silver Sands, to make way for tourism and residential development. Today, the Graeme Hall Swamp is the only remaining significant mangrove, which is about 20 hectares (Schueler, 2016). This destruction of the coastal ecosystem now contributes to increasing vulnerability in these areas, with coastal inundation occurring at the smallest rainfall levels.

Protecting Barbados' coastal archaeological record within the context of a changing climate requires a multi-pronged approach. As indicated, the coastal assessment undertaken revealed a high level of vulnerability of coastal archaeological sites with low adaptive capacity. This is within the context of significant infrastructural development, particularly linked to tourism in coastal areas, and other human-induced actions, and loss of or severely degraded coastal ecosystems. The issue of sand mining is however not as pervasive as on other islands of the eastern Caribbean.

The legislative and policy landscape for heritage in Barbados has remained unchanged since Farmer's (2011) research. Threats to heritage are constantly evolving, calling for the revision and strengthened implementation of legislation, ongoing reflection, and the utilisation of tools, methodologies, and other actions to address an impact that has already been realised. Complete

inventories are non-existent, and where they do exist, detailed locations are unknown. Neither has there been a mapping of risks to cultural heritage generally. The Planning Office maintains a list of sites throughout Barbados for its Physical Development Plan. However, this list is by no means complete and tends to be skewed towards the built heritage environment, and many previously documented sites are also unknown to this record.

The actions and steps taken can mitigate ongoing loss as well as determine how well archaeological sites can adapt in the future while responding to climate-hazards. Limited or no monitoring results in many impacts going unchecked, unreported, and unaddressed, resulting in the continued loss of sites, both documented and undocumented. As a result of this, no significant actions have been developed that focus on monitoring, and although climate change is something the heritage community in Barbados has been discussing for a while, assessments, and monitoring programmes for these sites remain non-existent. Neither is there good and available baseline data to develop robust monitoring programmes for these sites. Vulnerability assessments can provide this baseline data to support the development of relevant programmes.

To support the need for critical baseline data and as a useful planning tool for the heritage community, tools such as risk maps are needed to assess levels of risk and projected over specific timelines. As indicated previously, there is no systematic mapping exercise, nor is monitoring being undertaken. The lack of resources, both human and financial, is also critical. The state and vulnerability of the vast majority of Barbados' coastal archaeological record are unknown. To develop appropriate strategies and actions to safeguard this archaeological record, actions must be developed around the site's identification, threats, and vulnerability. These actions can be developed through various steps.

In terms of data collection, the work done by Drewett (2000) and Bright (2011) remain the most comprehensive documentation and mapping of sites, with a heavy focus on the pre-Columbian, providing some data on their location. In some instances, a description of the site's environment, data on elevation, and distance from the sea were also included. This data can be used as a basis to expand survey data and, through modelling, undertake a programme to identify previously unknown sites. This action can then serve as the basis for an expanded coastal heritage survey,

joint collaborative projects involving the BMHS, and other partners such as Coastal Zone Management Agency, the Barbados National Trust and the University of the West Indies (UWI). Barbados' Physical Development Plan also provides an avenue for this to be undertaken, in mentioning that risk studies should be undertaken in relation to climate change and cultural heritage.

Jamaica

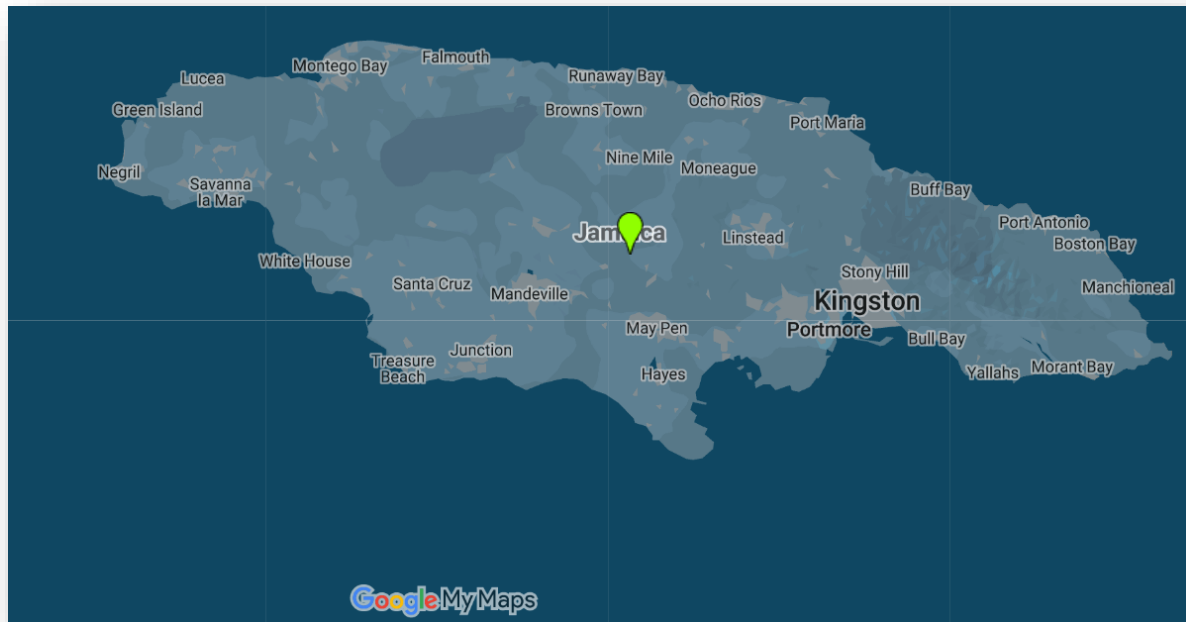
Introduction

Jamaica⁹⁸ is an island of 11,264 square km in addition to 9,600 square km of offshore banks and shoals in the Greater Antilles sub-region of the Caribbean (see Figure 17), with geophysical characteristics highlighted by a limestone plateau for its greater part, a mountainous interior and coastal plains that are largely alluvial with interior valleys and rivers (Robinson, 1994). Jamaica's coastline is characterized by variations, such as volcanic on the south and limestone on the north, with attending erosion susceptibility (IADB, 2018).

As is the case for most of the Caribbean, Jamaica's population resides within 1.5 kilometres of the coast, and the island's coastal zone generates about ninety percent of its Gross Domestic Product (CARIBSAVE Jamaica Profile, 2012). This environment, together with the ensuing destruction of coastal ecosystems that provide protection and stressors from tourism and other forms of coastal development, has guaranteed a limited ability to adapt to climate change in the coastal zone.

⁹⁸ Components of this case study were included in the article 'Richards, A., (2022). The Potential Effects of Climate Change on Jamaica's Pre-Columbian Archaeological Record: Monitor, Assess, Mitigate and Adapt' in the Journal of Caribbean Archaeology.

Figure 17. The Island of Jamaica in the Greater Antilles



Source: Author generated from Googlemaps.com

Climate Trends and Modelling Projections

The State of the Jamaican Climate Report (2015) projects increased heat and drying in the future and larger and more frequent tropical storms. A 0.5 mean SLR could lead to an increase in the frequency of sea level extremes. With projections of a conservative mean SLR of 0.87 to 0.9 meters throughout its coastal areas by the end of the century, SLR will be a climate phenomenon of concern for Jamaica. Jamaica's Vision 2030 National Development Plan (Government of Jamaica, 2009) anticipates that SLR will exacerbate beach erosion and result in permanent flooding in some locations. This eventuality will have significant implications for cultural life and livelihoods in these coastal areas.

The projected rise in temperature indicates values ranging from 1.18 to 1.31 in the 2020s to 2.76 to 3.62 in 2100. The intensity of tropical cyclones in the North Atlantic has increased in recent

decades, and SST rises, both observed and predicted, suggest the possibility of further increases in tropical cyclone activity.

The tourism sector will experience severe erosion and inundation in many areas, and these impacts will also extend to cultural traditions associated with the sea and beach areas, as well as amenity value and infrastructural damage. The very graphic and visual loss of the popular Hellshire Beach served to drive the climate crisis home for Jamaicans.^{99 100} The impacts experienced by these spaces linked to the national cultural identity of Jamaicans highlight the social value in using such places as part of climate heritage social action discussed throughout this research.

Climate warming has also been identified as a threat to Jamaica's reefs due to an increase in the temperature of coastal waters, resulting in the death of a significant number of corals. Along the Jamaican coast, climate change and non-climate stressors combine to contribute to the island's beach erosion. The rate of erosion is said to be very site-specific, with some beaches "experiencing significant erosion over the past sixty years while others have not experienced significant erosion" (Simpson et al., 2012, p. 79; also see CCCRA, 2012: Climate Risk Profile for Jamaica; Marine Geology Unit, n.d.). Regular monitoring of coastal erosion has only been conducted in Jamaica for the last fifty years (CARIBSAVE, 2012; Marine Geology Unit, n.d.). SLR scenarios of one and two meters, beach erosion, and SLR forecasts for the Caribbean are in line with prior evaluations of the possible effects of sea level rise (Dasgupta et al., 2007), and Figure 18 highlights coastal areas projected to be submerged under 1m sea-level rise by the year 2100.

⁹⁹ A beloved Jamaican beach is succumbing to climate. It won't be the last. Accessed at <https://www.theguardian.com/us-news/2020/oct/27/jamaica-hellshire-beach-climate-change>

¹⁰⁰ What happened to Hellshire Beach Accessed at <https://www.jamaicaobserver.com/columns/what-happened-to-hellshire-beach/>

Figure 18. Coastal Areas to be Submerged under 1m Sea-level Rise



Source: Climate Central's Surging Seas Global Risk Zone Map <http://sealevel.climatecentral.org/>

Overview of the Impact of Climate-hazards on Jamaica's Archaeological Record

The Jamaica National Trust (JNHT) maintains a national inventory to include designated national heritage of archaeological and built heritage sites across Jamaica. There has been no systematic assessment of risks faced by Jamaica's archaeological record and specifically those that are coastal. Simple observations will however provide evidence of a coastal archaeological record that is threatened by climate-induced hazards through continued erosion, inundation, and submersion of sites or threats to the structural integrity of built heritage.

Jamaica's pre-Columbian heritage is particularly vulnerable. This record underwent a period of rapid documentation by James Lee starting in 1959 (Allsworth-Jones, 2008). Allsworth-Jones also outlines an extensive history of pre-Columbian investigations in Jamaica in his book *Pre-Columbian Jamaica* (2008). Researchers of Jamaican archaeology have generally agreed that while much research has been completed, limited publication has ensued, resulting in the view that very little archaeological research has taken place on the island (Keegan & Atkinson, 2006; Wesler, 2013). Few pre-Columbian sites have benefited from extensive research by international and

national researchers alike. As such, many remain unresearched, others undocumented, and many their status unknown since initial mapping by Lee in the 1960s to 1970s.

Research to date indicates that the network of pre-Columbian sites in Jamaica is quite extensive, with many focusing on the coastal area or elevations with a good view and path to coastal areas. In his extensive mapping exercise, Lee (1976) concluded that the Redware¹⁰¹ culture preferred coastal settlements and was located predominantly on the seashore or near rivers at elevations of 0-15m above sea level (Allsworth-Jones, 2008). This fact means that many of these sites are vulnerable to climate-induced hazards, as approximately thirty-five percent of these known sites are located within 1.5 km of the coast, echoing true that coastal sites are caught between the dynamic of land, sea, and human-induced development, rendering them extremely vulnerable (Crock, 2019).

The research of James Lee, credited with mapping 265 of these sites, and the Archaeological Society of Jamaica (formerly Archaeological Club of Jamaica) have been critical to the documentation of Jamaica's pre-Columbian archaeological resources (Atkinson & Keegan, 2006; Allsworth-Jones, 2008). While sites such as White Marl, Paradise Park, Green Park, Newry, and Coleraine—among few others—have benefited from extensive research and have been the most published in the last decades, there has generally been limited references to environmental changes at sites that could be characterized as related to climate change. The Little River site in St. Ann is one of the earliest references to these impacts, with reports detailing the challenges of coastal erosion (DeWolf, 1953).

As highlighted, James Lee, in his various mapping exercises detailed in the *Archaeology Jamaica* newsletter and Allsworth-Jones (2008), indicated that Jamaica's pre-Columbian population demonstrated a preference for coastal occupation, often at high-tide coastline, making these sites susceptible to coastal erosion, ongoing wave action and rising sea levels (Wesler, 2013). Ongoing coastal changes and rising sea levels will only continue the trend of erasing this record.

¹⁰¹ Around 650 A.D, Jamaica was settled by the people of the *Ostionoid* culture (ancestors of the Taino), also known as the Redware culture (see Atkinson, 2008; Keegan, 2019; P. Allsworth-Jones, 2008). Ostionan pottery is characterized by simple black smudging, very basic modelling, and an orange-red slip applied to the whole of the typically thin and hard ceramic vessel. It is widely referred to as redware.

Climate change through SLR is also sometimes mentioned as a possible reason for the lack of identification of archaic sites in Jamaica. Callaghan (2008) examined the place for environmental factors such as tropical cyclone activity and sea-level changes for the dearth of archaic sites while highlighting that other countries in the Greater and Lesser Antilles were home to these sites. He noted that Jamaican data on Holocene SLR does not suggest a mid-Holocene high stand above present in the region, which would have caused the erosion or inundation of coastal archaic sites, nor do sea-level curves for Jamaica indicate a significant difference between the archaic period and present sea levels. He concludes that if archaic inhabitants were coastally oriented, and the sea level is 2 to 4 m higher today than four to five thousand years ago, it is likely that many of those early sites are now inundated and submerged (also see Keegan, 2019).

Data Collection and Vulnerability Assessment of Select Archaeological Sites in Jamaica

To frame this vulnerability assessment of Jamaican sites, a review of the existing literature was undertaken to identify references to sites being impacted by sea level rise, wave action, flooding, and erosion by the sea, among other key terms. The back issues of *Archaeology Jamaica* served as the primary source for the largest number of sites, followed by the Jamaica National Heritage Trust (JNHT) site inventory, files, research reports, and publications where they were available. This review indicated a few specific site references in relation to ongoing environmental and climate change. From this desk review, the following environmental or climate change or stressors-related references to sites were noted and highlighted below.

The **Little River** site is one of the earliest dated redware sites on the island. It has one of the earliest recorded references to climate change or environmental impacts on a pre-Columbian site. The site is noted as having been fully eroded by the sea, with none of the site remaining. Researcher de Wolf (1953) indicated that “the largest midden, about 2 meters high, was half washed away by the sea at that time and may well be completely washed away by now.” The precarious position of the site was confirmed by Lee (1976), who stated that when he last inspected it, it contained barely half of a single small midden held together by the roots of a coconut tree.

Nonetheless, the location retains its importance as the type of site that Lee referred to as the Jamaican Redware culture. Vanderwal (1968) estimated that “before its destruction, the site may

have covered an area of about three-quarters of an acre” (Allsworth-Jones, 2008, p. 140). In 2004, while undertaking a site visit for the Mammee Bay Archaeological Impact Assessment, the archaeology team from the JNHT found that only a part of the site on the eastern quarter strip of the beach appeared to be intact and undisturbed. Still, there was an area where waves had undercut a small bank, and numerous pieces of Amerindian pottery sherds, conch shells, and debitage protruded at the surface.

The **Ross Craig # 2** site in Portland is categorized as a submerged site and below present sea level. It was discovered in the late 1990s, and surveying was completed by archaeologist Ivor Conolley and the Archaeological Society of Jamaica to identify it positively as a pre-ceramic age site (Conolley, personal communication October 11, 2021; Keegan, 2019). Conolley suggests that while it is apparent from investigations that artefacts were washed in from offshore to the beach, there is some indication that these artefacts may have been deposited in the sea by an earthquake.

Sites in the parish of Westmoreland include **Auchendown**, which was reported as being at sea level and impacted by flooding, erosion, and wave action. At **Long Acre Point**, it was noted that storm waves were impacting the site and its artefacts. At **Fort Charles A**, a portion of a burial was reportedly revealed by wave erosion, and **Fort Charles B** was noted as being in proximity to the sea. The same is true for the **Billy Bay** site which is described as near the sea with artefacts being scattered by storm waves. The **Alligator Pond River** was highlighted as being near the sea and was being exploited for construction sand. The **Paradise Park and Sweetwater** sites were “located on a coastal dune between the Deans Valley River and Bluefields Bay” (Paradise Park 2000, n.d., p. 2). These sites were recorded as being strategically located on the only high ground, about one and two meters above sea level in the area. It was noted that changes “in exploitation patterns between the two sites suggested that these may reflect in part a change in environmental conditions, such as a rise in sea level of up to one meter between the two sites” (Allsworth-Jones, 2008, p. 54). Keegan et al. (2003) note that this may be the reason why a part of the deposit is below the water table and suggest that when the site was occupied, the sea was perhaps a meter lower than at present. If this is the case, then “all the other sites mentioned would also have been farther from the high-water mark than they are now” (Allsworth-Jones, 2008, p. 54).

The **Prospect Point** site in St. Thomas was mapped in 1984 and noted as being in a beach area where severe corrosion by the sea had altered the surface of most exposed sherds. The **Holmes Bay** site in Clarendon was recorded as being a village site right at the sea's edge, with evidence that storm waves had disarranged practically all the material. In Clarendon at **Round Hill**, wave erosion was noted over a few years and contributed to a collapsed strip of between five and ten feet, more than half of the site, with more collapses imminent. It was felt that the terrace on which the site sat would be completely eroded in about one hundred years.

The **Mammee Bay** site in St. Ann was discovered in 1984 and subsequently mapped that year by James Lee. Objects were collected from an area exposed to rough seas. Evidence at the site suggested that storm waves had demolished the village. Also, in St. Ann, the **Fortlands** site was discovered in 1954 and described as near sea level and not more than 100 yards from the sea.

In 2022, as part of this research, the coastline between Annotto Bay in St. Mary and Falmouth in Trelawny was surveyed with a team from the JNHT, and its coastal heritage subjected to a vulnerability assessment. This survey exercise revealed that the **Annotto Bay Baptist Church** was vulnerable as it was near the sea and being impacted by coastal inundation and storm surges. The **St. Ann's Bay Fort**¹⁰² was built in the mid-1700s using stone blocks taken from the nearby Sevilla la Nueva (New Seville) site. The sea was already encroaching on the fort in 1795, so it could no longer be used, and a new fort was constructed at a different location. During the assessment in 2022, the site was noted as being below sea level, and the site will continue to erode and be fully submerged in the years to come. The **Old Naval Hospital** and its extant structures and historic seawall in Port Royal were built around 1818. The site is presently at sea level and is often impacted by coastal inundation, erosion, and storm surges.

Table 16 identifies sites that were considered in this desk-based vulnerability assessment. Based on what is known of current and projected future impacts on coastal areas, it is evident from the selected sites that they could have already been lost or are being destroyed, and urgent actions are needed to mitigate loss, guided by appropriate data collection, surveys, and analysis.

¹⁰² St. Ann's Bay Fort on the Jamaica National Heritage Trust Website. Accessed at http://www.jnht.com/site_st_anns_bay_fort.php

Assessments undertaken for sites at Mammee Bay and Ross Craig revealed very little remaining. It should be noted that the extent of the Mammee Bay site is unknown, which is very much the case with other sites as they have not been surveyed or monitored since their initial mapping in the 1960s to 1970s.

As mentioned, in reviewing documentation concerning these sites, references to sites *washing away, eroding due to coastal erosion, being subjected to environmental changes* are used as the primary determinant keywords in identifying early impacts from climate-induced hazards. Table 17 highlights the field component of the vulnerability assessment applied to select sites, and Figure 19 provides a visual of Jamaican sites at risk due to climate-induced hazards, such as by being too close to the coastline or having an elevation below 10m.

Table 16. Sites in Jamaica considered in Desk-based Vulnerability Assessment

Parish	Name of Site	Distance from Visible Coast	Elevation M.A.S.L or M.B.S. L
St. Ann	Little River	< 0 km	0
Portland	Ross Craig	< 0 km	0
Westmoreland	Auchendown (Westmoreland)	< 0.03 km	3
	Long Acre Point (St. Elizabeth)	< 0 km	2
St. Elizabeth	Fort Charles A (St. Elizabeth)	< 0 km	8
	Billy Bay (St. Elizabeth)	< 0.03 km	8
	Alligator Pond River (St. Elizabeth)	< 0.06 km	3
St. Ann	Fortlands (St. Ann)	< 0.01 km	3
St. Thomas	Prospect Point (St. Thomas)	< 0 km	2

Parish	Name of Site	Distance from Visible Coast	Elevation
			M.A.S.L or M.B.S. L
Clarendon	Holmes Bay site (Clarendon)	< 0.03 km	2
	Round Hill (Clarendon)	< 0 km	15
Westmoreland	Paradise Park and Sweetwater sites (Westmoreland)	< 0.25 km	2
St. Ann	Mammee Bay (St. Ann)	< 0 km	1
Kingston	Old Naval Hospital	< 0.1 km	0
St. Mary	Historic St. Mary's Parish Church	< 0.5 km	5
	Historic 1824 Annotto Bay Baptist Church	< 0.5 km	2
St. Ann	1750 St. Anns Bay Fort	< 0.5 km	5 (BSL)
	Victoria and Albert Battery, Port Royal	< 0.2 km	0
Kingston	Old Naval Dockyard	< 0.5 km	0
	Fort Rocky	< 0.5 km	0
St. Mary	Old Court House (Port Maria Civic Centre)	< 0.5 km	-

Source: Research data compiled by Author

Table 17. Field Vulnerability Assessment of Select Sites in Jamaica

Climate Hazard Phenomena	Heritage Value	Impact	Sensitivity	Exposure	Adaptive Capacity				Measure of Vulnerability MV = (E + S) - AC
					LCD 1 - 4	LCED	CA	MR	
SEA LEVEL RISE	Old Naval Hospital (Port Royal): extant structures, historic seawall, and cultural materials	Storm surge; Coastal inundation	2	3	1	1	2	2	4 (3.5)
	Coastal road from Annotto Bay to Falmouth: several extant smaller historic structures; archaeological sites	Storm surges; Coastal inundation	3	4	3	3	1	1	4 (5)

Source: Research data compiled by Author from Field Vulnerability Assessments undertaken with the Jamaica National Heritage Trust Archaeology Division, Summer 2022. Key: 1 – Low; 2 – Moderate; 3 – High; 4+ – Extremely high.

Note: Adaptive Capacity = Average of LCD, LCED, CA, and MR. LCD – Level of Coastal Development, LCED – Level of Coastal Ecosystem Degradation, CA – Climate Action, MR – Management Response.

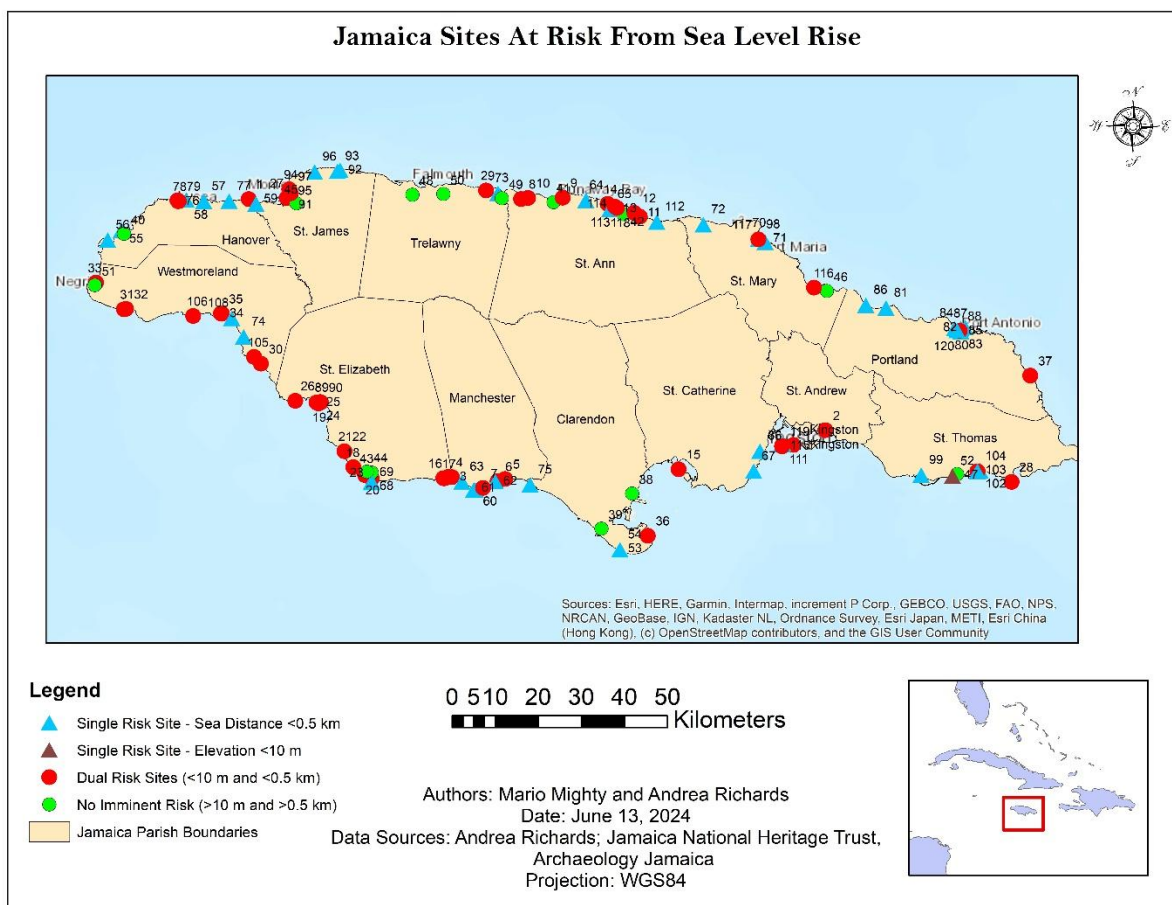
Table 17 (continued). Field Vulnerability Assessment of Select Sites in Jamaica

Climate Hazard Phenomena	Heritage Value	Impact	Sensitivity	Exposure	Adaptive Capacity				Measure of Vulnerability
					LCD	LCED	CA	MR	
			1 - 4						
SEA LEVEL RISE	Ross Craig	Coastal Erosion	3	3	1	1	1	1	4 (5)
	1750 St. Ann's Bay Fort	Coastal erosion, Storm surge, Coastal Inundation	3	3	1	1	1	1	4 (5)

Key: 1 – Low; 2 – Moderate; 3 – High; 4+ – Extremely high.

Note: Adaptive Capacity = Average of LCD, LCED, CA, and MR. LCD – Level of Coastal Development, LCED – Level of Coastal Ecosystem Degradation, CA – Climate Action, MR – Management Response.

Figure 19. Select Sites at Risk due to Climate-induced Hazards



Source: Author compiled from various sources highlighted throughout research

Summary of Assessment and Results

Field observations in 2022 revealed that the part of the coastline (eastern to northern) assessed was extremely vulnerable to sea-level rise and associated coastal erosion, inundation, and storm surges. The **Annotto Bay Baptist Church** was located in proximity to the sea and was previously impacted by coastal inundation and storm surges. For the **St. Ann's Bay Fort** portions of the site

are now below sea level, and the site will continue to erode and be completely submerged in the years to come.

This research acknowledges that although assessments are key for developing appropriate responses, there are difficulties in determining the extent of damage and loss that could occur due partly to uncertainty about future severe weather events. As such, assessing the vulnerability of sites is key to developing appropriate climate action to begin to address the impacts of future impacts.

The legislative and policy landscape for the protection of heritage in Jamaica, like much of the study area, has also remained largely unchanged and primarily centres on the JNHT Act (1985, and currently slated for an update). However threats to heritage are constantly evolving. Since the significant mapping of pre-Columbian sites by James Lee and the Archaeological Society of Jamaica in the 1960s to 1980s, there has been very limited to no extensive surveying and mapping of sites, except in instances related to large-scale infrastructural projects such as for highway development. Few sites have been fully researched, and there has been no systemic or periodic monitoring programme targeting these sites by the JNHT or any other partner, such as the Archaeological Society of Jamaica (ASJ). Limited or no monitoring results in many impacts going unchecked, unreported, and unaddressed, resulting in the continued loss of sites, both documented and undocumented. As a result, no actions are developed that focus on evidence-based monitoring, nor have baselines for sites been established.

The research does not provide evidence of archaic peoples in Jamaica, and it is largely felt that if an archaic culture inhabiting Jamaica at some point existed, its sites would be located on the coasts but would likely have been submerged due to past sea level fluctuations. Redware sites were also primarily located along the coast. By working to identify and map these sites, we are providing the space and opportunity to learn more about these earlier cultures.

Safeguarding Jamaican coastal heritage requires a multidisciplinary and collaborative approach and cannot solely focus on the work being done by heritage institutions. In order to prioritise actions, Jamaica's first step should be to undertake a comprehensive climate change vulnerability assessment or a multi-hazard assessment and (re) mapping of pre-Columbian, colonial, and post-

colonial sites within or without a wider strategy for addressing impacts on heritage. For threatened coastal heritage, it means awareness, observation and monitoring, data collection, studies, prioritisation, and the development of key actions.

In terms of data collection, the work done by James Lee and the Archaeological Society of Jamaica remains the most comprehensive documentation and mapping of sites, providing data on their location, elevation, distance from the sea, and a basic description of the site's environment. This data can be used as a basis to expand survey data to include mapping undertaken by the JNHT and, through predictive modelling, undertake a programme to identify previously unknown sites. This action can then serve as the basis for an expanded coastal heritage survey undertaken by the JNHT in collaboration with other partners such as the Universities of the West Indies and Technology and the Archaeological Society of Jamaica. This data can also guide persons doing future work at sites as they would have been exposed to the site's vulnerabilities, as well as establishing monitoring schedules for responses by communities and other heritage actors. This context is also an opportunity for the ASJ to scale up an activity it was once heavily invested in.

Following this survey exercise and with inventories in place, heritage managers in Jamaica can utilise various tools to undertake simulation exercises in relation to current and future risks. The use of satellite imagery is useful for highlighting coastal changes. Geographic information systems (GIS) can also be used to undertake predictive modelling exercises that can expose future risks and vulnerabilities and develop interactive tools such as Heritage at Risk Maps for use not just by the heritage community but also by those involved in coastal and or urban planning and or management. For example, the maps developed can be combined with the beach monitoring work being undertaken by the National Environment and Planning Agency (NEPA) or other monitoring work by, for example, the University of the West Indies. The improved organization and use of data will also create good entry points for the involvement of other actors, such as local communities, and in developing climate change narratives to build awareness and support engagement.

In Jamaica, the Department of Geology of the University of the West Indies, Mona Campus, and societies such as the Geological Society of Jamaica have already generated valuable coastal studies and SLR data, which can be of use in examining the risk to the coastal archaeological

record and could be pursued through collaborative work. This process actualises a truly multidisciplinary approach to examining the vulnerability of this coastal archaeological record. Already, the ASJ is comprised of individuals representing many scientific disciplines, not just archaeology, and so this platform presents an excellent gateway for pursuing this. These suggestions also apply across all islands in the study area.

Saint Lucia

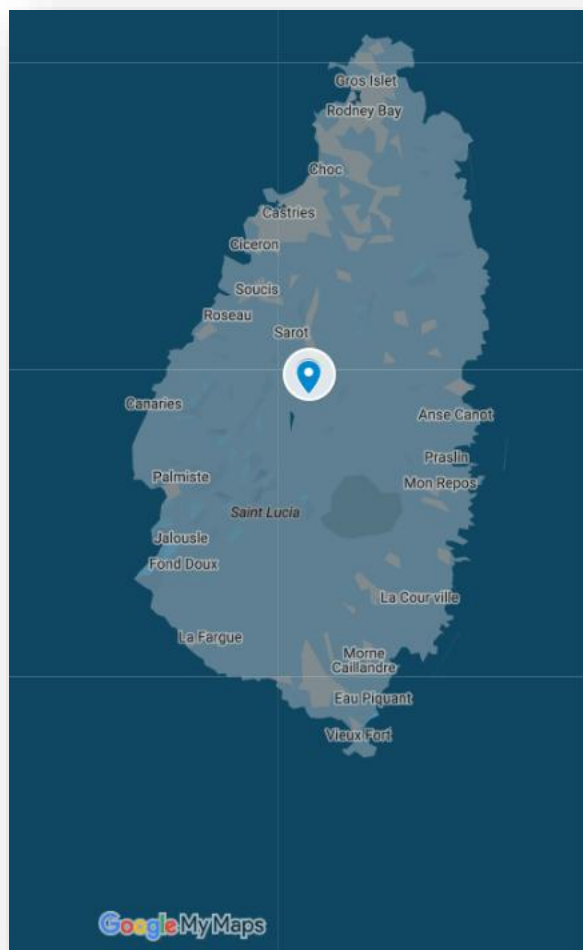
Introduction

The island of Saint Lucia is approximately 616 km² and is located within the eastern Caribbean, specifically the Lesser Antillean archipelago (Figure 20). It sits on top of an old volcanic ridge that links Saint Vincent and the Grenadines to the south, with Martinique in the north. The island has a relatively narrow coastal shelf area of 522 km² and a steep drop-off along the west coast. The long and sweeping coastline spans around 158 km (Saint Lucia Third National Communication, 2017¹⁰³). The terrain of Saint Lucia is made up of deep valleys, rivers, and mountains along a centrally situated north-south mountain line (Branford, 2011; Government of Saint Lucia, 2018; UNDRR, 2022).

The island's geographic location in the tropical cyclone belt means that the annual passage of these storms impacts it, resulting in an environment where heritage, both tangible and intangible, cultural landscapes and natural heritage are vulnerable. The natural hazards are many, ranging from volcanic activity, hurricanes, floods, drought, tsunamis, and seismic activity to anthropogenic hazards such as fires.

¹⁰³ Saint Lucia's Third National Communication (NC 3) to the UNFCCC (2017). Accessed at: <https://unfccc.int/documents/81558>

Figure 20. Map of the Island of Saint Lucia in the Eastern Caribbean



Source: Author generated from Googlemaps.com

Climate Trends and Modelling Projections

According to the CARIBSAVE Climate Change Risk Atlas (CCCRA) for Saint Lucia, the island is “already experiencing some of the effects of climate variability and change through damages from severe weather systems and other extreme events, as well as more subtle changes in temperatures and rainfall patterns” (CCCCC, 2012). Projections for Saint Lucia suggest increases in atmospheric and sea surface temperatures and a reduction in annual rainfall. Similar to other

islands in the study area, an increase in tropical cyclone intensity is also foreseen (CCCCC, 2012; see also UNDRR, 2022). Projections based on Regional Climate Models (RCMs) suggest that temperatures will increase with a range of 2.4 °C to 3.3 °C by the 2080s in higher emissions scenarios. General Circulation Models (GCMs) project an overall decrease in annual rainfall of -37 mm to +7 mm by 2080, with RCMs indicating decreases between -11% and 32%. Annual SST will see increases of +0.8 to 3 °C by 2080s.¹⁰⁴

According to data in its National Communications 3 (NC3, 2017), SLR projections include up to 0.38m and kilometre squared land inundation up to 0.065 (2040 – 2069), and SLR up to 0.82m and inundation up to 0.313 (2081 – 2100). Simulations based on this rate of SLR with storm surges related to tropical cyclones suggest a storm surge of 2m and inundation of 2.2km sq. of land related to a Category 2 hurricane and a storm surge of 5.4m and inundation of 17.2km sq. of land related to a Category 5 hurricane up to the year 2100 (NC 3, 2017).

NC 3 (2017) goes on to identify the areas of Micoud and Dennery on the east coast and Gros Islet, Castries and Anse de la Raye on the west coast as being particularly susceptible to SLR. Saint Lucia's CCCRA (2012) identifies Pigeon Island and its causeway, Rodney Bay and Soufrière as areas also vulnerable to SLR. These areas contain infrastructure related to tourism and international transport. All lie within less than six metres above sea level. One metre of sea-level rise will place seven percent of tourism infrastructure, fifty percent of airports, and one hundred percent of ports at risk.¹⁰⁵ Figure 21 illustrates coastal areas projected to be submerged under one meter in sea-level rise by the year 2100.

Also similar to many of the islands of the Caribbean, a significant portion of the coastal zone is used for tourism, and “these areas already face pressure from strong natural forces such as wind, waves, tides, currents, and human activities through beach sand removal and inappropriate construction of shoreline structures” (CCCCC, 2012).

¹⁰⁴ Government of St Lucia. 2018. St. Lucia's National Adaptation Plan 2018-2028.

¹⁰⁵ Caribbean Climate Change Risk Atlas (CCCRA) CARIBSAVE St. Lucia Country Profile (2012)

Figure 21. Coastal areas in Saint Lucia Projected to be Submerged under 1m Sea-level Rise



Source: Climate Central's Surging Seas Global Risk Zone Map <http://sealevel.climatecentral.org/>

Overview of Impacts of Climate-Induced Hazards on Saint Lucia's Archaeological Heritage

Saint Lucia has benefited from a significant amount of work in the documentation of its archaeological heritage through the organisational efforts of the Saint Lucia Historical and Archaeological Society (SLAHS) and the Saint Lucia National Trust (SLNT). Efforts by individuals such as Roger Stanley (petroglyphs) and Robert Devaux's extensive survey (1975) of historic sites on behalf of the SLNT have also extended the documentation of sites, in addition to investigations by Ripley and Adelaide Bullen, and the Florida Museum of Natural History, the University of Florida, Leiden University, Yale University, and Harvard University. Cultural resource management work in response to tourism development by non-Saint Lucian archaeologists and researchers have also been conducted (Branford, 2011).

Branford (2011) writes that the SLAHS located over 250 sites in coastal areas. Despite the threat posed by climatic challenges, few efforts have been implemented to address this threat, and there is no widespread monitoring of sites. In fact, although investigations by Leiden University produced extensive coastal surveys, these were not used to develop meaningful actions geared towards safeguarding Saint Lucian archaeological heritage, particularly within the context of ongoing and accelerated climate change.

Bright's inventory (2011) mentions the proximity of some sites to the coast and coastal erosion events. These sites include **Anse Capitaine, the Balemboche Petroglyphs, Banana Field, Black Bay, Lavoutte, Micoud Beach, and Sorciere Beach**. This inventory can be useful in identifying sites to monitor in the present and the future.

In the case of the **Pigeon Island National Park** this is an inland reserve situated on the northwest coast of Saint Lucia that was joined to the mainland by a human-made causeway in the 1970s. Since the construction of the causeway, the shore along Pigeon Island has experienced high erosion rates along the southern coast. Investments in coastal stabilisation, beach nourishment, restoration of structures, infrastructural development and upgrade, and general maintenance of the buildings and landscape have been made over the years to prevent and reduce erosion taking place. The island has been noted as having a high rate of erosion since the 1970s, having suffered from hurricane damage, with the shoreline retreating around the historic cemetery and the **Carib**

Caves. Other infrastructure, such as the groynes and jetty, were also damaged. These actions called into focus the urgent need for shoreline stabilisation and protection.

Data Collection and Vulnerability Assessment of Saint Lucian Archaeological Sites

A desk-based review of existing site inventories was undertaken, to include inventories detailed in Bright (2011), Field Reports of Leiden University (2002 – 2004), Deveaux's (1975), and Stanley's (2014) survey of historic sites and petroglyphs. These documents were augmented by a review of other archaeological reports and a brief field assessment to identify sites, undertake observations for the vulnerability assessment (see Table 18) and obtain GPS readings for sites which were not included in this document.

Table 18. Saint Lucia Field Vulnerability Assessment Sites

Parish	Name of Site	Distance from Visible Coastline	Elevation (M.A.S.L or M.B.S. L
Gros Islet	Comerette Point (SLU-42)	< 0.5 km	6
	Anse Lavoutte (SLU-91)	< 0.5 km	0
	The Ramp/Old Airstrip	< 0.5 km	2
	Pigeon Island National Park Burial Ground	< 0.5 km	4.8
Soufriere	Jalouse Petroglyphs (SLU-75)	< 0.5 km	0
	Hess	< 0.5 km	-
Castries	Fort Charlotte	< 0.5 km	251
Dauphin	Mill Dauphin Beach	< 0.5 km	17
	Dauphin Petroglyph (SLU-45)	< 0.5 km	4

Table 18 (continued). Saint Lucia Field Vulnerability Assessment Sites

Parish	Name of Site	Distance from Visible Coast	Elevation (M.A.S.L or M.B.S. L
Grand Anse	Grand Anse (SLU-70)	< 0.5 km	0
	Grand Anse Historical Structure	< 0.5 km	-
Dauphin	Sugar Mill at Dauphin	< 0.5 km	25
Micoud			
Highway, Vieux Fort	Vieux Fort Mill Tower	< 0.5 km	10
Laborie	Laborie Mill Remnants	< 0.5 km	21
Choiseul	River Doree Enslaved Burial Ground	< 0.5 km	1
	Copper Boiler at River Doree	< 0.5 km	24
	River Doree Aqueduct	< 0.5 km	25
	Anse Capitaine (SLU-04)	< 0.5 km	0
	Vierge Point # 1, 2, 3 (SLU-145, 146, 147)	< 0.5 km	0
Micoud	St Lucy's National Shrine	< 0.5 km	7
	Micoud Beach (SLU-97)	< 0.5 km	0
	Troumassie Estate House # 1	< 0.5 km	17
	Troumassie Estate House # 2	< 0.5 km	17
Micoud			
Highway	Troumassie Mill	< 0.5 km	13
Dennerly	Dennerly Bay Site (SLU-47)	< 0.5 km	6
Castries	Married Women's Quarters	< 0.5 km	25
	World War II Gun Mount	< 0.5 km	0

The sites of **Pigeon Island National Landmark**, **Dauphin Petroglyphs**, and **Sugar Beach Petroglyphs** were selected for the specific vulnerability assessment in consultation with national

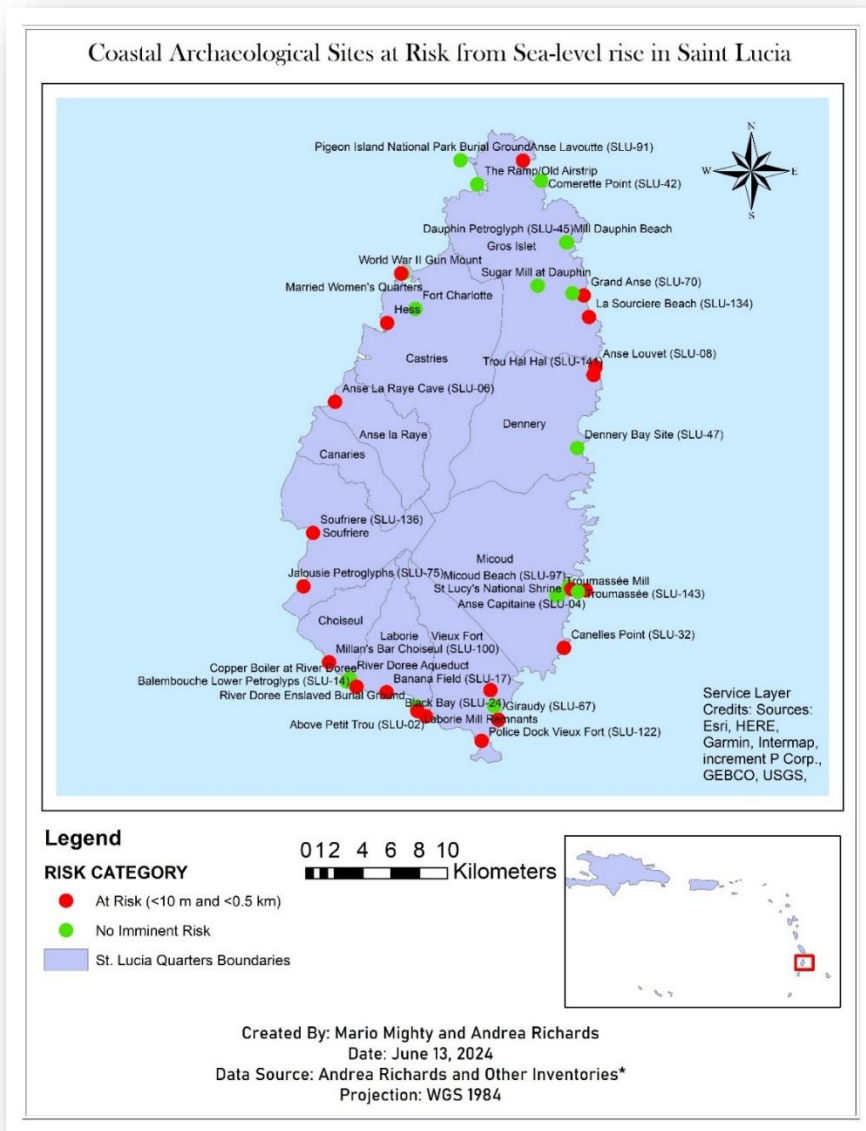
partners. The vulnerability assessment of select sites is presented in Table 19, and mapped sites at risk from climate-induced hazards due to being in close proximity (less than 0.5 km) to the coastline or having elevation below 10m are presented in Figure 22.

Table 19. Vulnerability Assessment of Selected Sites in Saint Lucia

Climate Hazard Phenomena	Heritage Value	Impact	Sensitivity	Exposure	Adaptive Capacity				Measure of Vulnerability
					LCD	LCED	CA	MR	MV = (E + S) - AC
					1 - 4				
SEA LEVEL RISE	Dauphin	Storm surge;							
	Petroglyphs	Coastal inundation	2	4	2	1	1	1	4 (4.75)
	Pigeon Island	Storm surge;							
	National Park	Coastal inundation;	3	3	1	2	2	2	4 (4.25)
		Coastal Erosion							
	Sugar Beach	Coastal Erosion	3	3	1	2	1	1	4 (4.75)
	Petroglyphs								

Note: Adaptive Capacity = Average of LCD, LCED, CA, and MR where LCD – Level of Coastal Development, LCED – Level of Coastal Ecosystem Degradation, CA – Climate Action and MR – Management Response. Key: 1 – Low; 2 – Moderate; 3 – High; 4+ – Extremely high

Figure 22. Saint Lucia Archaeological Sites at Risk Due to Climate-Induced Hazards



Source: Author compiled from various sources highlighted throughout research

Saint Lucia Vulnerability Assessment and Results

Saint Lucia's latest National Communication (NC 3, 2017) outlines an extensive programme of data gathering and simulating hazard scenarios in its coastal zone. It has also implemented more

than twenty projects and programmes that target adaptation to the changing climate (2017, p. iii), particularly in relation to SLR and storm surges based on various tropical cyclone strengths. Through its Fisheries Department, a beach monitoring programme that includes beach changes and coastal erosion has been implemented since 1995.

However, specific observations of the coastal archaeological record revealed that sites remain extremely vulnerable, and limited actions have been taken to safeguard them. Some sites have already experienced erosion into the sea.

As presented for Antigua, Barbados and Jamaica, many of the recommendations made also apply to Saint Lucia. Safeguarding Saint Lucia's coastal heritage requires a multidisciplinary and collaborate approach which does not only focus on the work of heritage institutions but also incorporates work by non-heritage partners and research institutions – *such as the beach monitoring programme by the Fisheries Department* - and assessing the vulnerability of sites is key to developing appropriate actions. Critical actions are also needed concerning surveying and mapping of sites, ongoing monitoring and data collection, development of inventories and interactive tools such as Heritage at Risk Maps.

Summary

Data provided by assessments of archaeological sites can greatly assist in the development of valuable climate action that involves the mitigation of climate-induced hazards and disaster impacts. This data can also support and guide the development of adaptation strategies for the future, such as those related to constructing in coastal areas, protecting retreating coastlines, relocation of communities, protection of critical infrastructure, or the elevation of structures as needed, as well as the application of other innovative solutions coming from the past, as these actions continue to influence adaptation strategies today.

Vulnerability assessments utilize varying data sources and paint a picture of the extent of risks facing the coastal archaeological record. They, therefore, can support the culture sector in developing needed strategies to address threats presented by climate-induced hazards. Daly

(2014, p. 110) points out that “vulnerability assessments are vital, as in the absence of the voice of cultural heritage, coastal defences and other hard engineering solutions have the potential to harm the archaeological record” (also see Edwards & O’Sullivan, 2007), and it is important to have sufficient dialogue and inter-disciplinary actions to ensure that human interference in the coastline is not catastrophic.

Archaeological site monitoring based on vulnerability assessments is, therefore, a critical tool for engaging the public and stimulating important climate action (Cochran et al., 2023; Miller et al., 2024). Monitoring data informs policy, such as coastal resilience plans, and monitoring also becomes the method of data collection once policy is enacted.

CHAPTER FIVE

CLIMATE CHANGE ARCHAEOLOGY IN THE CARIBBEAN

This Chapter focuses its discussion on the place of archaeology by presenting data from archaeological research undertaken throughout the region. It intends that this data contribute to the discourse on climate action in the region. At present, the limited evidence suggests the place for archaeological data is virtually non-existent in contemporary Caribbean climate action.

The information presented in this chapter emanates from a desk review of prior archaeological research undertaken throughout the Caribbean. It identifies and studies archaeological research that highlights or provides evidence of how past populations in the region responded to climate variability and hazards. In addition, present-day threats to the archaeological record from climate-induced hazards are examined, leading to a final discussion on contemporary uses for data from archaeological sites where these adaptation strategies have been researched, as well as sites threatened by climate-induced hazards. These are presented at the conclusion of this Chapter and again in Chapter Seven's analysis, which aims to support arguments for its applicability to the region's climate action at multiple levels and scales.

Although not all climate adaptation actions or strategies will be evident in the archaeological record, as indicated by Kaptijn (2018), archaeological data can also provide evidence for intangible heritage knowledge and practices at work in the past and which are now embodied in the record. Ways of thinking and doing can influence decisions, becoming manifested in the archaeological record as tangible actions. As indicated previously, understanding human-climate and environment interaction from a culturally specific and unique perspective is possible through the study of archaeology due to "archaeology demonstrating material evidence of past human lifeways" (Delpuech, 2004). Through archaeological research, we are able to delve into climate action processes as they present themselves in the archaeological record while also gaining interesting and valuable insights into how present-day populations might respond to these climatic challenges. Response strategies in the archaeological record might present themselves as shorter

coping strategies, such as temporary shifts in food procurement, or longer-term adaptation, such as through island abandonment or changes in settlement locations.

The IPCC recognized the importance of archaeology in examining climate action in its Fifth Assessment Report (AR5), which highlighted “the usefulness of considering lessons learned from past societies through archaeology in how they responded to severe environmental change” (IPCC, 2014, p. 920; see also Field & Barros, 2014).

This expanded role of archaeology has become known as climate change archaeology (Cooper & Peros, 2010; Burke et al., 2021; Van de Noort, 2013) and acknowledges its importance for not only studying this long-term perspective of how communities or populations adapted to the changing climate in the past (i.e., through the archaeological record) but also for examining current vulnerabilities of the archaeological record (the intersection of the archaeological record and climate hazards). It also acknowledges its role in engaging the broader public in better understanding climate change and the effects of climate-induced hazards, through participating in research activities at sites threatened by these hazards, such as through participating in monitoring actions, resulting in the building of climate literacy and social action through the lens of cultural heritage.

Severe climate variability presented challenges for past populations in the Caribbean, who were required to adjust to sea-level fluctuations and specific wet and dry phases, among other forms of climate variability. Strategies to manage these severe changes would have been needed through the decisions that were made in relation to where settlements were placed and where and how food resources were procured, in addition to the dwellings that were constructed (Hauser, 2021, p. 53). This would also be applicable to survival or resilience networks formed by individuals and communities at the intra- or inter-island levels and perhaps even regionally, based on discourse on geographical networks that may have been developed to support the survival of populations throughout the region (Hofman & Duijvenbode, 2011; Peterson et al., 2004)

Archaeological research in the region is by no means lacking and has contributed valuable studies and data on a range of topics - some more than others - over the last few decades (Bright, 2011). This archaeological research has informed the *who, what, when, and how of the earliest*

inhabitation of the region, reconstructions of past landscapes and livelihoods, subsistence, mobility, and livelihoods strategies, rewriting colonial narratives, giving voice to past marginalised groups and their erasure, discussions on identity and the Indigenous past, and the resilience of local populations within the context of changing social, environmental, and economic landscapes.

These are all critical issues in the region's history, and so it is fitting that archaeology now contributes to global and regional climate change discourse by analysing historical, ecological, and regional dimensions of social response and resilience. Archaeology is undoubtedly valuable for dealing with the climate-induced hazard setting in the Caribbean, one of the most defining challenges the region has and will continue to face.

While it is important to acknowledge that there has been a reasonable amount of documentation on the impacts of climate-induced and other natural hazards, for example, the loss of coastal sites to coastal erosion and the effects of severe weather systems on the archaeological record (see Delpuech, 2004; Fitzpatrick, 2006, 2012; Hofman & Hoogland, 2016; Murphy, 2023), there is still room for more significant research in this area, as well as on the influence these hazards had on past Caribbean societies and cultures. This existing research also lacks the identification and development of relevant climate action to protect this heritage. While this is critically needed, measures taken to protect the archaeological record have focused primarily on the documentation of some sites and very little in terms of mitigating climate-related disaster impacts or monitoring response over a period to identify successful strategies.

It is also essential to recognize the role of past knowledge systems in developing strategies beyond a very localised use of knowledge on islands in contributing to adaptation, such as traditional building techniques being used to counter the effects of tropical cyclones. Very limited studies have also been undertaken on how built heritage is impacted beyond recording physical damage from severe weather events. There has also been extremely limited research on how heritage contributes to reducing our carbon footprint within our regional context by addressing other climate change issues such as higher temperatures, or in the adaptive reuse of historic structures.

Given that the aforementioned research areas are witnessing significant development within the global culture space, it is reasonable to assume and expect that this will, at some point, influence

regional research aims and initiatives. This is considered even within the limited fiscal space for supporting cultural heritage research in the region and the insufficient attention paid to heritage generally by policymakers (Hofman & Hoogland, 2016; Siegel & Richter, 2011). As an immediate response in the Caribbean, actions should be set in motion for long-term adaptation processes, requiring not just heritage managers and practitioners to plan but also an integration with the work of agencies who deal with planning, development, and environmental response, through an integrated heritage management strategy.

Archaeology, Paleoenvironmental Data and Climate Research in the Caribbean

In relation to climate change studies in the region, archaeologists have fully utilised paleoclimatic and paleoenvironmental studies to provide critical information on past climate reconstructions or context for archaeological research. Although, as previously mentioned, the place for archaeology in climate change discourse in the region is not well articulated beyond the archaeological field, it is aptly placed to examine local and regional interactions of the socio-natural environment within a long-term perspective. For archaeology's value to be recognised at a broader societal scale in the region, it requires improved interrogation within the academic space, better articulation by the archaeological community, clearly demonstrating how it could be applied, and identifying usable data and opportunities for its use (Richards, 2022; Rivera-Collazo & Perdikaris, 2023).

Williams (2019) suggests that although there has been a surge in paleoclimatic studies in the region, that area also remains understudied. For the archaeological community, there is, nevertheless, quality and significant data from existing Caribbean paleoclimatic and paleoenvironmental studies which have revealed the climatic conditions and experiences of the region from the end of the Pleistocene to the present time (see Beets et al., 2006; Cooper, 2013; Cooper & Boothroyd, 2011; Cooper & Peros, 2010; Curtis et al., 2001; Curtis & Hodell, 1993; Delpuech, 2004; Hodell et al., 1991; Hofman et al., 2021; Malaizé et al., 2011; Perdikaris & Boger, 2022; Peros et al., 2006; Siegel, 2018; Siegel et al., 2015; Serrand & Bonnissent, 2021).

A significant number of current archaeological research projects in the region also include paleoenvironmental components. This data has supported revelations for the extent of dry and wet extremes across the region, and the severity of these events would have undoubtedly been reflected in societal changes in pre-Columbian populations (Florès Blancaneaux, 2009; Bright, 2011; Delpuech, 2004; Petitjean Roget, 1997).

Limited studies aside, when paleoenvironmental data is studied in tandem with archaeological data through a multidisciplinary approach, a more robust picture of that specific socio-ecological dynamic emerges. The site of Anse à la Gourde in Guadeloupe is one of the earliest examples where this multidisciplinary approach was utilised through oxygen isotopic studies undertaken on terrestrial molluscs to study climatic conditions over time and combined with data from the archaeological record (Beets et al., 2006). Research from Cuba by Cooper and Peros (2010) presents another example of this approach of combining multiple data sets from archaeological and paleoenvironmental research.

Integrating paleoenvironmental and archaeological data also creates opportunities to support an awareness of narratives of resilience and adaptation in past populations instead of a purely environmental determinism one, where past populations are mostly viewed as being impacted by environmental change or natural hazards or that cultural change only occurred because of severe environmental change.

The use of various paleoenvironmental proxies, such as sediment cores, carbon and nitrogen isotopic studies on shells, charcoal particles, flora and fauna data, or the use of tree rings from regional sites, are valuable archives for the study of historical climate and ecological changes (see also Curtis et al., 2001; Siegel, 2018; Siegel et al., 2015). In these instances, these data have supported the development of a more robust description of climate variability for example during the Ceramic Age and supported the reconstruction of the region's climate record (Beets et al., 2006; Hofman & Hoogland, 2015; Malaizé et al., 2012; Williams, 2019). Siegel et al. (2015) also suggest that many sites dating to the archaic age in the region may have been lost or obscured due

to SLR, coastal erosion, or sedimentation. As such, paleoenvironmental data potentially holds the best clues to human arrival and adaptation in the region during this period.

A future of archaeological research that combines modelling from paleoclimatic data with data from a paleoenvironmental context or framework can be applied to the identification of more precise adaptation strategies by past populations and also support current climate action throughout the region. As this data provides information on climatic change over the long term, it focuses our research gaze on the past through studies on reconstructed regional climate, different scenarios for SLR, severe climate variability, and the examination of multi-proxy data sets and human-environment dynamics.

Archaeological Research On Past Human Response in the Caribbean

While the preceding text highlights the extent and severity of climate variability resulting in changes to settlement locations and other forms of societal response, it is crucial to consider, as suggested by Rivera-Collazo et al. (2015, p. 637), that “human responses to change are complex and can vary drastically depending on the societal priorities at the time when change is perceived” or experienced. This is also to say that while some adaptation strategies were similar, they should not be treated as the same in all societies or past populations but depend on how societies perceive how they were being impacted and what they see as a priority in their localised response.

Rivera-Collazo and Perdikaris (2023) also contend that when a hazard is viewed as posing a risk to or endangering elements of social structures and cultural identities, adaptation to change takes place. Adaptation strategies or attempts evidenced in the archaeological record thus indicate that these hazards were intolerable and constituted a serious threat necessitating transformation. In this instance, traditional knowledge can provide critical context to the archaeological, paleoclimatic, and paleoenvironmental combined data approach, as was highlighted earlier. Another critical element to be considered is that the inclusion of traditional knowledge helps a transition from the ecologically deterministic approach in relation to climate change, whereas

Delpuech (2004) suggests that care should be taken to ensure that environmental challenges are not seen as purely responsible for cultural change.

Although climate change has become *the* buzz phrase in the past few years, such terminology was not widely used or recognised in the earlier decades of archaeological investigations in the Caribbean in the twentieth century. In relation to the archaeologist's research gaze, this would focus either on how sites were being impacted or on evidence for adaptation strategies in the record. In most cases, archaeologists may have focused on the former and merely only noted natural hazards impacting sites in field reports, such as was noted for the Little River pre-Columbian site in Jamaica (DeWolf, 1953; Richards, 2022). As regards the latter, focusing on identifying and or examining adaptation strategies in the record would be less known and documented. Keegan (1992) points out that Caribbean archaeologists really started to focus on the relationship between the natural environment and culture in the late 1970s. Since then, there has been a more focused examination of climate-induced and other natural hazards and geomorphological processes and their impact on cultural heritage, specifically the archaeological record.

This limited focus of earlier regional archaeological research suggests that valuable data from archaeological sites might not have been thoroughly researched or missed in relation to recognizing adaptation strategies in the record. Of course, many of these earliest sites have already been lost to the eroding waves or have become submerged (De Waal, 2019; Fitzpatrick, 2012; Fitzpatrick & De Waal, 2019; Hofman & Hoogland, 2015).

In considering the value of archaeological data in undertaking a deeper time analysis of socio-ecological dynamics to support climate action and discourse regionally, this section highlights some research that identified past human societal adaptation strategies to climate change in the archaeological record. With expected regional variations, all Caribbean pre-Columbian populations would have experienced similar climate variability through rapid and intense events such as cyclone activity and storm surges, coastal inundation, or gradual onset climate phenomena such as SLR and coastal erosion and would have adjusted to these rapid or slower

changes over time (Cooper, 2012; Davis & Oldfield, 2003). These observations and responses are relevant to us today.

Past climate variability would have been undoubtedly stressful times for peoples and their settlements and would have resulted in realignments or adjustments within their societies (Rivera-Collazo et al., 2015). Some of these past changes and strategies are manifested today in the traditional knowledge and practices passed down as intergenerational knowledge. As such, this data chapter identifies the intersections between archaeological research data and climate change in the region. This is done through examining examples of past human climate action present in the archaeological record or through the availability of archaeological research on adaptation or resilience in social networks, settlement patterns and locations, housing construction and technology, food and water resources management, and the general interaction of past populations with their coastal zones, and within the context of the climate-induced hazards experienced, as well as from changing coastlines. This is done through a review of past and more contemporary archaeological research data.

Cultural materials excavated in the region provide insight into the ways in which Indigenous populations responded to severe climate variability and the strategies that would have been deployed voluntarily or involuntarily to the constantly changing environment or persistent change. In addition to societal, community, or individual realignments, research points to past populations forming regional networks that provided safety nets during climatic challenges, which also aligns with the earliest networks of mobility and exchange noted between islands (Hanna, 2019; Hofman & Hoogland 2011, 2015; Hofman et al., 2021; Hofman et al., 2019; Rivera-Collazo et al., 2015).

Pre-Columbian Settlement Patterns and Landscape Transformations

Pre-Columbian settlements are recorded as being mostly coastal, near to fresh water supply, on hillocks, or located beyond protective ecosystems such as dunes or mangroves (Bright, 2011; Davis & Oldfield, 2003; Fitzpatrick & De Waal, 2019). Hofman and Hoogland (2015, p. 107) point to “the leeward slopes of mountains or the higher parts of flat areas” being utilised as preferred

settlement locations, as found in Los Buchillones in Cuba, Kelbey's Ridge in Saba, and El Flaco, El Carriland, and Los Ballatares in the Dominican Republic. Stratigraphic evidence and other data also suggest "that settlements shifted locally over time, moving back from the beach to a setting further inland behind dunes, perhaps connected to rising sea levels" (Bright, 2011, p. 25; see also Delpuech, 2004; Hofman & Hoogland, 2015; Keegan, 1992; Rivera-Collazo et al., 2015), as well as severe storm events.

Research at, for example, Angostura (Puerto Rico), Los Buchillones (Cuba), Anse à la Gourde (Guadeloupe) and Anse Trabaud (Martinique) indicated strategies for settlement location and housebuilding which were suited to the climatic challenges of living in coastal areas and being exposed to coastal inundation, tropical cyclones, storm surges and coastal erosion and changes (Beets et al., 2006; Delpuech et al., 1999; Hofman et al., 2021; Rivera-Collazo et al., 2015). Evidence of shifts in settlement location illustrate human climate action to climatic challenges as settlements would be relocated or shifted in response to the encroaching sea or coastal inundation over time or continuing erosion due to SLR and wave action (Hofman et al., 2021).

Hofman and Hoogland (2015) noted that the archaeological record identifies shifts in settlement patterns and density that were observed during periods of severe climate variability. Drewett and Oliver (2012) also highlighted that sea level changes would impact low-lying sites such as Port St. Charles and may partly explain some aspects of settlement shift at the site.

Rivera-Collazo and Perdikaris (2023), from their research in Barbuda, suggest that there is evidence of a combination of environmental issues and coastal landscape change coinciding with site abandonment during the late Ceramic period in Barbuda. Hauser (2021, p. 54), in writing about Dominica, points out that "in some instances, settlements were built on artificial mounds to protect communities against tsunamis and heavy storms, and it was also clear that people were not just reacting to the environment but trying to account for climatic variation and plan for the whims associated with water differences on the islands they settled."

Indigenous settlements were also noted as being located close to cave systems for natural temporary shelters (Cooper, 2012), and was also highlighted by De Waal (2006) in relation to La Désirade. Ethnographic research illustrates that this remains the case today in rural or Indigenous

communities such as *La Farallones* near El Cabo in the Dominican Republic (Hofman & Hoogland, 2015; Samson, 2010) or as mentioned by Kalinago community members¹⁰⁶ in Saint Vincent who highlight the use of caves as shelters and safe spaces during eruptions from La Soufriere, or even threats from intense cyclones (A. Sutherland, personal communication, November 16, 2021).

The same adaptive strategies noted in the location of pre-Columbian settlements were identified throughout the region. This suggests that actions based on environmental observations made over time benefit the resilience of areas chosen to locate or relocate settlements or decisions on when a habitation hiatus was needed.

Housing and Shelter Construction Practices

Houses and shelters are the frontline of resilience strategies and are most often mentioned when talking about resilience in Indigenous populations. Samson et al. (2015) highlighted excavations that revealed that house construction could and most often endured the hazards of islands and coastal ecologies.

Indigenous societies developed house-building practices that utilised local materials and locally appropriate building practices that were suited to hazards and endured over long periods. Hofman et al. (2012), among others, suggest that deep foundations became a recurrent feature of Caribbean architecture. Archaeological research also provides evidence of human-made or naturally occurring windbreaks, sometimes attached to houses, and the irregular layout of houses being used to mitigate strong gusts, and “easterly winds would be channelled over the house, creating a sheltered outdoor space in front of the house” (Samson et al., 2015, p. 329). Postholes were identified archaeologically as cuts in bedrock “comprising small, carefully designed, and evenly anchored structures with high-pitched roofs and reinforced facades” (Samson et al., 2015, p. 332); see Hofman et al., 2021).

House posts were so profoundly embedded, sometimes up to 3m into the ground, that they were resistant to wind shear and remained in use for hundreds of years. All that was required to be built was the skeleton of the house using locally available materials. Excavations at Golden Rock on Sint

¹⁰⁶Augustine ‘Sardo’ Sutherland, Kalinago Tribe community Leader of the Sandy Bay community (Saint Vincent and the Grenadines)

Eustatius, Anse a la Gourde in Guadeloupe, and El Cabo and El Flaco in the Dominican Republic demonstrated evidence of hurricane-proof shelters, in addition to sharing the building practices previously mentioned (Cooper & Peros, 2010; Hofman & Hoogland, 2015; Versteeg & Schinkel, 1992).

The utilisation of stilts, man-made platforms, and higher foundations across the islands demonstrated further resilience in pre-Columbian house building. As posited by Samson et al. (2015), these house-building practices have proven to be suited to natural hazards and endured them over long periods. The same could be said of locations chosen for settlements displaying resilience to coastal flooding. Hauser (2021, p. 54) highlighted that housing structures were reinforced with numerous poles and demonstrated “a degree of resilience and planning for the high winds and heavy rains.”

Wooden structures were built on stilts in coastal areas and mitigated the threat of flooding and storm surges (Cooper & Peros, 2010). Although they looked to be poorly designed to withstand hurricanes, wind shear, and coastal flooding, they were found to have many advantages. Stilted structures suspended over coastal wetland areas meant buildings were not impacted by flooding, flood waters ran under the house floors and directly to the sea, and the impact of storm surge and coastal flooding was mitigated by the location of the site with natural barriers or protection (Hofman & Hoogland, 2015). It is interesting to see the continuation of this same engineering used in contemporary building construction in traditional communities, such as the Windward Maroons in Jamaica, as well as in broader society, such as for hotel construction, the Hilton Hotel in Barbados being an example, with clear open ground floor spaces with access for flood waters to run through if necessary.

The similarities with the various strategies applied and discussed above echoed and illustrated a response in a geographic area with somewhat similar ecologies and the prevailing climate. This basic design of the pitched roof was not only simple to construct but also provided the most functional slope to keep out rain and prevent roof uplift during times of strong winds or cyclones. This basic feature endures and has been identified in vernacular architecture across the Caribbean,

such as chattel houses in Barbados, small settler houses in post-emancipation Jamaica (Green, 2012) and Dominica's *ti kai* house, which brings together Indigenous knowledge of material use and specific climatic conditions (Taylor, 1938) with French design and African housing construction features and practices (Heron and Honychurch, 2023; Heron, 2021; Honychurch et al., 2020).

These houses would also benefit from the transposition of construction techniques by Africans who were enslaved and brought to the Caribbean and other regions of the Americas. Here, traditions associated with the African round hut were integrated with existing construction techniques. The African round hut was based on an architectural philosophy that evolved based on temporary human existence and life in harmony with nature rather than against it, similar to the Amerindians.

These Indigenous forms of housing construction deviated from building homes that stand in the way of natural elements like air or wind, water, and earth. As the air blows against the hut, it circumvents the cylindrical structure and continues flowing. If the water comes, it finds its way around, and if the earth expands or contracts, the rounder structure remains intact. These Indigenous houses represented a combination of kinship, climate action in response to extreme environmental hazards, resources, and settlement geography, rather than the mere construction of shelter (Onyejebu et al., 2023; Steyn, 2006). Green (2022) provides a full discussion of transitions in Caribbean architecture, and throughout her discussion, the word 'tropicalising' is used to emphasise the continuous process of architectural development in responding to recurring natural hazards that require climate mitigation strategies.

Features such as the high-pitch hip, hip-gable, or gable roof enabled fast rain run-off and minimal hurricane-wind lifting, and the shingled roof and, later, a separate porch were included, limiting roof detachment in high winds. Other features included a sturdy dowel-joined structure (fusing with weathering to create a single, stronger form), as well as braced walls, a collared roof, and a small rectangular footprint – which enabled the structure to flex and hold together in hurricane winds or earthquakes, and jalousie blinds and shutters mitigate window damage, and finally a raised stone

or wood pile foundation which afforded anchorage and reduced flood exposure (Heron, 2021: paragraph 5, “a deeply intuitive and resilient ti kai” see also Heron and Honychurch, 2023).¹⁰⁷

Green (2022) speaks to the inherent knowledge, experience, and practices of the Indigenous and African peoples to mitigating the effects of natural hazards such as earthquakes and the hurricane season occurring between June and November in tropical climates, contributing to the development of styles and constructions of Caribbean architecture. Hans Sloane (1707, p. xlvii) described the Spanish Creole houses as anchored deep to resist earthquakes, and the English considered them cool. Fretwork was also more than decorative elements, as local experiences demonstrate that they are also climatic elements. As decorated fenestrations, fretwork allowed ventilation and mitigated hurricane force winds.

Food and Water Resources Management

Constructing raised fields was identified as one method available to farmers arriving in the Caribbean centuries before Columbus in order to manage water in an environment that endures both drought and flooding. Here, archaeological evidence suggests that farmers built little agricultural mounds with wooden tools along the South American shoreline of the Caribbean to control water during yearly intense rains and dry spells (Plew & Daggers, 2022; Rostain, 2008). It was also highlighted that “the muck that was continuously being scraped from the flooded basin and put on the mounds improved the drainage, soil aeration, and moisture retention of these raised fields, as well as their fertility” (Hauser, 2021, p. 64; also, McKey et al., 2010; Rostain, 2008). The farmers kept their rows to a minimum, protecting soil structure as well as organic matter and soil nutrients. Hauser (2021) points out that archaeology has not yet identified such examples in the Caribbean islands, although studied in Puerto Rico and the Guianas (see Hauser, 2021; Richards et al., 2023). Raised fields proved to be one adaptation strategy farmers employed to manage water, especially in locations that frequently flooded (Hauser, 2021).

¹⁰⁷ Still Standing: The Tik’ais of Dominica. Accessed 31 May 2024 from <https://survivingstorms.com/2021/03/25/still-standing-the-ti-kais-of-dominica/>

Archaeological research also identifies past responses in addressing issues of food and water security or insecurity that are equally relevant to us today and are critical areas in addressing the vulnerability of the region today and for the future (see also Cooper, 2012; Douglass & Cooper, 2020; Hofman & Hoogland, 2016; Hofman et al., 2021; Perdikaris & Boger, 2022; Samson et al., 2015). Cooper and Peros' (2010) research on intersections between archaeology and climate change with a focus on Cuba examined pre-Columbian food procurement strategies, which contributed an analysis of, for example, changing strategies for obtaining food in relation to the changing climate.

Issues with water would also present challenges for the drier, low-lying limestone islands of the Caribbean, such as Aruba, Barbados, the Bahamas, Antigua and Barbuda, Carriacou, or Mustique. On some of these islands, archaeological research suggests the application of varying strategies used to obtain water in drier times, such as paleochannels, harvesting of rainwater from rock pools, plant foliage, or using upturned conch shells (Drewett & Harris, 2007; Hofman & Hoogland, 2015; Versteeg & Rostain, 1997).

As a precursor to sinking wells, Drewett and Harris (2007) identified evidence of pot and wood-lined waterholes in Barbados to obtain fresh water when surface water was limited due to factors such as droughts. Their research (see also Drewett, 2000) pointed to these pot-lined waterholes as a mechanism for obtaining fresh water in saltwater conditions along coastal areas. These pot-lined waterholes, also referred to as pot stacks or pot stags, were identified in Saint Vincent and the Grenadines (Saint Vincent and Mustique), Guadeloupe, and Carriacou (see also Fitzpatrick & De Waal, 2019; Hofman & Hoogland, 2015). From research at the Tanki Flip archaeological site in Aruba, Versteeg and Rostain (1997) identified the Tanki Flip *rooien* - which are ditches or natural irrigation channels seen in Figure 23 - as representing ancient water management systems. Ditches such as these were seen as critical within the setting of Aruba's persistently dry climate and available water resources (Haviser & Hofman, 2015).

Figure 23. The Overgrown Tanki Flip Rooien



Source: Harold Kelly (used with permission)

Likewise, the Barbuda Research Complex Project identified persistence in the use of historic wells (see Figure 24) to address ongoing water challenges on the island of Barbuda (Perdikaris & Boger, 2022).

Figure 24. Historic Well (Barbuda)



Source: Author

Antigua, on the other hand, focused on the use of water cisterns, dams, and natural pools (Murphy, 2023), as seen in Figure 25. The challenges of water insecurity that some of these islands experienced in the past during drought or reduced rainfall are also areas that require further archaeological research to locate other water management strategies that have not yet been identified or to determine how successful these strategies were.

Figure 25. Historic Tank Bay Water Catchment (Antigua)



Source: Author

Petroglyphs were also identified next to water sources, sometimes on arid islands such as Anguilla, and were thought to indicate the location of water sources (Hauser, 2021). Petroglyphs in the Windward Islands were typically found on stones in riverbeds where the water's flow is impacted by the yearly cycles of rainy and dry seasons. Consequently, the fact that Dominica only has one known piece of rock painting could indicate that the Kalinago were confident of the availability of water or water security (Hauser, 2021), which is likely due to Dominica being a volcanic island with an abundance of rivers. According to this logic, Hauser (2021, p. 59) writes that "one of the reasons Dominica has so little rock art is that there was never a shortage of water, even during the dry season." The same, however, cannot be said for Saint Vincent, which had an abundance of petroglyphs while also experiencing similar water security. This was, perhaps, due more to the land's ability to retain groundwater than it was to water management.

Florès Blancaneaux's research (2009) also sought to better understand the effects of climate change on Saladoid cultures in the Lesser Antilles. Specifically, the author sought to understand

the impact that severe environmental instability around eight hundred to nine hundred A.D had on the societal structures, habitats, and resources of existing cultures, leading to their demise.

Archaeological research in the Caribbean can, therefore, provide a wealth of data regarding social, political, economic, technological, and ritual climate action in response to climatic challenges in the past. As such, it contains valuable messages to strengthen the resilience of contemporary communities and populations.

Archaeological Research on Contemporary Climate Change Impacts in the Caribbean

While a discussion of the vulnerability of the Caribbean's coastal archaeological record was pursued through case studies in the previous data chapter, this present section looks at specific and current archaeological research being undertaken in the region. It undertakes a review of research that integrates elements focused on studying the exposure of this record to climate-induced hazards. Across the region, archaeological sites face constant threats from climate-induced hazards, and present research points to the dearth of archaic age sites correlating with SLR, erosion, and submersion (Bright, 2011; Callahan, 2008; Crock & Petersen, 2001; De Waal, 2006; Fitzpatrick & De Waal, 2019; Keegan, 1992; Siegel et al., 2015).

In addition to examining the evidence for adaptation strategies in the archaeological record, contemporary vulnerability issues should also be probed. The recent years have sought to herald a more severe and consistent thrust by regional archaeologists and heritage practitioners to better document the impacts of climate-induced hazards on the archaeological heritage. Hopefully leading to the development and promotion of climate action for the issue at present.

Coastal archaeological sites, particularly pre-Columbian, have been significantly impacted by coastal erosion, among numerous other threats in all islands of the region. Some of the more pronounced and extensive research which have included a focus on the effects of climate-induced hazards, include Shoal Bay East and Rendez Vous (Anguilla), Lavoutte (Saint Lucia), Round Hill (Jamaica), Winthorpe (Antigua), Godet (Sint Eustatius), Seaview (Barbuda), Brighton Beach (Saint Vincent), Maycock's Fort (Barbados), Grand Bay (Carriacou), Sauters (Grenada), Nelson's

Dockyard (Antigua, also see Figure 26), and the submerged sites of Anse Trabaud (Martinique) and Ross Craig (Jamaica) (Atkinson, personal communication, March 19, 2021; Boger et al., 2019; Boomert et al., 2017; Crock, 2000, 2019; Fitzpatrick, 2012; Fitzpatrick et al., 2006; Friedman-Look, 2013; Hanna, 2022; Hofman et al., 2012; Hofman & Hoogland, 2015, 2016; Murphy, 2023, 2020; Perdikaris & Boger, 2022; Rivera-Collazo & Perdikaris, 2023).

At these sites, coastal erosion has served the triad role of *preserving sites through submersion* while simultaneously *revealing previously unknown sites*, contributing to further research on our past, and, at the same time, *erasing these sites perhaps forever*.

While these impacted sites' documentation actions in and of themselves are worthwhile or even critical, undertaking these actions in a siloed setting without anchoring them within a local framework is not particularly sustainable, maintains an 'us (archaeologist) versus them (local community) context in that only archaeologists know what to do at sites, and does not encourage the development of community involved initiatives linked to the monitoring and protection of sites. Neither does it encourage communities to become involved with their archaeological heritage being impacted by climate-induced hazards.

Figure 26. Predicted Sea-Level Rise Impacts to 2090 at Nelson's Dockyard



Source: E. Friedman 2013. Used with permission.

As an example of the direction archaeological research in relation to climatic challenges has recently been trending, research by Rivera-Collazo and Perdikaris (2023) on the island of Barbuda and specifically the Seaview pre-Columbian site sought to explore landscape dynamics within the context of climate change. This approach was pursued in order to better understand the impacts of current coastal processes over the archaeological record, with the hope that research also sheds light on parallel challenges being experienced by other coastal locations.

In addition to individual or academic research studies, some projects that combine work between state and community actors have been developed. Examples include the project Archéologie Littorale Outre-Atlantique (ALOA), which was initiated in Guadeloupe and seeks to develop participatory actions using a network of observers and state services and interactive online tools to better monitor and protect coastal archaeological sites threatened by SLR (Motte et al., 2022). Other initiatives, such as the Saint Kitts case study (Stancioff, 2018) documented erosion processes using satellite imagery and ArcGIS. This project was a collaborative one between the

government, civil society, and community members and contributed valuable data in relation to monitoring archaeological sites in tandem with local communities. This project sought to measure the impacts of coastal erosion on the environment. The area's rich archaeological heritage and livelihoods generated data that resulted in the creation of a shoreline database to help policymakers make more data-informed decisions, provide an assessment of the state of the coastline, and capture perspectives on coastal erosion to better protect the archaeological record and community livelihoods (Hofman et al., 2021; Stancioff, 2018; Stancioff et al., 2018,).

The Puerto Rican initiative, Descendants United for Nature Adaptation and Sustainability (DUNAS), integrates archaeology, community engagement, and coastal ecosystem restoration and advances archaeological research on climate-induced risks. The archaeological component of the restoration of the coastal environment focuses on determining the duration of human habitation on the coast, locating low-elevation sites, and analysing human interactions with the dunes and the shore. This increases the resilience of the coastal ecosystem and the populations nearby by advancing understanding of how people react to abrupt environmental change (Climate Science Alliance 2019;¹⁰⁸ Kohler and Rockman 2020).

In the Dutch Caribbean, the Island(er)s at the Helm project¹⁰⁹ aimed to co-create inclusive, sustainable solutions for adaptation to climate issues and brought together a variety of researchers and community partners to explore climate action from a long-term perspective by utilising a variety of technical, traditional, and contemporary knowledge approaches. Archaeology, paleoecology, paleoethnobotany, socio-cultural anthropology, visual arts, performance arts, political science, urban design and planning, governance and policy sciences, legal studies, architecture, and civil engineering are themes among the interconnected work packages that make up this transdisciplinary project. Specifically, Work Package One focuses explicitly on “resilient past communities and traditional knowledge practices. The generated long-term climate record and inventory of traditional knowledge practices rooted in the deep history of the Island(er)s will contribute towards consciousness of how to respond, mitigate, recover, and adapt to climate

¹⁰⁸ Climate Science Alliance 2019. DUNAS: Descendants United for Nature, Adaptation, and Sustainability. Electronic document, <https://www.climatesciencealliance.org/dunas>, accessed 1 December 2023

¹⁰⁹ See Note 3

challenges” (Islander(s) at the Helm, 2023, n.p) and will be anchored in archaeological (paleo)ecological, and (paleo)ethnobotanical research.

The Curacao Cultural Landscape Project being implemented in Curacao, also seeks to study how climate action strategies were developed in the past in relation to climatic challenges related to drought and other extreme weather events with applicability for the present time (Curacao Cultural Landscape Project, n.d., paragraph two).¹¹⁰

Siegel’s (2018) research on various islands of the region has also demonstrated the opportunities for multidisciplinary research centred around archaeology, providing answers in relation to examining human-environment relationships through studies on historical processes of colonisation and human-induced habitat modifications. For this study, coring locations were selected near known archaeological sites, which allowed a more robust understanding of human impacts on and adjustments to environmental change (2018, p. 8).

Summary

This dissertation argues that research on the dynamics of climate and coastal change in the region’s coastal areas allows archaeologists to more profoundly contribute to discourse regarding the health of coastlines and integrated coastal planning. This is supported by examining how coastal sites have been impacted over time and in what ways. As an example, understanding past human settlements and their response to coastal changes influenced by climate-induced hazards helps us contextualise present-day geomorphological transformations and their impact on coastal communities and visualise possible responses.

Data from archaeology within this climate action framework would therefore emanate primarily from studying adaptation in the archaeological record, examining how archaeological sites and the communities that formed them, and their settlements, are impacted through community-based and focused initiatives that support monitoring for data generation (Miller et al., 2024). Finally, vulnerability assessments targeting the coastal archaeological record can also provide meaningful guidance to communities and planners, as there is a strong correlation between environmental

¹¹⁰ Curacao Cultural Landscape Project. Accessed at: <https://naam.cw/publikashon/curacao-cultural-landscape-project/> on 12 June 2024.

degradation and vulnerability to coastal hazards, as well as the level of degradation of archaeological sites (Beck, 2014).

Even while contributing to building community capacity, further research is needed to examine how Indigenous communities, historic towns, and other coastal sites for example, functioned in the past when severe climatic variations occurred. This would prove useful for land use, physical planning and development, and where we build, among other possible benefits of this data.

CHAPTER SIX

ETHNOGRAPHIES OF TRADITIONAL KNOWLEDGE AND CLIMATE CHANGE IN THE CARIBBEAN

This chapter presents ethnohistorical and ethnographical data, in addition to other contemporary studies relevant to the research discussion. This data illustrates the inherent value of understanding how past Caribbean populations or communities responded to severe environmental changes and its applicability to current and future climate action in relation to the ongoing and accelerated effects of climate warming. It follows on from a presentation of data in relation to research at archaeological sites, establishing continuity with the adaptation strategies identified through the archaeological record and present in Indigenous and local communities today as their traditional knowledge systems.

In this way, it focuses on data in relation to the continuity of traditional knowledge systems of island people from the past to the present. It highlights ethnographic field research based on participant observations and interviews discussing knowledge and practices in relation to the changing climate. It also highlights strategies utilised to manage this change and is discussed within the context of what this change and resulting response mean for individuals and communities. This activity was undertaken as knowledge sharing sessions in collaboration with specified Caribbean Indigenous communities, with the express purpose being to inform a discussion on better understanding how these communities in the Caribbean responded to climate challenges in the past, continuity in these actions through intergenerational knowledge, and how these reinforce present climate action.

Through ethnography, we are presented with the opportunity to better understand how transformation and innovation occurs in response to the changing climate and how climate action is formulated. This response is examined through the lens of traditional (Indigenous or local) knowledge, practices, and experiences transmitted over generations.

The Caribbean, like much of the world, has experienced severe environmental change over several millennia. The implications of this are that the peoples of the Caribbean have a climate action

record that matches the effects of climate warming experienced. This exists within the archaeological record, social memory, contemporary actions, and the landscape that bears witness through its biographical layers.

In addition to examining these knowledge and practices and identifying what might have been viewed as successful or unsuccessful climate action in relation to severe environmental change, this Chapter's data presentation will conclude with a discussion of considerations for possible ways of applying this data at a broader scale in studying how the islands of the Caribbean pursue climate action (Bynoe, 2016).

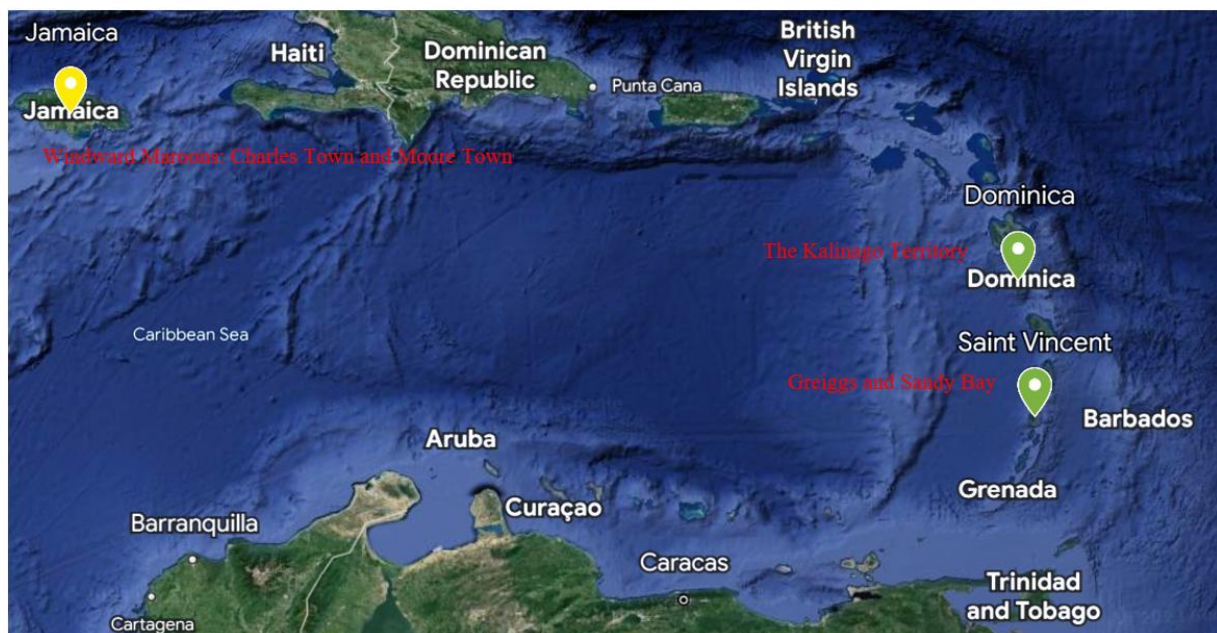
The most vital role of traditional knowledge systems in climate action is to address the scope for societal adaptation to climate change at all temporal scales, from rapid to slow onset emergencies and deep histories of adaptation. This knowledge is engaged at every phase of the emergency cycle, from preparedness through response to recovery. Delpuech (2004) suggests that while places and lives may be destroyed, they will eventually resume, making it difficult to fully gauge how these climatic occurrences have affected the cultural development of societies and in some ways, the transfer of inter-generational knowledge within this setting. There are, however, adjustments applied over time and building on each other in response to recurrent impacts. These are considered in this research as adaptation strategies. These effects leave lasting impressions on the social memory of people and communities, and the landscape is imprinted with these activities and memories, bearing testimony to environmental, historical and cosmological or mythical events concerning and processed within the world views of these communities.

The interplay between traditional knowledge and climate action occurs at different scales. The archaeologist's understanding of features, changes and other material evidence that point to adaptation in the archaeological record can be better understood or defined through traditional knowledge, which provides a contemporary context for understanding past actions. Through this inter-generational knowledge, communities adapt through time while building on and adjusting this knowledge. This knowledge will in turn inform future action that is transmitted also as inter-generational knowledge and practice, also becoming part of the future archaeological record.

Combined, archaeological data (presented in Chapters 4 and 5) and traditional knowledge offer culturally relevant solutions, pathways and insights to develop climate action for contemporary societies.

Detailed information on the methodology applied to the ethnographic data presented in this Chapter was discussed earlier in Chapter Three. To understand and highlight contemporary local community responses, this research utilised participatory research methods for ethnographical knowledge sharing in collaboration with Indigenous communities in Dominica, Jamaica, and Saint Vincent (see Figure 27). This participatory approach benefited from collaborative research design, and the identification of relevant knowledge and practices, and possible climate heritage actions based on this knowledge. This knowledge-sharing component benefited from group and individual interviews and permitted observations of practices. This ethnographic research was also pursued in tandem with ethnohistorical research and a review of contemporary studies to further contextualise data.

Figure 27. Caribbean Indigenous Communities Case Studies



Source: Author generated from Googlemaps.com

The outcome was the documentation of Indigenous knowledge and practices identified by individuals and communities with their free, prior and informed consent. When combined with the archaeological and ethnohistorical record and contemporary studies, this data provides rich opportunities to better identify and articulate adaptation strategies evidenced through landscape modifications, established social networks, Indigenous knowledge, and practices, artefacts, and other evidence. Further, it sought to identify how Indigenous knowledge can boost social and ecological resilience for Indigenous communities and wider Caribbean society and be mobilised for more robust climate action, even within the context of accelerated climate warming and its attending effects. Because traditional knowledge and practices are dynamic, this research takes the position that they are also suited to work with other knowledge systems, combining with them on an equal footing to address climate challenges, and adapt to same.

The value of studying and integrating traditional knowledge and practices into the development of climate action is an area requiring more in-depth research and application in the Caribbean. Globally, the value of integrating this data into a more comprehensive strategy relating to disaster risk management and responding to the effects of the changing climate has gained traction, as elaborated by Petzold et al. (2020) and Nakashima et al. (2012, 2018; see also Agarwal, 1995; Brace & Geoghegan, 2011; Maldonado, 2014, 2016) and is widely acknowledged and used in regions such as Africa and the Pacific (see Guto, 2020; Iloka, 2016; Nunn et al., 2024; Van Oosterzee & Hunter, 2023).

Although this traction has increased and is perhaps more evident at the programming level, the transition into policy has only been successfully attempted in some countries. This area, from programming to policy, remains extremely limited in the Caribbean, in the sense that while some areas and sectors of Caribbean society have referenced these same knowledge and practices (i.e., agriculture, see also discussion in Chapter 2), the data remains predominantly abstract and in a format that is not easily applied, nor has it been integrated into wider strategies and actions beyond perhaps the local level.

The fact that the research and application of Indigenous knowledge and practices remain restricted in the Caribbean is also strongly linked to commonly held views that the Indigenous populations of the region were completely exterminated as a consequence of European contact and subsequent colonialism (e.g., Hofman & Duijvenbode, 2011; Strecker, 2016; Wilson, 1997), and that there is little remaining of their traditional knowledge and practices as put forward by various encounter reports from the seventeenth century to the present time, and the heavy toll of colonialism and the socio-ecological fragmentation left in its wake (Bonilla, 2020; Stancioff, 2018).

There are, of course, varying levels of truth to these points. The Indigenous peoples of the region experienced an almost complete genocide during colonialism, and experienced forced relocation from their lands due to the expanding plantation economy and other opportunities for land grab. These processes and actions deeply affected the transmission of said knowledge and practices. Cultural practices and traditions were also subjected to acculturation or transculturation in their interaction with peoples from Europe, Africa, Asia, and the Middle East for centuries. As such, the commonly held view persists that there are no Indigenous knowledge and practices to be passed on. However, as Wilson (1997, p. 7) puts it, “Indigenous communities today are products of and originators of change...and the extent to which Indigenous peoples interacted with others allowed for a substantial transfer of knowledge and practices in the human-land interactions system” that would form part of the local knowledge of contemporary Caribbean communities.

To undertake this study of the role Indigenous knowledge systems played in past adaptation to severe climate variability and to inform contemporary and future climate action, an intimate understanding is required of how past Caribbean communities interacted with their natural environment (Bynoe, 2016; Honychurch, 1997). The Indigenous peoples of the Caribbean utilised elements of their island’s physical environment to make observations, benefit from it, and adjust to its challenges. This awareness is considered within the context of climate change perhaps presenting as a much more severe challenge today than in the past due to a myriad of anthropogenic causes, more significant environmental degradation, and varying issues contributing to the vulnerability of Indigenous and other local communities.

This brings in to focus discourse on how vulnerability should be approached in relation to traditional communities within island systems. Fosberg (1963) Fitzpatrick and Keegan (2007) and Stancioff (2018) suggest that islands can be fragile and vulnerable environments. Island ecosystems are indeed fragile, particularly when considered within the setting of present rates of unprecedented climate warming and variability, ecosystem degradation at alarming levels, historical processes such as colonialism, and the earliest transformations of the region's cultural landscape from the initial peopling of its islands would also be a factor (Castilla-Beltrán et al., 2018, 2020; Keegan & Hofman, 2017).

Added to these are varied external and internal factors that demonstrate points of weakness to natural hazards. Existing within such a system or environment contributes to the vulnerability of its people, but this is not simply a cause-and-effect relationship. Portraying island communities, particularly the communities of the Caribbean as vulnerable, dismisses the agency of Indigenous and local communities and the place for cultural knowledge, practices, and traditions in shaping resilience and in transforming challenges. Salick and Ross (2009, p. 137) suggest that the assumption of "helpless victims of change beyond their control" in the face of climate change must be challenged. Indigenous peoples have lived in extreme environments for generations, which means that there is a long record of knowledge creation to manage this risk and uncertainty. These people have interpreted, filtered, and processed this change using their own traditional representations of the world and designed adaptations using their own knowledge (Berkes, 2012b).

Due to the continued perpetuation of systems originating from colonialism, disruptions have occurred in the region's socio-ecological systems and relationships, which have increased the level of exposure to climate-induced hazards by local populations, as well as disrupted the transmission of critical ecological knowledge and data concerning the treatment and management of the natural environment and in responding to severe environmental change or instability. As put forward by MacDonald and Ferdinand (2023, p. 232), "the Caribbean is of critical importance in considering historical events that shaped local culture [and its transmission and use] and examining how individuals and groups perceive and act to solve environmental problems."

Because these disruptions persist and are reinforced, vulnerability contexts persists, and it is within this system and processes that inter-generational adaptation strategies to the changing climate have been and continue to be shaped, transmitted and applied.

It is important to highlight that this research does not seek to assume singularity or exactness in adaptation knowledge practices used by Indigenous communities in the Caribbean to respond to the changing climate and its hazards. Instead, it recognizes that while response and adaptation practices may seem similar across groups and borders, the landscape plays a critical role in its use and application and is the cocoon that births these practices. Traditional ecological knowledge has been the basis of survival for many peoples and local resource management systems in diverse environments and contexts for generations. John (2007) suggests that although it is often not quantitative, amoral, or specialised, it can nevertheless yield crucial community-held knowledge or good practices for the Caribbean region. Emerging actions by international organizations and climate agendas are also now increasingly being called on to support the development of indicators that support the application of Indigenous knowledge in climate action.

Bynoe (2019, p. 76) cites Owuor (2007) in highlighting that “Indigenous knowledge is a process of learning and sharing social life, histories, identities, economic, and political practices unique to each cultural group.” Bynoe (2019) goes further by highlighting that it is also “indicative of the unique ways in which specific societies construct their realities and use such forms of knowledge to resolve local problems,” such as experiencing increasing environmental challenges and change.

Through a presentation of ethnohistoric, ethnographic, and other studies, this chapter highlights patterns that have emerged in the formulation and use of this knowledge, as well as identified knowledge and practices that focus on *agriculture, water management, and housing construction* where it exists. Indigenous environmental practices emerge as the nexus from specific situated histories of interaction between people, landscape, and their dynamic environment. So, although methods may be similar, the knowledge and strategies created can be further molded by cultural conditions, the natural environment or landscape, available resources, geophysical features, exposure, and sensitivity to a particular hazard, among many other indicators, similar to the

adaptive capacity of an archaeological site as discussed in Chapter Four. This approach further highlights the importance of the concept of human-ecodynamics.

While climate change is a global phenomenon, the experiences of each island and community are different, and their actions are localised, resulting in knowledge practices being developed, honed, and implemented differently across islands. Traditional knowledge systems are grounded in a specific sense of place or place-based identity relating to locations, environments, communities, and the changing climate. This is then processed through the landscape, so the erasure of heritage in this area due to climate-related hazards such as flooding, drought, coastal erosion for example, will impact this history and social memory, or as posited by Favini (2018, p. 24), “erasure of an ecologically materialized archive.”

The grounding of these knowledge and practices in a particular place is key. Ford et al. (2020, p. 533) define *place* as “spaces that have acquired meaning for those that are associated with them, and it captures the nature of the environment to which individuals or cultural groups have attachment and contexts that give meaning and value to people’s lives.” It is a vital component, source, and sustainer of their knowledge, cultural practices and belief systems. However, while Indigenous peoples experience loss of their social memories when their cultural heritage is destroyed because of climatic hazards, disruptions in their connections with their natural environment also result in susceptibility to the effects of ongoing climate change, as “this closeness and intimacy to place promotes resilience to environmental change” (Ford et al., 2020, p. 533). Indigenous communities are therefore caught up in a circular relationship where the degradation of their environment promotes disruption in the transmission of practices and diminished resilience. The increased pace at which these communities experience climate change, again due to their degraded environment, has served to erode these knowledge and practices further.

Indigenous and other traditional communities often occupy some of the Caribbean's most economically and environmentally marginalized or fragile areas, making them more vulnerable to severe environmental changes (Barclay et al., 2019; Bynoe, 2016, 2019; Palmer & Fraser, 2021). It is also important to reiterate that this vulnerability context does not automatically suggest that they

are also victims, as they have historically leveraged and applied traditional knowledge innovation to find solutions which are identified as coping strategies in the short term or social adaptation over more extended periods (Douglass & Cooper, 2020; Hofman et al., 2021; Nakashima et al., 2012).

As presented in Chapter Five, there is information on the knowledge practices of the Indigenous peoples of the Caribbean in relation to the changing climate from archaeological research (see Florès Blancaneaux, 2009; Cooper, 2012; Douglass & Cooper, 2020; Hofman & Hoogland, 2015; Hofman et al., 2021; Samson et al., 2015). As this chapter focuses on ethnohistorical and ethnographic data, the early accounts of Europeans such as by missionaries such as Father Breton, based on their interactions with Indigenous peoples will also be reviewed (see Alegria, 1997; Bright, 2011; Delpuech, 2004), in addition to re-interpretations of these accounts and contemporary studies by ethnohistorians, anthropologists, and others to include Bright (2011); Cummins (1997); Delpuech and Hofman (2004); Lalubie (2014); and Wilson (1997).

The colonial impact and interaction period was severe, resulting in biological, cultural, and political upheavals and genocide against the Indigenous peoples (Hofman & Duijvenbode, 2011; Hulme & Whitehead, 1992). These accounts written on the lives of Caribbean Indigenous populations emanate from the earliest contact period during European colonisation. Since then, Indigenous communities have experienced being written about from a position of the world view or gaze of others, ignorance, romanticized, or misunderstood, molded to fit the description of a savage, and sometimes seeking to perpetuate longstanding clichés.

These are a people who have endured interruptions to the transmission of their knowledge and practices attributable to various historical factors, faced genocide, experienced relocation from ancestral land for varying reasons such as land grab or the impact of natural hazards, restricted to small parts of the islands they inhabited, and in some instances, experienced a denial of their claim as Indigenous by the broader society and the governments in these territories. Later, they were viewed as extinct and not retaining much of their cultural traditions as written by those representing colonial administrations or religious institutions (see Hulme & Whitehead, 1992). These views persist in the wider contemporary societies of the Anglophone Caribbean.

Alegria (1997) writes that European accounts offer differing perspectives concerning Indigenous peoples, and always from the worldview of Europeans observing others through their own cultural lens. The chroniclers during this age of European colonisation were primarily explorers, missionaries, and colonisers, and certainly could not be classified as trained ethnographic observers. They were also bound by the biases of their time and in how ‘others’ were looked upon. In his journeys to the Caribbean, Columbus brought with him colonists whose views were hardened by war and saw conquered persons as inferior and fit for servitude and their resources to be plundered (see Burbank & Cooper, 2011; Delpuech & Hofman, 2004; Lalubie, 2014).

Researchers such as Alegria (1997), Bright (2011), Hulme and Whitehead (1992), and Peterson et al. (2004), among others, have compiled the documentation of various and largely seventeenth-century missionary accounts such as Anonymous from Carpentras, Breton, de Rochefort, du Tertre, and Labat. These proved to be accounts of missionaries living with and observing Indigenous peoples in the Caribbean from the 1600s. These accounts involved details on lifeways, belief systems, practices and languages and are valued today as a record of the Indigenous peoples of the Caribbean “after nearly two centuries of cultural contact” (Hulme, 2005, p. 22) (see Hulme & Whitehead, 1992).

Although many Indigenous peoples did not survive the initial period of conquest, as Wilson (1997) argued, the archaeological record and ethnohistorical sources based on others’ encounter descriptions do give insightful information on these persons, their communities, customs, history, and rituals. The physical and symbolic landscapes that the Indigenous peoples of the region and their forebears had created to regulate their living environment would have been disrupted along with their virtual eradication (Saunders, 2005). Many accounts are noted as flawed, containing many biases through the mode of acquisition, transcription, and background of the chronicler (Lalubie, 2014), and sometimes confined to myths processed by Europeans who might not have understood what they saw or heard, such as how stories were often told as myths. As indicated however, these accounts nevertheless provide helpful data for further research and reinterpretation.

The ethnohistorical accounts referenced earlier at times detailed information in relation to the cosmology and sometimes creation myth of the Caribbean’s earliest inhabitants. This has also been passed from generation to generation in the oral history, sometimes the oral traditions of

these persons, and even their governance structures, such as the example of the *Warao* people who live in the Orinoco Delta and whose oral history speaks to a time when the “serpent’s mouth was dry (Caribbean Sea level lower), and Trinidad was connected to the mainland” (Wilbert, 1993, p. 7). The fact that this would have happened thousands of years ago speaks to endurance of resilience through stories and the capacity to identify this resilience, and counters the accounts of those who wrote about the Indigenous people of the Caribbean as essentially losing their culture with very few traditions remaining (Hulme & Whitehead, 1992; Wilson, 1997).

Caribbean Indigenous peoples generally believed that good and bad spirits were central to their understanding of the physical environment and its changes. As such, images, petroglyphs, and *zemis* communicated relationships with nature and environmental change. Their response to these natural phenomena was also anchored in myth as suggested by Honychurch (2018). Mythical stories functioned as ways of explaining and marking beliefs and experiences. Natural phenomena were grounded in the cosmology of the region’s Indigenous peoples and would have influenced their perceptions regarding these events and the actions that would be put in place to define how they managed them. Writings by Pane (1999) and Stevens-Arroyo (1988) highlight the seasonal behaviour of the frog as being linked to rainfall and agriculture for the Taínos, where it served as a zoomorphic representation of these things in addition to feminine fertility. Roth (1901, pp. 267, 370) also highlighted Indigenous knowledge that indicated that “the frog’s behaviour during its rutting was the cause of increased rainfall.”

Petitjean-Roget (1997, cited in Hauser, 2021, p. 58) suggests that the fruit-eating bat and the tree frog (*coquí*) were recurrent themes in Indigenous myths, with the tree frog being “linked to the destructive hurricane season and the fruit-eating bat to the equally destructive dry season.” Petitjean-Roget further put forward “that these two motifs reject attempts by ritual specialists to influence the regularity and intensity of dry and wet seasons” (Petitjean-Roget 1997 cited in Hauser, 2021, p. 58). *Zemis* were also seen to have a vital role in the sterility or abundance of the land and the various elements of nature or the natural environment. Duin (2018) has written on the possibility of a rock outcrop (L’Eperon) on the coast of Guadeloupe linked to the Anse a la Gourde site being used by Indigenous peoples as an astronomical system concerned with predicting the

start of the rainy and hurricane seasons (see also Hofman & Hoogland, 2011). In this astronomical system, the relationship between the positioning of the stars with the sun and other stars was highlighted for the arrival and ending of seasons.

The Taínos of Hispaniola used the word *ouragan* to describe storms, which the Spanish and French adopted and became hurricane in English. In the Taíno myth recorded by Father Pané in the Greater Antilles, the *ouragan* was guided by a powerful female spirit, *Guabancex*, the Lady of the Winds, who had two assistants in *Gua-taubá*, who produced the hurricane-force winds, and *Coatrisquie*, who caused the floodwaters. For the Kalinago in the Lesser Antilles, the hurricane was *loüállou*. They realised that the seasonal cycle was changing from May, sending stormy waves towards them until October, and they called this time *loüállououýourou* (Honychurch, 2018). Caribbean Indigenous populations linked hurricanes to supernatural forces, and in some cultures, *huracán* signified a powerful god and threatened native peoples and lands with destruction (tempestuous spirit). In Mayan culture, *Huracán* was one of the three most powerful forces in the pantheon of deities, along with *cabrakan* (earthquakes) and *chirakan* (volcanoes). Other observers suggested that Indigenous peoples did not view the storms themselves as deities but instead saw them as under the control of some supernatural spirit or god.

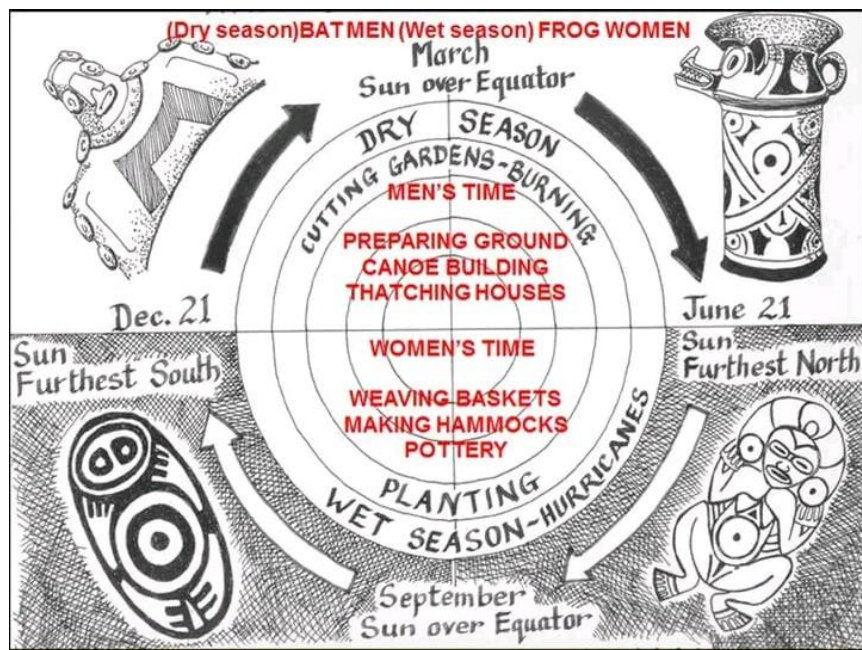
Another crucial area in studying Indigenous knowledge regarding responses to climatic changes was the place for social and trading networks between islands. These networks would also have provided ample opportunity for the development of strategies and the transmission and sharing of cultural practices and knowledge regarding response to drought, rainstorms, hurricanes, and other natural hazards and events, as well as possibly to mitigate seasonal changes such as the coming of the annual cyclone season and resource management within this setting (see Crock, 2000; Curet & Hauser, 2011; Hofman & Duijvenbode, 2011; Hofman & Hoogland, 2011; Hofman et al., 2021; Keegan & Hofman, 2017).

With each subsequent generation that migrated to the Caribbean and made the region their home, the inhabitants adapted to becoming islanders, having been brought into new environments, landscapes, and resources, centering the formation of human ecodynamics within the context of the region. Past populations would have observed the differences with natural hazards as present

populations do today, using local knowledge emanating from the past. They would, therefore, amass knowledge of environmental observations that informed them of approaching hurricanes or other climatic events. They developed a life cycle in tune with the seasons, and knowledge and practices evolved relevant to the nature of the islands and their exposure and sensitivity to climatic challenges. Over time, this knowledge became integrated with other knowledge systems, evolved or was lost or experienced disruptions in transmission due to the various historical processes and contexts discussed earlier.

In discussion sessions as part of this research programme, Kalinago community members spoke of the importance of doing things according to the correct moon phase. Lennox Honychurch (personal communication, July 17, 2023), in his research (see Figure 28) on the Kalinago Solstice, notes that June 21, when the Earth tilts furthest north, signified the end of the dry season and the beginning of the rainy season (and hurricanes) for the Indigenous Kalinago people of the Lesser Antilles. They realized that the seasonal cycle was changing, sending stormy waves towards them until October, and they called this time *loüállouoúyourou*. The dry season was considered the ‘men’s time,’ signified by bats (which live out of the water and are dry animals), and the wet season was ‘women’s time,’ signified by frogs (which come from beneath the surface of the water). Honychurch notes that this information on natural change and human actions was being passed on by Kalinago elders as late as the 1920s.

Figure 28. Solstice and Moon-phase Calendar Utilised by the Kalinago



Source: L. Honychurch (personal communication, July 17, 2023; used with permission)

These observations by the Indigenous peoples would sometimes be utilized or transferred to Europeans. An example is the word *huracán*, which was the Taíno word for a storm of wind and rain under the control of a supernatural force. By the end of the 1650s, colonists had learned the seasonal boundaries of hurricanes from July to September from the Kalinago. Attempted English improvements, however, exacerbated rather than diminished the devastation from hurricanes (Mulcahy, 2008). Colonists began by describing hurricanes as wondrous events, divine judgments for human sins, or others linked the storms to various natural processes such as shifting wind patterns, the explosion of various chemicals in the atmosphere, and the celestial movement of planets and stars (Mulcahy, 2008).

Barclay et al. (2019) also put forward that the knowledge and practices shared by Indigenous peoples in relation to severe environmental change did not go unnoticed by Europeans, although they seemed hesitant. In most instances, colonists had to begin anew and learn from the Indigenous peoples, particularly how to build like them. Captain Langford's observations reported in Mulcahy (2008, p. 54) highlighted the Indigenous peoples as "the ignorant country people and barbarous, are better observers of times and seasons, and draw better rules from them, than more civilised and reasoning people, for they rely more on experience than theories." Views such as these led to both short- and long-term forecasting influenced by the Indigenous people, which were incorporated into trading and military patterns and behaviours.

Honychurch, in 2018, wrote about historical perspectives on disaster readiness of buildings in the Caribbean and highlighted that Indigenous construction methods depended on a knowledge of wood *maho* cord bindings, which tied together all components (such as posts and rafters) of the Indigenous house. Transfer of knowledge of woods and building techniques from the dwindling number of Amerindians to the European and African arrivals after 1492 was an important aspect of contact and culture exchange, which influenced the design and materials used in the Creole house. In some cases, Indigenous houses were adapted to become homes for Europeans. Other important applications of this Indigenous knowledge included crop times not coinciding with the hurricane season, where windmill sails and frames could be taken down and stowed, and drainage and defences for fortifications set up along the coastline. Traditional methods of Caribbean architecture, such as steep, heavily braced roofs and thick wooden shutters and doors aimed at hurricane resistance (see Chapter Five), have now declined in use.

Caribbean Indigenous Communities and Climate Change Perceptions

The communities that collaborated in this ethnographic research component are among those who have lived in the region the longest and are able to share valuable observations in relation to their experiences in how the climate has changed over time and their response to this change. This is not to say that responses to climate change were always positive for these communities. It,

however, recognises that adjustment is often about trial, error and maladaptation, as well as finding what works to address challenges. This would be in contrast to a Western framework which viewed people as being separate from nature.

Results presented in Table 20 highlight general perceptions of severe environmental change, specifically climate change, and are based on ethnographic research pursued for this dissertation.

Indigenous communities throughout the Caribbean also adapted to climate stressors by depending on social capital as a form of resilience. Within the context of this research, social capital refers to “norms and networks that enable people to act collectively,” as defined by Woolcock and Narayan (2000, p. 226), and can be bonding (norms, values, and trust relationships that exist among families and communities) or networking (more formal but weaker bonds of trust outside of kinship networks) capital. In the Caribbean, this was evident through the sharing of work to manage issues in the community or the *koudmein* system (see Stancioff et al., 2017; also, Heron and Honychurch, 2023. Heron (2018) discusses this social resilience in writing about surviving Hurricane Maria’s impacts on Dominica but notes that these practices are rarely transmitted today. This type of social capital was also evident in the region’s earliest settlement, where Indigenous populations utilised mobility and resource networks across settlements, communities, and islands to respond to impacts such as those presented by severe environmental challenges (Hofman & Hoogland, 2011).

Overall, for communities collaborating with this research, interviewees presented a good understanding of how they were presently being impacted and how they felt they would be impacted by climate challenges in the future. They however felt that there was little to be done in response. This paradigm was confirmed by Smith and Rhiney (2016, p. 29) in their research on the Indigenous Caribs in northeastern St. Vincent who highlighted that “they were conscious of their local context and a change in the climate, of which increased temperature was a strong predictor.”

Table 20. Perceptions on the Changing Climate Reported by Indigenous Communities

Climate Change	Perceptions
Phenomenon	
General perceptions in relation to the changing climate	All part of the cycle of life and nothing can be done about it except adjust where possible. In Sandy Bay (Saint Vincent), we are in a cycle of life with the volcano and the storms. The volcano builds up our coastal areas, and the storms wipe it away. In Greiggs we live in mountainous areas far from the coastline and sheltered from hurricane and so will not be impacted by climate change. Storms are a cleansing of the earth, and nothing can be done about that. Animals return night after night and know where to hide. Although climatic changes have increased, the eruption of La Soufrière remains our biggest concern. Many impacts now are unprecedented. Informal systems of managing resources have broken down. Ecological systems need a longer time to recover. Ancestors left information we should consider as important. Kalinago relationship with the environment has been interrupted. Forested areas and the environment were respected as they were key to survival from the past to the present time. Land cleared and destroyed for monoculture which contributes to how communities being impacted by climate change. Younger persons not interested in how we dealt with environmental issues in the past. If we do the research to combat climate change, we have to study why and how historic spaces were used. Target persons and document this information about how they coped with climatic issues. Persons today depend on equipment [and technology] instead of the knowledge which has been honed over time and tested. Always history versus modern knowledge. Solutions rest in raising awareness plus practical initiatives. Changes in nature are largely going unnoticed (earthquakes, heat). Man doing a lot to destroy the environment. Kalinago utilized environment well in the past. Repackaging of this knowledge is happening now as permaculture.

Table 20 (continued). Perceptions on the Changing Climate Reported by Indigenous Communities

Climate Stressor	Perceptions
Increased Drought	The river has changed drastically for the worse in recent years in terms of its hydrology, morphology, and biology and becomes drier in the dry season. More sedimentation in channels caused swimming holes to disappear. Sedimentation also impacted fish and crayfish availability. Drier periods are happening more often now. There are lobster and fish. The Sea is always rough, so less fishing on rocks and the water is always dirty, plus seaweed. Try to grow food naturally/organically such as composting. Communities used traditional initiatives to protect water and water sources during and after Hurricane Maria.
Increased Rainfall and Flooding	Wet and dry seasons are no longer evident, and there is a noticeable increase in flooding. Cannot always run from destruction, Sandy Bay is a disaster zone and has accepted its disaster context. Our ancestors lived in these places and managed, so we should be able to also. People now build in dry canals/ravines. Community moved from Old to New Sandy Bay due to 1945 flooding of the Cayo river. Climate change looks like more rain and flooding, more storms for the future.
Increased heat/hotter temperatures	Knew when to plant, how to rotate crops, and which crops could manage heat. Understanding nature is a process of trial and error. Paid attention to the moon, horizon bands, stars, colours, the atmosphere, and the sky. Knew when and how to manage the forest. Did not need to collect rainwater as the river was there, however, this is now changing, and river flow has decreased. Temperatures getting hotter. Modern imported materials do not keep the house cool.

Table 20 (continued). Perceptions on the Changing Climate Reported by Indigenous Communities

Climate Stressor	Perceptions
Stronger hurricanes	Traditional construction methods better manage hurricanes, but people feel these are old and useless solutions and indicate poverty. Aid houses do not consider local cultural context as houses cannot accommodate natural air or additional buildings for children. Every hurricane season brings pressure to the coastline.
Coastal erosion	The coastline must disappear, and then it will reappear. Less and fewer fish. More frequent sea swells, and coastal erosion in Saint Vincent. Sea will continue to come in more inland, and coastal ecosystems must go back. Screw pine can be used to protect coastlines. Should not only depend on sea defences. Told government that sea defences are being done incorrectly but they don't listen.

Note: Ethnographic field research by Author

Case Studies

Charles Town and Moore Town Maroon Communities, Portland, Jamaica

The Community (ies)

Maroons are described as “New World Indigenous groups found from Texas in the United States of America to Brazil in South America” (John, 2007, p. 9). Similar to Maroon communities in the Americas, the Maroons of Jamaica are descendants of Africans who founded free Black settlements in the island’s mountainous interior after escaping enslavement on the island.

Africans were enslaved and brought to Jamaica under Spanish rule in 1509. Following the capturing of the island by the English and general colonial instability caused by this transition from Spanish to English rule, the large-scale flight of enslaved persons commenced, creating Maroon strongholds known as the Leeward and Windward Maroons (Bilby, 1996; White, 2014). Agorsah and other Maroon researchers have also suggested that there is a continuous link between the original Taíno inhabitants and the Maroon communities of Jamaica. One component of this link

being the use of the natural environment as hideaways or as a refuge, where runaway enslaved persons could hide from colonial pursuers and flourish in relative isolation.

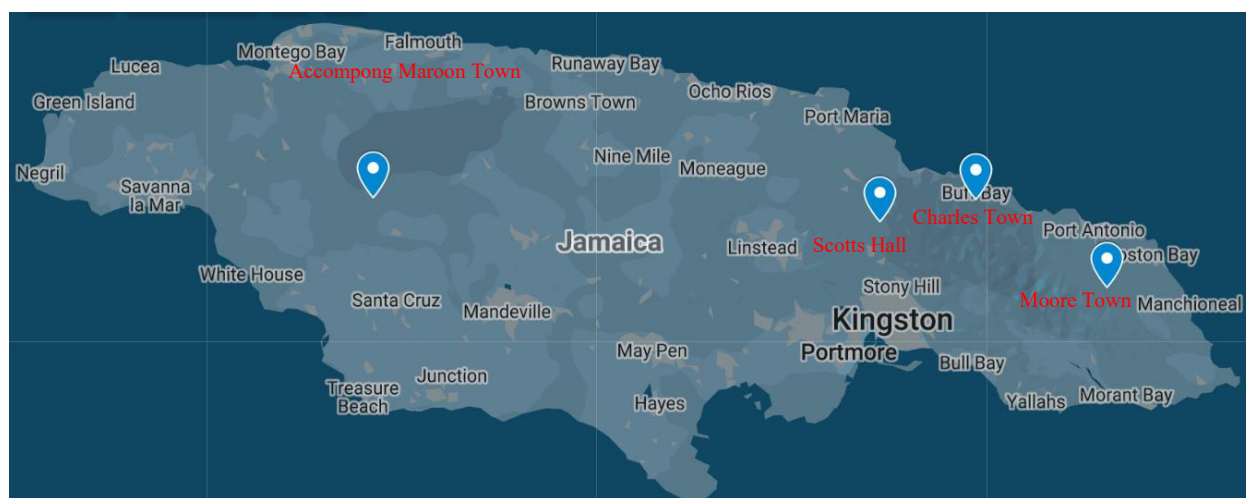
Figure 29 identifies the four contemporary Maroon communities in Jamaica: the Trelawny Town Maroons of the Sovereign State of Accompong (western Jamaica known as Leeward Maroons) and Moore Town, Charles Town, and Scotts Hall in eastern Jamaica (Windward Maroons). This research focuses on the Windward Maroon communities of Charles Town and Moore Town.

Charles Town is found in the upper reaches of the Buff Bay River Valley. There are three villages in the Charles Town Development Area comprising Charles Town, Cotton Tree, and Plum Valley. Charles Town is the largest, with a population of approximately 2,400 persons, of which about forty percent of the residents are of Indigenous Maroon descent. The main economic activities in the community include agriculture, commerce, and tourism. Charles Town is distinctive as one of the communities of the Windward Maroons, established by enslaved Africans who escaped and established settlements in the mountainous regions of the island. Charles Town Maroons have retained strong African traditions and cultural beliefs, with their intangible cultural heritage contributing significantly to the livelihood of the various communities. Charles Town is one of the contiguous communities of the area designated as the Blue and John Crow Mountains National Park and World Heritage property, presently the Caribbean's only mixed cultural and natural heritage inscribed property.

Jamaican National Heroine Nanny, known as Nanny of the Maroons, established Moore Town (also known as New Nanny Town) and was the Maroon leader in 1781. The town is situated in the highlands of eastern Jamaica in the Blue and John Crow Mountains of Portland in the Rio Grande River Valley. It is the easternmost of all Maroon settlements in Jamaica, with approximately 1000 inhabitants. First named Nanny Town, then changed to New Nanny Town in 1782; the Maroons later changed its name to Moretown (*more land*). The three key districts of Moore Town are Cornwall Barracks, Ginger House, and Comfort Castle. Moore Town is 515 hectares in size and situated in the upper reaches of the Wild Cane River, a major tributary of the Rio Grande River. The settlement is bowl-shaped, with one access road and the river flowing right through the centre. The

dwelling are located along the valley walls and are accessible by footpaths leading up from the road and river (Bedasse et al., 1996; John, 2007).

Figure 29. Map of Jamaica of Historic and Present Maroon Settlements



Note: Case Study Communities are highlighted in red. *Source:* Author generated from Googlemaps.com

The rivers and their tributaries around these communities bring reflections on the water management traditions and practices of the Maroons into focus. Agorsah (1995, p. 407) writes that “hunting and fishing are the normal occupations people encounter in these remote areas of the Blue Mountains, and according to Maroon traditions, these were their occupations from ancient times.”

Much of the Rio Grande Valley is located within the Blue and John Crow Mountains National Park World Heritage property, where the Windward Maroons have been identified as frontline actors for conservation activities (John, 2007). The Valley is noted for maintaining a traditional rural lifestyle with vernacular houses. The production of Blue Mountain coffee has, however, spread in the Rio Grande Valley at the expense of conservation programmes tackling soil and land degradation. Coffee farming has resulted in significant erosion in mountainous areas and significant flood risk when rain comes. Park managers of the Blue and John Crow Mountains National Park (BJMNP)

highlight that as the area is known as a protected area with sacred natural sites, “incorporating these sites into protected area management will help to preserve their knowledge and transmission within the Windward Maroon community and, in turn, reinforce the culture of Jamaica’s only remaining Indigenous group” (John et al., 2010, p. 146).

The Maroons have a long socio-ecological relationship with their natural environment. John (2007, p. 2) points to “a more than 300-year legacy of intimacy with forest and aquatic ecosystems and communal ownership of resources,” where the “Maroon’s history of autonomy, semi-isolation, and dependence on local natural resources would have fostered home-grown natural resource management knowledge, systems, and traditions” (John 2007, p. iii) John et al. (2010, p. 146) also highlight “widespread ecological degradation and erosion of Maroon culture” as important considerations for the protection of natural sites and *vis a vis* the natural environment.

Climate Hazard Scenario

The parish of Portland, the location of these two Jamaican case studies, is known as one of the more disaster-prone areas of Jamaica and a particularly vulnerable stretch of coastline (CCCCC - Jamaica, 2012). Under the smallest SLR scenario of 0.5m, up to forty-seven percent of the beach area will be lost (Jamaica National Communication NC3, 2019, p. 39). The communities in Portland are both coastal and rural communities with a significant dependency on ecotourism. The CARIBSAVE perceptions study in the parish revealed that communities were experiencing significant changes such as sea level rise, “coastal erosion and beach loss, and new weather phenomena such as hail and mini tornadoes, and changes in agricultural yield and output” (CCCCC - Jamaica, 2012, p. 94) and increasing incidences and severity of flooding events and land slippage due to hurricanes. The Portland coastline has already experienced significant land loss in the bays of the parish. In communities, farmers have observed declines in agricultural production due to “seasonal weather patterns, hotter temperatures, longer dry periods, and more intense rain and wind events” (CCCCC - Jamaica, 2012, p. xxv). See Chapter Four for detailed information on Jamaica’s climate hazard scenario.

The Buff Bay Valley in the Blue Mountains is one of the most scenic corridors in Jamaica. There is a montane mist forest from 4000 feet above sea level to the traditional fishing village of Buff Bay. Along the route can be found the meandering Buff Bay River, waterfalls, and springs.

The environment is generally fragmented because of the mountainous nature and the deep gullies of the Rio Grande, Buff Bay, Negro, and Dry Rivers, which cut through the region of both communities and the forested regions proved to be particularly suitable for runaway settlements. The landscape has significantly changed from forest to shrubs, bamboo, and coffee plantations, and there is a loss of forest cover, particularly from the upper sections of the Valley. The rivers of Portland, which have their source in the Blue Mountains, flow swiftly and can be very destructive when there is torrential rain. The Rio Grande Valley (RGV) in Portland also has a history of flooding, and communities along the course of the Rio Grande River are repeatedly flooded.

Campbell et al. (2021, p. 4) describe the RGV as being situated within over 41,000 hectares of forested land in the BJCMNP. Its river system is one of the largest on the island of Jamaica, and over 20,000 inhabitants occupy the Valley. The watersheds of the upper sections of the Rio Grande comprise one of the last remaining undisturbed stretches of tropical broad-leafed montane rainforest in Jamaica. The river separates the contrasting geologies of the two sides of the river, and steep slopes dominate the mountainous, deeply dissected topography of the upper Rio Grande.

The local environment is prone to multiple hazards, including erosion, mass wasting, flooding, and landslides from torrential rainfall. The upper watershed region serves as home to forty percent of the population, with the highest concentration in the Moore Town community, which is considered to be the capital of the Windward Maroons. The Upper RGV is also exposed to hazards such as landslides and flooding that are accentuated by storm events. Livelihoods depend predominantly on agriculture. The natural and social history of the Blue and John Crow Mountains positions the region as an important area for the examination of how global changes are manifested in rural agrarian societies and mediated by traditional knowledge systems.

The upper slopes of Jamaica's Blue Mountains are an important protected area, while the lower slopes are key coffee-growing locations. Climate change impacts, such as stronger hurricanes and more intense drought, threaten to increase erosion and landslide risks. These hazards place

communities in danger, threaten livelihoods, and impact a crucial watershed serving the city of Kingston, the capital of Jamaica, and its key urban areas. As such, actions are needed to reduce climate-driven erosion and landslide risks through reforestation and agroforestry while working with local farmers to manage ongoing climate change pressures.

In recent years, some communities have experienced increased soil erosion and landslides from climate change associated with longer drought periods, higher temperatures, and high-intensity rains that force local farmers to seek new farmland further up the mountainsides. This has resulted in a continual cycle of land degradation. Farmers clear forest land for agriculture when landslides and soil erosion render previous fields unusable, only to put the new fields at increased risk for future erosion by clearing the protective ground cover. This is a case where communities previously utilised sustainable traditional knowledge and practices but are now mixed with those who don't use these practices. Do these traditions persist or do new unsustainable practices take root? Today, these communities are now caught up in a dangerous cycle of unsustainable landscape practices, further contributing to their vulnerability and loss of livelihoods and living heritage.

The Jamaica Conservation and Development Trust (JDCT), the managers of the BJCMNP world heritage property implements initiatives that seek to break the cycle of degradation and land encroachment on the nearby BJCMNP. These initiatives are implemented through promoting sustainable traditional agricultural techniques such as soil conservation, organic farming, and greenhouse farming. Here, farmers are successfully increasing the quality and quantity of their crops, which has served to increase economic opportunities for local farmers and has reduced their susceptibility to the impacts of climate change.

Exploring Maroon Socio-ecological relationships through Ethnohistorical, Ethnographic, and Other Studies

John (2007) writes that it is unclear how much of the Maroon's traditional ecological knowledge remains today. Although the Jamaican Maroons as a group have been heavily researched, few accounts offer insights into practices relevant to the natural environment and its resources and within the context of the changing climate. Maroon ecological knowledge is most known in relation to the plants and herbs used for their traditional medicinal value. The Maroons of Jamaica's socio-

ecological relationship is borne out of its need for the environment as a source of nurturing, protection, and resistance against those who were seeking to re-enslave them. Moulton (2022) suggests that the Maroon occupation of these areas in Jamaica contributed to forest management in an era when the colonial administration sought to take up more and more land for the plantation economy.

Researchers of Maroon heritage have highlighted that the development of Maroon societies emphasised cultural links with Indigenous societies (Agorsah, 1994; Bilby, 2005; Carey, 1970; Price, 1976, 1973). This provided opportunities for the sharing and integration of knowledge and practices in relation to cultural responses to severe environmental change. Agorsah (1994) suggests that Maroons heavily invested in environmental adaptation and continuity of traditions in hunting, fishing, and farming, which were essentially a composite of Amerindian and African traditions. Campbell et al. (2021, p. 13) have written that:

“Maroon practices of food harvesting persist into the present and serve two functions, that of wild food harvesting which enacts a claim to the forest as a common space, and preserving the cultural traditions of Maroon ancestors, and wild food harvesting which serves to ameliorate food insecurity among residents. In both ways, the forest is broadly imagined by residents as a space akin to tropical home gardens.”

The relationship Maroons in the Caribbean had with their natural environment was sometimes played out in the utilisation of their spaces as both refuge sites as part of resistance activities and long-term settlements (Singleton, 2020), and they believed that the placement of settlements was determined by the *apuku* (forest spirits). More importantly, the matrilineal and matrilineal descent order ensures that the clans within a tribe ascribe to a permanent geographic area, utilising the resources therein and thereby establishing fixed ancestral territories while also ensuring sustainability in resource management. Here, centuries of traditional knowledge connect people with places and the environmental changes experienced by these places over time. This socio-cultural development was suggested as the reason why Maroon tribes do not just leave flooded areas or areas experiencing severe environmental change (Jabini, 2020, pp. 4-5, cited in Richards et al., 2023; see also Scholtens, 1994, p. 148).

The Maroons' relationship with their natural environment was one based on resilience and survival, as highlighted by Singleton (2020, p. 3). They "fled to places where they could elude capture for as long as possible in thick forests, swamplands, mountains, caves...and other places that offered seclusion" (Singleton, 2020). The impacts from climate change experienced by these spaces of resistance and forested areas would, therefore, serve to interrupt the people and place narrative of these communities, resulting in disruptions to the transmission of vital knowledge and practices. The Maroons in Jamaica occupied hilly, remote terrain, and have remained in these areas, unlike some Maroon groups in Suriname that first utilised the forested interiors and later moved to coastal areas following the signing of peace treaties. Today, personal observation suggests that these coastal Maroon settlements and by extension communities are experiencing varying levels of river erosion, such as where the Saarmaka Maroons established their settlements along major rivers.

Favini (2018, p. 20), in his research on the Jamaican Maroons' relationship with their environment, highlights that Maroons emphasised immersion within ecology and meaningful relationships with the non-human elements of life. Such an environmental philosophy would be vital to their resilience and would undoubtedly extend to their responses in relation to severe environmental change. Bedasse and Stewart (1996) have detailed Maroon practices in relation to forest usage and streams when agriculture cannot be practiced and could provide useful strategies in the event of impacts from climate stressors.

Maroons speak of using the landscape to pursue surveillance of their enemies, identify plants that contain water reserves or offer cure and food, and use vines to cover their body as part of their ritual 'ambush' (Bilby, 2005; Favini, 2018) which represented a merging of people and place, human and plant, or a socio-ecological relationship. Connell (2019, p. 2), in further explaining Maroon relations with their landscape, writes that the Maroons have had a long history of tension with the state "over the boundaries of their land and the extent of sovereignty." This issue continues today with attempts to extract bauxite and redraw boundaries in their traditional territories. The continued erosion of their sovereignty also serve to disrupt traditional practices connected to the land.

In Jamaica, traditional cropping systems based on local knowledge are recorded as being practiced from the days of slavery; however, within the region, the archaeological record suggests a much

longer timeframe. Small-scale cultivators utilised various traditional knowledge and practices such as symbiotic crop combinations such as cassava and gungo peas to provide shade, ground cover, and nutrients, planted sweet potato alone, as well as practised pre-Columbian mixed cropping (Sauer, 1966). For food production on plantations and during the post-emancipation period, Mintz (1985) and Satchell (1990), suggest that these practices were also utilised in kitchen gardens and food forests.

Farmers in the Rio Grande Valley differentiated and classified soils on the basis of crop yield, soil texture, and colour (Davis-Morrison & Barker, 1997), and the absence of earthworms and smell were used to indicate infertile, possibly acidic soils. Soil observations were also used as indicators for soil erosion, land degradation, and quality. They prepared and planted fields under a mulch of dried guinea grass cover to reduce soil moisture loss while keeping down weeds and reducing soil erosion, all traditional strategies used to combat the challenge of moisture deficiency and low rainfall (Campbell et al., 2021).

The Maroons describe the forest as more than providing food. It is also a spiritual ecosystem rooted in their ancestry and embedded in their memories, emotions, and overall well-being. Therefore, the forest is more than an ecosystem providing food production services to the communities; it is a metaphysical space that can be described as a place-based relationship where farmers are in unity with the land.

In prior studies undertaken in rural farming communities in Jamaica, including Maroon communities, Campbell et al. (2021) highlight that these communities employed various adaptation strategies built on local and Indigenous knowledge applied over the long term. These included switching between livestock and farming as needed, cultivating shade trees to protect other plants from extreme heat, increasing pruning activity and removal of excess leaves from plants, focusing on maximising production from a section of the entire farm under cultivation, harvesting rainwater, cultivating crops that are more drought resistant, contour ploughing especially along very steep slopes, constructing trenches to control the flow of water on farms or using contour grassing techniques to minimize the loss of topsoil. Another example in Jamaica comes from the planting of yams and the unavailability of yam sticks due to scarcity, poor quality,

and high prices. In this case, Indigenous technical knowledge was applied by yam farmers who adapted their cultivation methods and innovated new ways of staking yams to solve the yam stick problem. Here, they relied on their Indigenous knowledge as the basis for innovation (Campbell et al., 2021; Davis-Morrison & Barker, 1997).

A study on Maroon water resource management traditions and practices in the Blue Mountains (John, 2007) also indicated that the Maroons had retained a river culture, which ensured the use of sustainable practices for its protection. Other traditional practices noted were the zonation of streams and springs for drinking and washing, the regulation of settlement and fishing, and the use of sustainable inland fishing techniques such as trapping and biodegradable poisoning (John, 2007). More recent innovative practices that have developed perhaps in response to changes in the water supply or disruption due to heavy rains, include the construction of entombments at springs and water delivery infrastructure. Because of this close relationship with nature, Maroons also developed an intuitive way of *reading* the environment for instability and change, such as forecasting rainstorms, hurricanes, or drought by analysing the behavior of plants and animals (Bedasse & Stewart, 1996).

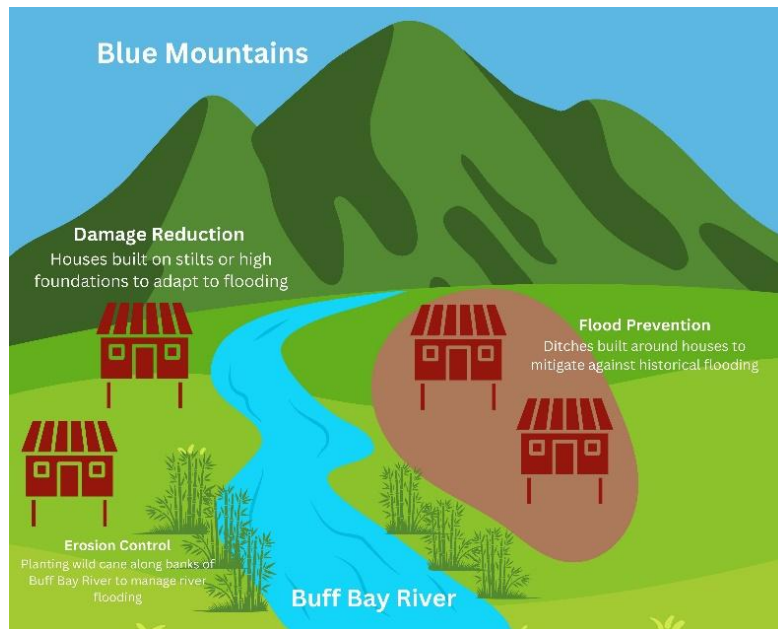
For ethnographic research with Maroon communities, the leadership (Colonel) provided community members with the option to determine whether they wanted to participate in individual interviews or group interviews. A group interview was overwhelmingly selected, ranging from 10 to 15 persons in each community at both Charles Town and Moore Town. Climate change stressors, hazard impact, and adaptation strategies are presented in Table 21. Figure 30 presents an example of an adaptation strategy identified by the Charles Town Maroons to manage river flooding.

Table 21. Climate Impacts and Action identified by the Charles Town and Moore Town Maroon communities

Focus Area	Climate Impact	Climate Action
General	The incursion of the sea in coastal areas such as Orange Bay, generally in Portland and Saint Mary parishes	None indicated
Agriculture	Loss of agricultural produce	Use of the trumpet tree to keep crops cool. Adjustment of planting seasons. Wild cane used to minimize river flooding and stabilise riverbanks.
Housing construction	None given	Built ditches around houses to control flooding. Elevated houses or build on stilts to manage flooding.
Water Management	Less water in sacred spaces that utilise water. This impacts communities and agriculture	Water always available with spring water and it is always clean as water is collected using rolled leaves to funnel water off rocks. Use of non-edible fish or the <i>wedhu</i> beetle to gauge the suitability of springs for drinking water.

Source: Compiled by Author from Ethnographic Research

Figure 30. Cultural Practices in Relation to Flooding Identified by the Charles Town Maroons



Source: Author

Long (1774, pp. 514 – 5 cited in Green (1988)¹¹¹ in writing about housing construction in Jamaica, described the dwellings of colonists as “fixed on an airy, dry and elevated spot, raised some feet above the surface of the earth, floored and constructed either of timber and *plaister* (plaster), or bricks but never of stone, which is a very improper material for the climate for dwelling houses on account of the damp chill which strikes in rainy weather.” Green (1988, p. 10) also writes that “as settlements increased and people became more familiar with the land and the climate, they began to rearrange their settlement patterns and modify their building designs in accordance with environmental factors.” The architectural adaptation over the years was a response to addressing climatic issues and utilising the practices they would have observed from the pre-Columbian and Maroon communities.

¹¹¹ Extract from Long, *The History of Jamaica*, 2:3, 6 pp. 514-5, cited in Green. 1988. *The Evolution of Jamaican Architecture 1494 to 1838*

Disruptions in Maroon Socio-ecological Relationship

The Maroons' insistence on their rights within the Jamaican state has been a central tenet of long-standing issues related to Maroon sovereignty and their non-recognition as an Indigenous community by the Jamaican Government (Lewis, 2022). In recent years, Maroon communities have experienced threats to their sovereign lands, particularly from resource extractive activities. The Maroons of Jamaica are however recognised as Indigenous peoples and possess rights under the United Nations Declaration of the Rights of Indigenous Peoples. These ongoing issues, however, threaten landscape degradation, compounded by coffee farming, and contribute to the vulnerability of these communities, which depend primarily on agriculture and ecotourism activities, and serve to disrupt their cultural knowledge and practices concerning the land and their socio-ecological relationships.

These activities contribute to communities being more susceptible to the effects of the changing climate and erode and disrupt historical relationships with landscapes and cultural practices. Reflecting on the potential impact of mining on Maroon culture, Maroons have referenced the importance of the Cockpit Country to both Maroon history and spirituality, stating that the land is the protector, and that mining would contaminate the water and the environment and impact wild food harvesting. Connell (2020, p. 11), in documenting the concerns of Maroon farmers, noted them saying, "farmers will not have any soil to do farming, so, hunger will take over, and we would become as though this place turned into the Sahara Desert." Approaches such as these mentioned earlier ignore the Maroon element of the local land-use history and often will result in injustices that undermine food and livelihood security, as well as cultural heritage, and also perpetuate environmental injustices.

The Kalinago, Kalinago Territory of Dominica

The Community

The Kalinago present in the islands of the Caribbean are the descendants of the previously known Island Carib, who inhabited the Caribbean as early as 5000 BC (Allaire, 1997; Auguiste & Hofman,

2022; Honychurch, 2000, 2024). Encounter reports by Europeans most often make references to the Carib or Kalinago as a people and hostilities with the Taínos and the Spanish (see Allaire, 1997; Hulme & Whitehead, 1992). However, the Kalinago have had an enduring history of resistance and resilience within the context of social, environmental, and political upheavals, which have defined their past and present and will undoubtedly continue for their future (Honychurch, 2024).

Around two thousand years ago, Arawakan-speaking Amerindians arrived on the black sandy shores of Castle Bruce and built a settlement there called *Kouanari*. Today, the Kalinago people of Dominica are the descendants of the Island Carib who inhabited the island of Dominica and called it *Oüaitoucoubouli* or *Wai'tukubuli*, meaning tall is her body, in the language of the Kalinago prior to and at the time of the arrival of Europeans in the Caribbean (Auguiste & Hofman, 2022), and as recorded by French missionary Father Raymond Breton in the seventeenth century.

Due to treaties between the various European colonising powers at the time, the islands of Dominica and Saint Vincent and the Grenadines were left to the Carib people on the condition that they abandon claims to other lands (Strecker, 2016). Dominica became the last Caribbean island to be colonised, and it remained a home for pre-Columbian societies, such as the Kalinago, that had been virtually wiped out in other locations. Dominica was not apportioned to either the British or the French and the island was to be a neutral island for the sole benefit of the Carib people.¹¹² It was also decreed that no European nation should settle there, and a native chief should be recognized as the master of the island. This decree would not remain, and the ninth article of the Peace of Paris in 1763¹¹³ set aside the previous arrangement, and Dominica was assigned to the British.

As British and French settlements increased in the 1700s, the Kalinagos had their homes torn from them, were forcibly relocated, and their hunting grounds disappeared under the cane fields and coffee plantations of the Europeans and their burgeoning plantation society and economy. Claims of the Kalinago to arable land were ignored as plantations spread from the coast inland. The Kalinago, who were located throughout Dominica, were forced to relocate to the areas around

¹¹² Treaty of Aix-la-Chapelle 1748.

¹¹³ Treaty of Paris 1763. Accessed at: <https://www.oas.org/sap/peacefund/belizeandguatemala/historicdocs/treaty%20of%20paris%201763.pdf>

Salybia, the eastern coast of the island, which was viewed by the colonial administration as highly unsuitable due to severe topography and undulating landscape (Stancioff, 2018). Although the Kalinago were located throughout Dominica, the area around Salybia came to be known as the Carib Quarter. In 1903, the Territory was delimited and expanded from 300 acres beyond the Carib Quarter at Salybia to 3,782.93 acres. In 1930, a letter (Figure 31) by Douglas Taylor to Noel Teulon speaks about the Carib Reserve. Today, a community of approximately 3,000 Kalinago live in their self-named Territory in Dominica, and the Kalinago Territory was legislated under the Carib Reserve Act 1978¹¹⁴.

Figure 31. Letter by Douglas Taylor about the Carib Reserve

“THE CARIBS NOW LIVE IN A LEGALLY DEFINED RESERVE OF AMPLE DIMENSIONS ON THE WINDWARD AND MOST SAVAGE PART OF THE ISLAND, UNDER THE NOMINAL RULE OF THEIR CHIEF. THERE IS NO VILLAGE AS WE UNDERSTAND IT, THE HOUSES WHICH ARE WELL BUILT OF HARDWOOD IN A STYLE OF THEIR OWN RAISED ON STAKES, AND SCRUPULOUSLY CLEAN, BEING SCATTERED OVER MILES, EACH ONE BEING SURROUNDED BY PLANTATIONS OF COFFEE, COCOA, VANILLA, NUTMEG, BREADFRUIT, TANIA, DACHINE, LIMES, ETC. AND THE WHOLE INTERVENING COUNTRYSIDE BEING COVERED WITH BAY TREES. ABOUT TEN MILES INLAND STARTS THE FOREST, FROM WHICH THEY GET THEIR HARDWOODS, SEMAN, BALATA, CEDAR, AND GOMMIERS, WHICH THEY SELL FOR 25/- THE CURRENT PRICE AT FORT DE FRANCE (MARTINIQUE) BEING 18 POUNDS (A GOOD BOAT TAKES SEVERAL MEN SEVERAL WEEKS TO COMPLETE).”

Source: Letter of Douglas Taylor to Noel Teulon Porter, 25 September 1930, Colonial Office – CO 152/418/2 in Hulme and Whitehead

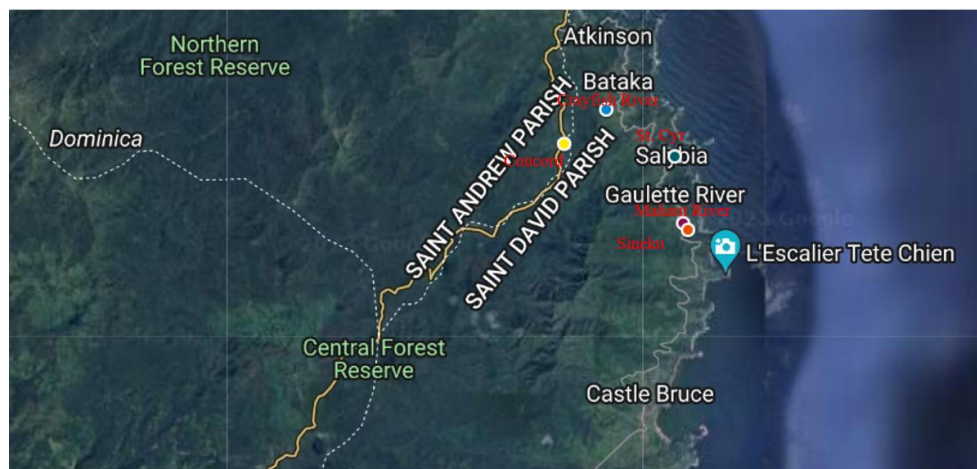
There is acknowledgement that much of what we know about the Kalinago from history stems from the accounts of priests and other chroniclers from the seventeenth century, and these accounts have been repeated, analysed, and re-interpreted by others since then.

¹¹⁴ Carib Reserve Act 1978. Accessed at: <https://www.dominica.gov.dm/laws/chapters/chap25-90.pdf>

These records speak of a people who had lost much of their cultural knowledge and traditions. Phrases such as this would be dismissive of the fact that traditions were not frozen in time or static but constantly evolving. The seventeenth-century Kalinagos were a people whose culture had already been impacted for many years by disease, slave trading, and other colonial practices that Europeans introduced to the region precipitated by the earliest days of contact.

The Carib (Kalinago) Territory today is a forested area crossed by many streams and rivers running along approximately 13km of coastline. There are seven coastal communities (Figure 32), with Salybia being the administrative centre (Auguiste & Hofman, 2022; Boomert, 2011). A coastal road from Marigot to Castle Bruce connects the various communities. Houses are described as being of the Dominican creole type “raised about 0.5 - 1.5m from the ground on piles with flooring and walls of hardwood boards and galvanized iron sheeting for roofs” (Honychurch, 2000, p. 10; Taylor, 1938). The virtual isolation of the Carib Territory and the mountains of Dominica have played a vital role in safeguarding elements of the living heritage of the Kalinago people and assisted in maintaining some autonomy, as the terrain proved difficult for the expansion of the plantation economy spreading across the island and the region (Honychurch 1997; Stancioff, 2018).

Figure 32. Hamlets of the Kalinago Territory



Source: Author generated from Googlemaps.com. Note: N-E Dominica (Bataka, Concord, Crayfish River, St. Cyr, Salybia, Gaulette River,

Climate Hazard Scenario

Dominica is a volcanic island with rugged and steep terrain (Dominica, Third National Communication, 2020). The island does not offer the traditional white-sand beach tourism experience and has instead built its tourism product around eco-tourism, taking advantage of its rainforests, volcanic activity, and rugged landscape. The island is experiencing the effects of climate warming, tropical cyclones being of the greatest concern, and the island has been impacted by a string of such events, such as the devastating Hurricane Maria in 2017.

According to the Climate Change Risk Atlas for Dominica¹¹⁵ (CCCCC, 2012), a 2m sea-level rise would put six percent of the major tourism properties and fifteen percent of roads at risk. Temperatures are projected to increase to 3.0 °C and SST up to 2.9 °C by the 2080s (CCCCC Dominica, 2012). Rainfall increases and decreases will range from -35 to +14 mm per month by 2080.

The majority of Dominica's infrastructure and settlements are located in coastal areas. This placement is also connected to the island's mountainous terrain. The effects of climate warming, particularly SLR, will exacerbate the effects of development in these coastal areas and contribute to coastal erosion. The eastern boundary of the Kalinago Territory is coastal, and the entire territory, specifically Salybia, has been exposed to land degradation, erosion and slippage.

The Caribbean Disaster Emergency Management Agency (CDEMA) highlights the Kalinago community as the most vulnerable in Dominica to climate-induced and other natural hazards. (United Nations Office for the Coordination of Human Affairs - UNOCHA, 2017). A post-disaster needs assessment (PDNA) undertaken by the Government of Dominica (2017) in collaboration with the international development agencies after Hurricane Maria advised that "special attention should be paid to the Kalinago Territory, given that the population there are primarily subsistence farmers that live off their production and the sale of crafts to tourists" (2017, p. 43). Following the passage of Hurricane Maria in 2017, the loss of materials and markets severely impacted these livelihoods. While the livelihoods of the Kalinago are indeed vulnerable to the effects of ongoing

¹¹⁵ The Carib Save Climate Change Risk Atlas Project (CCCCC, 2012). Accessed at: <https://www.caribbeanclimate.bz/blog/2010/02/11/2009-2011-the-caribsave-climate-change-risk-atlas-cccra/>

and accelerated climate change, these entrenched vulnerabilities stem from a history that has forced the Kalinago to exist in vulnerable spaces and adopt practices that are in no way sustainable cultural practices in relation to the land.

A 2021 unpublished United Nations Development Programme (UNDP) study revealed that eighty-five percent of respondents in the Kalinago territory perceived changes in the climate over their lifetime. Of the respondents who reported observing changes in climate patterns, they highlighted that the most frequently noticed change was an increase in the number of hot days, followed by a shift in rainfall patterns and more frequent and severe droughts. Almost ninety-four percent of respondents in the study believed that the climate would continue to change over their lifetime.

The climate challenges that the Kalinago faced in centuries past would not have been framed by historical processes of land degradation and historical human-induced vulnerabilities caused by colonialism. As the oldest remaining Indigenous population in the Anglophone Caribbean, the Kalinago are now facing an existential threat to their traditions and cultural practices due to the accelerated effects of climate change affecting their centuries-old socio-ecological relationship with the landscape.

Exploring Kalinago Socio-ecological relationships through Ethnohistorical, Ethnographic, and Other Studies

The main sources of early Carib ethnology in the Caribbean, and specifically the Windward Islands, are the accounts of missionaries, the most prominent being Father Raymond Breton (Allaire, 1999; Con Aguilar, 2020; Honychurch, 1995; Hulme & Whitehead, 1992; Keegan & Hofman, 2017; Petersen et al., 2004). Breton, in his 1665 *Dictionnaire Carraïbe-Français* documented terminologies used by the Kalinago to describe perceptions concerning natural risk, the environment and its hazards (Lalubie, 2014).

Literary sources, to also include Breton's text, are useful in establishing how Indigenous peoples, in this case, the Kalinago, understood their environment. These accounts, although often one-sided and mired in bias and misunderstandings in relation to the Indigenous peoples, are nevertheless vital information about the daily life of the Kalinago people (Allaire, 1997; Peterson et

al., 2004). At a broader scale, another interesting source of information on climate variability are ship logs, and writings from individuals from the 1700s such as Edward Long (1774) and Byam (1755) on Antigua, and Thomas Thistlewood who wrote on eighteenth century climate in Jamaica (Chenoweth, 2003). In the case of the former, local knowledge is recorded specifically in determining the arrival of cyclones (2003, p. 112).

Hauser (2021) points out that the Kalinago in Dominica would have experienced the land as providing them with all that was needed for life, in addition to being aware of natural phenomena that would have “reminded them of the earth’s sentient nature” (Hauser, 2021, p. 51). Lalubie’s (2014) research on perceptions of the Amerindians regarding the environment and natural hazards in the Lesser Antilles points out that based on the vocabulary used by the Kalinago, they had a good knowledge of the various natural hazards that abounded and applied grading or stages to their intensity such as:

“simple, intense rain versus storms or hurricanes; the river is troubled, the overflowing flood, different from the exceptional flood; gale, storm or hurricane wind; beautiful sea, agitated sea, choppy sea, waterspouts, the impact of the swell in the shire: on the sand, up to the rock, the storm swell, up against the cliff and exceptional swell submerging the shore to the path” (Translated from French - Lalubie, 2014, p. 332 - 333).

Using the various accounts from the seventeenth century to further delve into how the Kalinago perceived their environment and experienced its challenges and change, Lalubie highlights that the people who occupied the Lesser Antilles when Europeans first arrived were a people who had detailed perceptions regarding their natural environment and knew how to utilize the resources of their environment, through various agricultural practices and technologies, and villages were located near the sea or not far from the river mouth. Villages were spaced several kilometres apart and connected by coastal paths in most cases (Breton, 1999, cited in Hofman et al., 2022).

The encroachments and relocation the Kalinago experienced in relation to their land, therefore, contributed to disruptions in their relationship with their natural environment. Noting that the land was seen as dangerous to travel across due to torrents from the mountains to the sea, the Kalinagos’ maritime environment would have taken on even greater meaning as an adaptation

strategy in response to their environmental conditions. This, in addition to their superior maritime navigation skills, would have enabled them to relocate as an adaptation strategy in the event of severe environmental risk. The Kalinago also made significant adaptations to their canoes to deal with sea swells as they adjusted to traveling on the Orinoco to the wider sea and its swells, so they likely adjusted to the prevailing climatic phenomena when they settled in these spaces.

Honychurch (2000) writes that the Kalinagos' capacity to survive would have been dependent on detailed knowledge and awareness of the environment and their relationship with it. Communities along the east coast created specific linkages to other communities and the natural resources in the forested interior of the island and along its coastline as a form of adaptation to severe environmental change. Local knowledge of the land from which their resources are obtained and the ways in which these resources are used are contained in a perception of their island habitat, which emanated from earlier inter-generational Kalinago knowledge of the landscape, which has contributed to their worldview.

Kalinago housing construction presents another form of adaptation strategy that has benefited from documentation. Taylor (1938), in describing the Kalinago house, noted that, "the usual but now rare dwelling of the Dominica Caribs was known as the *muinan*, a simple structure consisting of a ridge pole supported by a main post at either end. The rafters, crossed by rods (*gaulettes*) to which the thatch is tied, reach to the ground. The whole is covered with cane straw [or vetiver] or more rarely, with the leaf of the *yattaghu* palm. The *Uanas*, called *mibi* and *calabouli*, are used to tie the thatch to the thatching rods, which are made of wood or bamboo. An interesting thing about these *muinans*, is that they were commonly built double, one within the other, after the style of a Carib pannier" to better withstand storms (see Figure 33). The *muinan* gave way to huts, which were raised on piles up to four feet from the ground. The construction of the roof remained consistent.

Figure 33. Sketch of the roof of a Kalinago Muinan

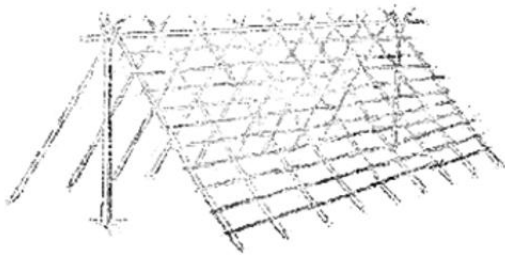
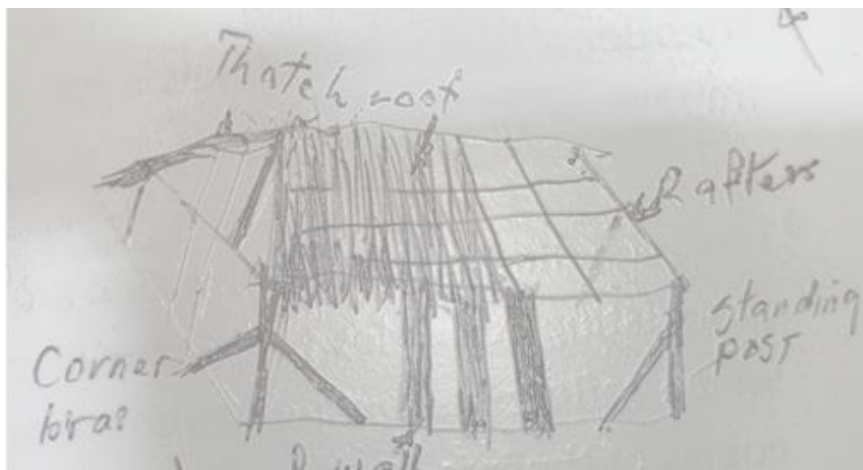


Figure 34. Sketch of a Kalinago Hut



Source: Sketch by Kent Auguiste for the Author (2022)

Burke & Lovell (2000) and other historians (see also Barclay et al., 2019; Honychurch, 1995; Schwartz, 2015) suggest that the Kalinago preferred “small, dispersed settlements, close to fertile land and relatively sheltered from hazards” such as hurricanes. Mulcahy (2008) suggests that this “dispersed pattern of settlements also distributed the collective impacts of any one storm and that land use in coastal areas particularly prone to storm surge was restricted.” Schwartz (2015) and Honychurch (2017) have highlighted that these practices were also utilised by colonists. What can

be inferred from the above, is that the Kalinago had good knowledge of the intricacies of mitigating the effects of storm systems. Mulcahy (2008) and Schwartz (2015) also pointed out that the Indigenous peoples paid attention to the behaviour of the elements, animal behaviour and the look of the moon, such as it having an unusual aura around it. Early European encounters suggest that these Indigenous observations received the full attention of colonists.

Early colonists did not always utilise these Indigenous practices. Later, they introduced practices such as cutting down trees and building westernized housing, which increased susceptibility to natural hazards. Some however continued to recognize the value of Indigenous building practices which prioritised storm resilience and improved ventilation, which, according to Mulcahy (2008), had the added benefit of managing diseases.

The 2021 UNDP report pointed out that many farmers were seeking to revitalize Indigenous farming practices, although these practices are not detailed. This paradigm aligns with Stancioff's (2018) research, which highlighted that community members were noticing landscape changes related to declining agriculture, soil erosion, and landslides. This acknowledgement is also added to the significant coastal erosion taking place already, and the availability of rainwater no longer predictable.

Kalinago community members pointed out that the rainy season was unpredictable, and the land was dry more often. Community members still continued to depend on the water from rivers for many aspects of their livelihoods, with this water also being vital for cultural practices and traditions. The monoculture system introduced first through sugar cane and later through bananas also resulted in significant alterations to the landscape, further impacting socio-ecological relationships and systems and the transmission of intergenerational knowledge and practices in relation to the natural environment.

Persons contributing to this research from the Kalinago Territory acknowledge that the climate is changing and that there are some knowledge and practices that have been passed from one generation to the next that help them to manage this phenomenon better to continue with lives and livelihoods based on the implementation of cultural practices highlighted in the next section. A point made in relation to agriculture is that the Kalinago ensure their food security by participating

in whatever main crop there is in the country. There are smaller family plots and also provision grounds, which are at a distance from family homes. Participating in the country's main crop has had deleterious effects in many instances. It has made the Territory more vulnerable within the context of climate change, as banana farming continued to focus on monoculture, which resulted in issues with pests and diseases. Banana farming also cut down many of the windbreaks (K. Auguiste, personal communication, July 13, 2022), which increased exposure, and soil from banana farming was dumped into rivers, which impacted water supply and quality for both rivers and the sea, which further impacted fishing and the use of rivers and the sea.

Figure 35. Community Session in the Kalinago Territory to discuss Initial Research Findings



Source: Author

Figure 36. Climate Impacts and Climate Action Identified by the Kalinago of Dominica

Focus Area: General

Climate Stressors and Impacts: More frequent and stronger tropical cyclones. Drought or drier environment. More frequent heavy rain, landslides, coastal erosion, coastal inundation, and higher temperatures.

An influx of seaweed and Sahara Dust, in addition to new pests; damaged trails; physical infrastructure damaged; brain drain (youth and elderly who are knowledge bearers); increased health hazards; loss of archaeological sites before they can be studied and impacts to cultural spaces.

Climate Action: Relying on savings and other community members when crops fail; if everything is done according to its correct lunar phase, the community will be able to adjust better; *koudmein* helped everyone in times of distress; general observation of plants to see how they are behaving; type of fish marijuana (*nivuage/enivrage*) increases fish yield in low times; did not settle in areas with repeated vulnerabilities as the Kalinago saw hazards in coastal areas; good idea to document how spaces were used in the past and build awareness around this.

Focus Area: Agriculture

Climate Impacts: Reduction in crop production quality and quantity (food insecurity); soil erosion; no access to materials for making things such as craft; loss of trees.

Climate Action: Practice permaculture; use of intercropping for plants; generally, pests do not look for food during the full moon; planting should be done after a full moon as the crop bears a lot, and the last quarter of the moon is better for crops under the earth; use of yam sticks to conserve water to retain productivity during drought (mulching); change cultivation sites and practise soil conservation; earlier or later farming cycles; diversity in farming; plant crops that are drought/drier temperature resistant varieties; plant below ground instead of above; change fishing locations, techniques, and production processes; leave a portion of the yam in the ground and harvest one month before full harvest (for more food); utilised cutting and harvesting practices before and after the full moon; plant more manioc/cassava as it is a resistant crop; cover land to retain moisture

and control erosion; maintenance of agriculture plots or provision grounds a distance from family homes; vetiver grass used for slope and soil stabilization and erosion; crushing and placing neem plant at the root of your crops will get rid of pests or use sand to treat plants or stifle borers; digging drains around plants to reduce water damage in times of flooding; Materials can be changed, but techniques should remain.

Focus Area: Housing Construction

Climate Impacts: Severe weather events can cut off communities from each other and result in loss of homes; persons believe concrete solutions are better; anything else is seen as an indication of poverty.

Climate Action : Windbreaks previously used frequently around houses (agro-windbreaks would also provide additional food); using the 'A' frame type constructed house prevents roof uplift during strong winds from cyclones; the sharper hip roof withstands hurricanes better than the gable; building houses on stilts (also for houses used for food storage and drying process); pegs, joints, and braces better for construction than nails; harvesting of wood for construction should be during the dark phase of the moon; houses built based on wind direction and flow based on inter-generational knowledge; anchored wood trunks in the ground to stabilize the structures and used banana leaves as a sealing material.

Focus Area: Water Management

Climate Impacts: Impacts to agriculture; transformation of beach areas and fishing coves, and heavy sedimentation in rivers. Some people don't see it as there are subtle changes, but there is less available clean water, and no rainwater harvesting is being practiced as the island seen as blessed with abundant water resources through rivers

Climate Action: Placing banana stumps in fields to collect water for soil moisture and to slowly provide moisture in drier times.

The Kalinago speak about their use of traditional construction practices that can be utilised for contemporary society, with a focus on the process and technique instead of solely focusing on the materials. Traditional techniques also prioritised the use of local raw materials and construction according to lunar phases. There is no doubt, and this was repeated over and over by community members, that traditional Kalinago structures were well-adapted to their environment. There is, however, a concern that when houses are lost because of the passage of a hurricane, there is no consultation with the Kalinago community when international donors set about replacing houses as a form of aid. These houses very often did not reflect the cultural practices of the Kalinago people in how they were constructed to allow airflow or in allowing multi-generational families to live together (I. Auguiste, personal communication, July 17, 2022).

There are numerous opportunities to use these techniques to build hurricane-resilient homes and public structures. In fact, elements of this traditional construction were later integrated with the traditional skills of enslaved Africans to develop what became the traditional Dominican vernacular house or the *ti'kai*, which various reports have provided evidence of their durability against tropical cyclones (see Chapter 5 for this discussion). An example of this traditional technique is the utilisation of the A-frame roof construction (see Figure 37). Here, the building can withstand high winds, as the structural load generated by the high winds during a hurricane is transferred to the ground.

Figure 37. Construction within the Kalinago Territory using Indigenous Knowledge



Source: Author

A noted example of this type of Indigenous construction technique is the traditional long house of the Kalinago, known as the *karbet*. Heron (2021) and Honychurch et al. (2020) describe the *karbet* as having a “tall, steep roof section, combined with the long rectangular rounded layout [which] reduces wind turbulence and works in harmony with wind flow around and over the building and is a good example of simple design principles adapted well to extreme climate conditions.” The present Community Resource Centre in St. Cyr, built in 2015, is presented by the Kalinago community as a way of blending traditional and modern design (also see Figure 37).

Disruptions in Kalinago Socio-ecological Relationship in Dominica

Since the period of European contact, the Kalinago of Dominica have experienced land encroachments and were eventually forced from their lands to less suitable environments due to the growing plantation economy on the island in the eighteenth century. This unsuitable land, which was recognised as the Kalinago Territory, was exposed to severe coastal erosion and land slippage. The Kalinago nevertheless made it their home and continued to practice many of their traditions, which would have previously experienced disruptions when they became internally and externally

displaced communities at the beginning of European colonisation. The plantation economy and the subsequent banana industry would also severely erode and disrupt Indigenous relationships with their natural environment and landscape through the introduction of monoculture.

Honychurch (2000) highlights additional restrictions that would have been imposed on the Kalinago, such as where and how they could fell trees, which he described as a “colonially constructed restriction on Indigenous concepts of their environment.”

The Kalinago and Garifuna of Saint Vincent and the Grenadines

The Community(ies)

Saint Vincent is a small volcanic island in the Eastern Caribbean, specifically the Windward Island sub-group of islands. It is the largest island in the state of Saint Vincent and the Grenadines, which comprises 32 islets and cays. The Grenadines, of which only eight are inhabited, are also volcanic as well as have coral limestone formations (John, 2015)¹¹⁶.

As is the case with Dominica, the present-day Indigenous Kalinago of Saint Vincent and the Grenadines are the descendants of the Island Carib, who occupied the Lesser Antilles of the Caribbean originating from the coastal areas of the Guianas. Father Breton recorded the Island Caribs calling the island *Youloumain* or *Ioloumain* (later *Yurumein* by the Garifuna). The Lesser Antilles archipelago, and specifically the Windward Islands sub-group of islands (southern portion of the Lesser Antilles and primary location of the Kalinago), have, however, been the focus of ongoing debates in relation to migration and habitation in relation to the Kalinago (Boomert, 1986; Bright, 2011; Hofman & Hoogland, 2011; Hofman et al., 2021b).

Some of the earliest eye-witness accounts of Amerindians on Saint Vincent appear in 1596 by British lieutenant captain Lawrence Kemys, who saw Indians on the leeward side of the island

¹¹⁶ See the Second National Communication on Climate Change for St. Vincent and the Grenadines, prepared by N. John.

(Kemys, 1596), and Captain William Turner in 1605 of the ship *Olive Branch* who saw Indians also on the leeward side (see Hulme & Whitehead, 1992).

The year 1763 signalled a key point in the history of Saint Vincent. Prior to this, the island was free of European colonisation except for some French clerics and farmers who clandestinely settled there despite agreements among the European nations that the islands were to remain refugee sites for Caribs (Gonzalez, 1997, p. 202). The arrival of Africans resulted in intermingling with the Kalinago and the mixing of cultural practices from as early as the sixteenth century (Bright, 2011), giving rise to the Black Caribs, later known as the Garifuna, who see their origin narrative as emerging from the meeting of the Kalinago and a population of West Africans who were enslaved and brought to the Caribbean (Finneran & Welch, 2019).

When the British formally occupied Saint Vincent, this led to conflict between the British, French settlers, and the Kalinago and resulted in British incursions on Kalinago lands for the eventual establishment of plantations. In 1796, following years of warfare between the British and the Caribs, with support from the French and Kalinago from other islands, their resistance faltered, and many were captured by the British and deported to the Grenadines Island of Baliceaux and later to Roatan, Honduras (Bright, 2011; Finneran & Welch, 2019; Gonzalez, 1997; Scarlett, 2022). Those who were left on Saint Vincent experienced imprisonment or other forms of discrimination. Gonzalez (1997) notes from her research “that by the middle of the eighteenth century, the Black Caribs were culturally and biologically indistinguishable from the Yellow Carib” (1997, p. 202). From 1770, the planters described the eastern side of the island as being occupied by the Black Caribs, with a smaller group of Yellow Caribs occupying the western side (Hulme, 2003). From the 1790s, it was estimated that there were about twelve main Carib groups, mostly resident on the eastern side of the island (Hulme, 2003).

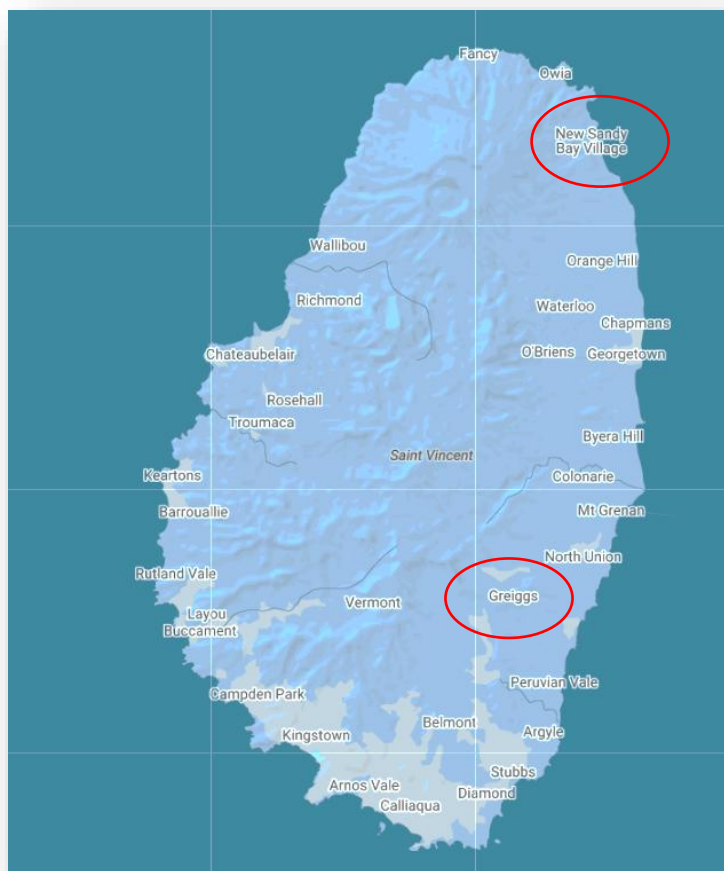
Scarlett (2022), in her research on Indigenous communities in Saint Vincent and the impacts of volcanic hazards, notes that the locations of plantations were later used as post-emancipation settlements, and “this forced land settlement led to greater risk from a variety of natural hazards, including volcanic eruptions, landslides, flooding, and tropical storms.”

The Indigenous community in Saint Vincent has retained the categories of Red/Yellow or Black Caribs that were established during the colonisation of the island. Residents of [New] Sandy Bay refer to themselves as Caribs, while the community of Greiggs is referred to as Black Carib or Garifuna. Ober (1880, cited in Wild Majesty Hulme & Whitehead, 1992) identified Carib Country as that portion of Saint Vincent lying between the central ridge of mountains and the Atlantic Coast comprising fertile and level land, with La Soufriere (volcano) dominating the entire landscape. Today, the area known as Carib Country extends north on the windward side from the Dry Rabacca River through the remote coastal villages of Waterloo, Orange Hill, Overland, Magum, London, Sandy Bay, Point, Owia, and finally Fancy, where the coastal road ends (Smith & Barker, 2013; Twinn, 2008).

The historic community of Sandy Bay takes its name from a beach of grey sand guarded by volcanic rocks lined with tropical vegetation. It is a community exposed to coastal elements, and the main activity is farming on hillside plots. Ober, who visited Sandy Bay in 1877, considered it the most secluded community on the island and described the houses as made of reeds, wattled, and thatched. While the Sandy Bay community is coastal, the Greiggs community is located inland from the eastern coast of Saint Vincent. One of the earliest records of the settlement mentions the Greiggs settlement of Black Caribs in the mountains.

According to the 2012 Population and Housing Census Preliminary Report of Saint Vincent and the Grenadines, 3,280 persons identified as Indigenous, with the majority of 988 persons being in the Sandy Bay census division, followed by 866 in Georgetown.

Figure 38. Indigenous Community Study Areas in Saint Vincent



Note: Case Study Communities are highlighted in red. Source: Author generated from Googlemaps.com

Climate Hazard Scenario

Saint Vincent's Coastal Vulnerability Study (United States Aid Agency - USAID, 2007) identified the coastal zone as being particularly vulnerable to natural hazards. The island has experienced numerous impacts from volcanic eruptions, droughts, and hurricanes over the years. In the same 2007 study and cited in Saint Vincent and the Grenadines' Second National Communication, the coastline from Colonaire Bay to Sandy Bay (home of the Kalinago) is described as a "high energy area...includes the Georgetown and the Rabacca River floodplain...exposed to wind-generated

swells, waves, and storm-generated seas.” The coastline is characterised by steep slopes and narrow coastal corridors, and major rivers contribute to significant coastal flooding (John, 2015).

Saint Vincent and the Grenadines has been highlighted by various regional climate change studies as already experiencing the effects of climate change (see CCCCC Saint Vincent and the Grenadines, 2012). Climate projections to the 2080s suggest an increase in average atmospheric temperature to 3.1 °C, reduced average annual rainfall, increased SST to 3.0 °C, and the potential for an increase in the intensity of tropical cyclones. SLR of 1m is expected to place 10 percent of major tourism properties at risk, and 100m of erosion from a 1m SLR will impact approximately seventy-six percent of the major tourism resorts. This projected change will undoubtedly impact the various Indigenous communities, as settlements are predominantly coastal.

For the coastal community of Sandy Bay, its closeness to the ocean has resulted in significant impacts to the community. In the past, these events resulted in some inhabitants relocating to other communities along the coast at London and Magum, and to a new village adjacent to Overland (Gullick, 1985). The Old Sandy Bay village is noted as being beyond Sion Hill a mile to the north of the present New Sandy Bay. Gullick (1985) notes from informants that historical records suggest that “shortly after the Second World War, there was a flood from one of the many rivers that destroyed the village of Old Sandy Bay...and it was abandoned save for a few inhabitants who remained, and the new settlement built at its present site.” This new settlement of New Sandy Bay continues to have a high level of exposure.

Exploring Kalinago Socio-ecological relationships through Ethnohistorical, Ethnographic, and Other Studies

A study by Smith and Barker (2013) identified several coping strategies among farmers and fisherfolk in Sandy Bay, Owia, and Fancy in relation to drought and tropical storms. This study utilized a mixed methods ethnographic approach through surveys and focus groups and was undertaken in the aftermath of a severe drought followed by Hurricane Tomas in 2010. From this study, farmers in selected communities identified climatic hazards through droughts and storms as the main issue. Several coping strategies were also identified as being embedded in the cultural knowledge

and practices of the Garifuna and having the potential to help build adaptive capacity and strengthen resilience within the communities.

Farmers highlighted various strategies utilising their Indigenous knowledge in efforts to cope with specific hazards. Knowledge and practices included intercropping, lunar phase farming, and fallowing during dry season, were noted, although not unique to Saint Vincent. Farmers highlighted that it was important to utilise crop choices that were drought resistant, as these required less water to manage during drought conditions, such as sweet potatoes, cassava, peanuts, and peas. They also deployed other traditional strategies to manage temperature stresses in crops during prolonged drought. Other solutions utilised to manage climate stressors include tie-back plants, contour furrowing, building drains in land, planting in season, irrigation, drought-resistant crops, special vegetation for landslides, and rainwater harvesting using spouting and catchment containers (Smith & Barker, 2013, p. 7)

Gullick (1985) produced one of the most detailed studies on the Vincentian Carib. His research, published as *Myths of a Minority: The Changing Traditions of the Vincentian Caribs*, noted various myths, cosmology, and observations regarding how the Caribs perceived natural hazards and the changing weather, among other areas relevant to the changing climate or environmental variability and instability.

Through Gullick's research, a persistent theme in traditions collected in the 1970s about this entire period involves the relationship between humans and nature. References to disasters involving nature and probably their spiritual cause were common. During the period 1813 to 1945, he highlights that such interactions between culture, nature, and spirits were mainly found in folktales. This observation is not unknown, as Indigenous communities commonly practised the transmission of traditions through stories, and oral traditions were an important component.

Gullick (1985) writes that the moon was important to the Carib as it was believed to be the ultimate ancestor. The moon's status was high as the Vincentian Caribs measured the months by it, undertook tasks by moon phases, and used it to identify changes in nature. "Their actions toward the moon were noted as being ritualistic" (Gullick, 1985, p. 27). Eclipses were attributed to the *mapoia* (also *maboya*) or bad spirits. If the moon was totally eclipsed, it was ill, and the Caribs also

became ill (Borde, 1674; Tertre, 1654, pp. 410-411, cited in Gullick, 1985), and full and new moons were believed to bring tidal waves, tempests, and hurricanes. The August full moon is the chief time for such manifestations. A halo around the moon was also a sign of coming wind and rain, while a ghost moon or sun (translucent clouds of dust accompanying the celestial body) or the appearance of comets signified disasters or tempests. They considered the moon to be part of heaven and the controlling force of agriculture and fishing.

Carib relationships with nature and the spirit world are interconnected with their belief systems. The phrase natural disaster was noted as being alien to the Carib (Gullick, 1985, p. 155), though explanations of hurricanes and volcanic eruptions were common. We also know from the Dominica context, specific words existed for natural phenomena. The gods' wrath resulted in minor disasters and the Kalinago listened to sounds from the volcano and decided when and how to move. In recent times, it was reported that some Kalinago believed geologists stirred up the volcano and tried to make it erupt. Some of these tales about natural disasters (hazards) demonstrate some of the Caribs' response to nature and its backing myth. The symbolism of the moon in Carib beliefs in the 1970s was noted as "complex" by Gullick (1985).

Similar to others, Gullick also highlighted that a common element in Amerindian cosmology is the link between creation myths and natural phenomena and hazards, such as the tale of the flood which contributed to the formation of the Antilles and the continent of America. This also had similarities to Taíno creation myths and water produced transformations. The Caribs looked upon La Soufriere as the abode of a vengeful spirit hiding itself in the clouds. An eclipse of the moon meant that a *maboya* was eating it, and the *oumoko* were spirits that caused shipwrecks (Breton 1999, [1665]). "Thunder was thought to be caused by *Coualina*, the captain of the *chemeens*, chasing the lesser ones. Their falling in fear created noise and made the earth shake and tremble, and rainbows after rainy weather explained *Joulanca's* significance" (Gullick, 1985). In Carib weather lore, a great number of bats flying was a sign of coming good weather (dry versus wet weather, as mentioned earlier), as bats were good spirits. The combination of nature and spirits in one grouping was justified as both good and bad spirits were related to natural phenomena (Gullick, 1985).

As with the island of Dominica, the earliest accounts were largely produced by missionaries, and these accounts did not record how communities were impacted by or responded to natural hazards or how their cultural practices came into play. The references to natural hazards causing disasters were simple, such as the 1875 flooding did damage to Kingstown, Marriaqua Valley, and Mesopotamia, and likely Greiggs; or in 1876, a second storm caused Caribs living at the foot of La Soufriere and at Morne Ronde to flee Chateaubelair where they were lodged in the church's schoolroom as they experienced significant damage to their houses.

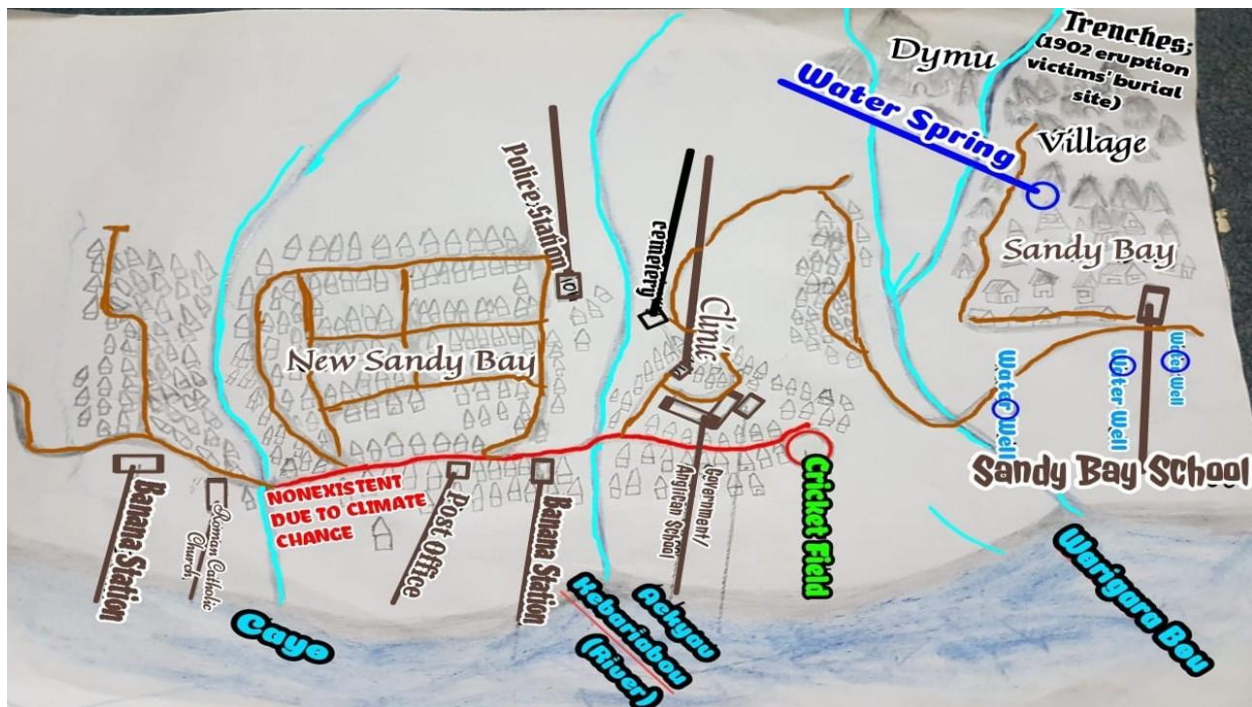
Ober, visiting the Caribs in 1877 (cited in Hulme and Whitehead, 1992), mentioned that they considered the period since 1805 to be peaceful, which could suggest that they disregarded the various natural disasters and riots of this period. Various annual reports in the 1800s noted that Carib communities were impacted by natural disasters such as the Hurricane of 16 August (1886), damaging Rabacca and Georgetown, and probably Owia and Sandy Bay, with ten thousand people homeless and almost two thousand homes destroyed.

Some of these storms and impacts would be in the social memory of Caribs in the 1970s, and it would be interesting to identify the oral histories that would have formed as well as any cultural practices used to respond. The storm of 1895 was key in social memory as it produced a crack in the hill overhanging Morne Ronde. Also, the floods of October 1896 caused a landslip at Old Sandy Bay, resulting in 11 deaths. Windsor Forest was reported as gone in the sea, and nine others died in the Carib Country (Colonial Office Annual Report for St. Vincent, 1896). The Caribs of Sandy Bay in the 1970s still recalled this storm, which they said flooded their village. The September 1898 hurricane destroyed Morne Ronde, but no one was reported as seriously injured. Some Caribs built huts from the debris, but others moved to Frasers, where relocation was pursued as an adaptation strategy. The configuration of the shoreline is noted as being altered by this hurricane, and land at Rose Bank was almost flat before the storm, but flood water had washed it away and created grooves to make it a valley now. These specific disasters and their place in the social memory of these communities today present an interesting entry point to examine linkages with adaptation strategies.

In the Annual Report of 1947, Old Sandy Bay was said to be a compact village located on the lower slopes of land that was ill-adapted for housebuilding and afforded limited number of areas for building. The water supply was one well on the beach. In times of heavy rain, destructive torrents of water rushed down the hillside, causing deep erosion channels, destroying crops and stock, and sometimes washing houses away. Flooding in October 1945 swept away three houses and nearly demolished the church and school. A Central Housing and Planning Authority was formed, and the government acquired 13 ¼ acres of land from the Orange Hill Estates in two areas on Big Sands known as Phyllis Level and Baptiste Level. These, together with the 24 ½ acres bought in 1942 at Delves Level, were handed over to this new authority to relocate Sandy Bay.

A survey was conducted of the old village from which the requirements of the new village were determined. The old village was threatened by erosion and flooding, but this was delayed by planting trees and ditching, although marine erosion continued unabated. Its residents described the present Sandy Bay community (New Sandy Bay) location as a failure due to it being sited on sandy soil and thus also susceptible to erosion. Figure 39 presents an illustration created by a community leader visualising land lost and being lost due to coastal erosion and flooding since the community's relocation in the 1940s.

Figure 39. (New) Sandy Bay Community Map Initiative



Note: The map highlights areas lost or impacted by climate-induced and other natural hazards created by A. Sutherland (personal communication, November 16, 2021) and used with permission.

Regarding descriptions of the houses of the Caribs, Moreau de Jonnès' 1795 account in *Adventures in Wars of the Republic and Consulate* in Hulme (2005, p. 40) described the houses of the Caribs as "being beside streams flowing from the mountains in the interior and with houses like beehives in the shape of their roofs, made of palm leaves but with their wattle sides admitting refreshing breezes and daylight."

In terms of agriculture, within the Carib communities, an important cultural link exists between past crops and food security, where small agro-processing cottage industry operations continue to utilise cassava, arrowroot, and sweet potatoes, all crops cultivated by the Caribs before the arrival of Europeans (Smith & Barker, 2013).

Participants from Sandy Bay and Greiggs contributing to this research acknowledged that their ancestors developed successful strategies that should not be dismissed or ignored. However,

community members highlighted that although they are more equipped, present communities are less prepared than their ancestors. This is a profound statement that brings into focus the applicability of past strategies in combination with current technology to present innovative strategies for addressing the climate crisis.

In the Greiggs group discussion, persons saw climate change as mostly a coastal thing and mentioned that as they were inland, their impacts would be minimal. This way of thinking, however, transitioned to a discussion regarding a ‘climate change chain of impacts’ and how they would experience these phenomena from the coast to the hills. They noted, however, that they practiced river and rainwater (Massar-aqua)/Marriaqua) harvesting and historically utilised multiple water sources in times of drought. It was felt that relocating Indigenous persons away from their traditional enclaves resulted in them losing their protection and impacted their lifestyles and livelihoods, leading to more consumption-oriented ones. The historical development of sugar plantations and, later, bananas involved the large-scale destruction of the island’s forests, which the Caribs needed for hunting, planting, and sustaining livelihoods (Hulme, 2003).

Figure 40. Climate Impacts and Climate Action Identified by the Kalinago and Garifuna of Saint Vincent

Focus Area: General

Climate Impacts: Increased health hazards; loss of archaeological sites and heritage spaces; damaged trails and physical infrastructure; brain drain and loss of knowledge bearers and practitioners

Climate Action: In Greiggs, the community depended on the mountains as safe locations which have traditionally broken hurricanes.

...

Focus Area: Agriculture

Climate Impacts: Reduction in crop production quality and quantity; soil erosion; loss of trees.

Climate Action: Trees and shrubs were used as windbreaks; plant crops that do better traditionally with higher temperatures (heat resistant); planting grass and trees by the Bay is useful; dug trenches around plants that were planted in areas prone to flooding; Old Man Beard, lavender and vetiver grass used to manage erosion; Ancestors utilized more trees and even if rain fell for two weeks there would be no flooding; screw pine used in the past to protect coastlines; utilise trenches in the field.

...

Focus Area: Housing Construction

Climate Impacts: Cuts off communities; loss of housing stock, which is no longer very traditional.

Climate Action: Build higher and steeper roofs, such as those used in the traditional Cayo hut construction. These could respond to hurricane-force winds, and if not, the repair was simple and easy from locally sourced materials. Thatch houses allow air to pass through better in extreme heat.

...

Focus Area: Water Management.

Climate Impacts: Transformation of beach areas and fishing coves; heavy sedimentation in rivers.

Climate Action: Rainwater river and rainwater harvesting (Massar-aqua)/Marriaqua); community has intergenerational knowledge about finding water from springs in drier times.

Persons contributing to discussions highlighted that the volcano La Soufriere built up the land, and climate change eroded it, and this was a part of the ongoing cycle of life for them.

Disruptions in Kalinago Socio-ecological Relationship in Saint Vincent

Smith and Barker (2013) have suggested that in Saint Vincent, the Garifuna (Black Caribs in original text) still struggle with the legacy of European colonisation, which decimated their population and access to land resources, with the connection to land being an integral part of this cultural identity.

Other natural hazards, such as volcanic eruptions, have in the past served to disrupt ancestral ties with land for the Indigenous people of Saint Vincent. It is important to highlight that in speaking to these communities, they did not see these hazards as necessarily disrupting their ties with the land, but frequent relocations would.

The Carib Country first attracted the attention of the English for the fertility of its lands and was called New Caledonia. In 1722, the best part of the Carib lands was seized, which resulted in hostilities, and the Caribs retreated to the mountains during the conflict. Carib lands were left desolate and declared forfeited, surveyed, and subsequently sold. In 1805, a few remaining Caribs were pardoned, and 250 acres near Morne Ronde were granted to them. However, this land was not considered fertile by the Carib population.

The history of the Anglophone Caribbean is one replete with Indigenous displacement and resettlement schemes. In the case of Saint Vincent, this was related to the various eruptions and hurricanes it experienced. Actions post-1902 eruption, for example, have significantly impacted Indigenous culture and its transmission in Saint Vincent (Gullick, 1985; Palmer & Fraser, 2021). Gullick (1985) records an example in 1902, where the Morne Ronde Caribs “petitioned the King of England, and complained about their resettlement at Rose Bank, drawing attention to the fact that the location was not one that they had chosen or preferred, as it was not suitable for the continuation of their ancestral farming and fishing practices.”

The British felt that the Caribs had too much land for their numbers and misunderstood their agricultural practices. The Caribs practiced a form of agriculture that required vast amounts of land under secondary and primary forests compared with that under cultivation every 2 – 3 years when the Caribs would move to non-exhausted land and start all over again with their farming (slash and burn). Old lands would then be allowed to slowly return to secondary forest. Gullick (1985) also records that in contrast to the aforementioned, “lands they received from the British were issued as individual small plots, a form of land tenure entirely contrary to their traditional, collective land tenure arrangements.” In the aftermath of the 2021 volcanic eruption of La Soufriere, it was stressed that persons should be allowed to return home once it was safe to do so, with the Government only offering relocation to those who wished it. This action was a marked change from

previous ones where communities were forced to relocate with no say as to where they would end up. One government senator of Garifuna descent stressed that Indigenous communities had deep ties to places that had experienced these disasters in the north of the island, and that this was a part of their cultural traditions, and not for them to be cut off from these ancestral lands.

Summary

The Indigenous communities in the study area highlight that the erosion of or disruption of socio-ecological relationships has profound implications for the transmission of cultural knowledge and practices regarding how severe climate variability from the past to the present was experienced. Indigenous communities also did not view the changing climate as something that was operating in a silo but as a part of complex relationships existing between various phenomena and the natural environment or landscape.

This chapter concludes by reinforcing that an analysis of ethnographic studies of heritage-based knowledge of climate change does offer crucial insights that demarcate opportunities and roadblocks in the application of practical solutions and how local and Indigenous knowledge may be mobilised for human-centred climate action and strengthen social and ecological resilience in the region. A more complete analysis of this data is developed and discussed in the following chapter as part of a wider discussion on the applicability of data and the creation of these pathways.

CHAPTER SEVEN

ENTRY POINTS FOR CULTURAL DATA IN CLIMATE ACTION

This Chapter analyses the data presented in Chapters Four to Six and discusses entry points for climate action in the Anglophone Caribbean.

This research challenges the notion of sustainable and holistic climate action in the Caribbean without cultural lens. In doing so, it sought to determine what is needed at the levels of policy, planning, and programming to better support the integration of culture in climate action. Although no concrete actions have yet been developed and implemented in the Caribbean using cultural data for climate action, this research positions itself as an opportunity to bridge this gap by contributing to the value and application of this data as a resource for climate action. This is done by promoting useful or concrete examples from archaeology and traditional - to include Indigenous and local - knowledge systems in the development of climate action in the region and determines how they can be better leveraged at the levels mentioned, as well as how the elaboration of useful indicators could be approached.

As our understanding of holistic adaptation to ongoing and accelerated climate change evolves and expands within a broader context, so does our perception of culture and its applicability to support climate action. The culture sector in the Caribbean has, however, yet to align itself internally in terms of prioritising and addressing the solutions that culture can offer in responding to climate change to bridge gaps and establish solidarity between culture, climate change actors and communities, as pathways in support of climate action.

Identifying Gaps and Missed Opportunities with Integrating Cultural Data in the Caribbean

A jarring conclusion from this research is the paucity of attention to or mention of culture in climate change frameworks and *vice versa* in the Caribbean, as was highlighted throughout Chapter Two. This limitation is due to numerous factors shaping the discourse and the opportunities for intersection at the local, national, and regional levels.

Programmes or studies such as the Heritage in Climate Planning (HiCLIP)¹¹⁷ under ICOMOS' Climate Heritage Network highlight that the culture sector lacks the knowledge, capacity, and awareness to successfully integrate cultural heritage in climate action at various levels, and in the case of this research, *policy, programming, and planning*. This disconnect is directly relevant to this research's earlier postulation that the sector requires internal alignment and, importantly, needs to start producing data that can be used sector-wide for evidence-based decision-making.

Information in Chapter Two of this research identified several key gaps in relation to integrating cultural data into national climate change planning, policy, and programming. One of these critical gaps is a general absence of references to climate change or even natural hazards in the region's cultural policies, legislation, or strategies. The other speaks to the absence of or poorly articulated references to culture in climate change and intersections between the two in national development documents. The synergies required for advancing this dialogue and process in programming across sectors are presented in the following section and discusses the review that was undertaken of various national development documents and frameworks in relation to how cultural heritage is presented either as being impacted by the changing climate or how it could support climate action planning at the national level.

Heritage legislation and cultural policies in the study area have not been updated to reflect contemporary challenges and realities in safeguarding heritage in the region (Siegel & Righter, 2011), and Byer (2022, p. 146) supports this in indicating that heritage laws “appear fragmented due to cultural heritage being undefined and placeless...and only seem to be effectively

¹¹⁷ *The HiCLIP Pilot Project for Understanding the Integration of Culture into Climate Action*. A report on the Climate Heritage Network WG4 HiCLIP project. ICOMOS. Accessed at: <https://www.climateheritage.org/cultural-heritage-in-climate-planning>

coordinated when they are integrated within the institutional framework for planning.” As such, heritage’s place in a planning framework can also assist with the availability of needed resources to support heritage climate action.

The review undertaken as part of this research also highlighted that policies for both cultural heritage and climate change do not reflect synergies. A review of relevant legislation revealed that Disaster Management Acts did not sufficiently, if at all, make provisions for culture or highlight how it might be affected unless it is captured in areas broadly defined as vulnerable. Archaeological heritage is also not included, except in instances when coastal zone management or other relevant maritime legislation includes historic shipwrecks and built heritage as part of coastal heritage. While most planning legislation in the region carry some definition of heritage, this is often as a standalone topic and not necessarily integrated in the island’s planning framework in terms of other actions, such as related to the impacts of climate-induced or other natural hazards.

While climate change legislation or policy could make these cultural integrations, many of the islands presented in the study area are without these documents or in the earliest stage of development. Although this early stage presents opportunities for intersectoral dialogues. This pathway, however, is critical in protecting coastal heritage resources and inserting heritage into the dialogue in relation to programming, policy, and planning at the local and national levels (See Chapter Two and Appendices for more comprehensive information on legislation in the study area.

In relation to legislation, and as elaborated also in Chapter Two, many of the laws concerning heritage are vestiges of the colonial era (in the Anglophone Caribbean, this time period ranges from the 1490s to the 1960s). They do not address contemporary issues impacting cultural heritage and were developed in an era when climate change was a relatively unknown phenomenon, particularly culture’s intersection with it. Heritage legislation across the region are therefore lacking in addressing the present issues concerning severe environmental change. National Parks and Protected Area legislation tend to be more contemporary in their terminology, their foundational text, when they were established, and in their formulation, and mention climate change, particularly in the case of ecosystems and biodiversity, which needed to be protected from this threat.

Regional culture documents also predated the recognition of the climate emergency, so there are no well-defined challenges or fields of inquiry linking the two.

Important programming has however developed in the past few years contributing to growing awareness amongst heritage practitioners of the need to address climate-induced challenges for heritage. This has largely stemmed from increased recording of sites being impacted by climate-induced hazards. Projects mentioned throughout this research have also sought to make these integrations at the regional level, but clearly with no policy, planning or formalised programming integrations as yet.

The other end of the spectrum is that non-culture legislation related to the environment, climate change, or disaster risk management do not integrate considerations for culture in its own formulation.

It is precisely this working-in-siloes approach that led the Caribbean Disaster Emergency Management Agency (CDEMA) and UNESCO to collaborate in bringing culture, disaster and climate change management agencies and actors together at a regional meeting in 2019. This workshop sought to better integrate programming in relation to culture, disaster, and climate change. These efforts have borne some fruit, such as in Barbados, where a national committee has been formed in relation to disaster risk management for the culture sector and has been embedded in the national disaster management framework, as well as the inclusion of the culture sector for the first time in the Department of Emergency Management's (DEM) Country Work Programme, and more robust references to and linkages between climate change and cultural heritage in Barbados' updated Physical Development Plan. In Jamaica, a climate change committee has been formed, led by the Climate Change Division, which includes the culture ministry as one of its focal institutions. This resulted in the culture ministry being asked to suggest integrations in relation to the country's draft climate change national adaptation document. Inclusion in this draft document is a noteworthy first step, although the references to culture remain weak, reflecting the elementary thinking in approaches in relation to cultural heritage and climate action. This approach is nevertheless a good foundational step in the sense that it can be recognised and actualised as a

relationship that can be beneficial in that culture is used to promote resilience in disaster emergency planning at the national level and, by extension, climate action planning.

From the legislation data provided, it is evident that what these different disaster management legislations highlight is that Planning and Development Authorities and Physical Development or Town Planning legislations have significant authority in relation to tangible cultural heritage in the Anglophone Caribbean and thus provide an opportunity or a platform for intersections with climate action planning. The amended Physical Development Plan (2023) for Barbados illustrates this, with its significant inclusion of the island's tangible cultural heritage as a section while also highlighting actions that need to be implemented in terms of climate change. While this is still only from the perspective of how cultural heritage is impacted, it creates avenues for future iterations of the document to include how culture contributes to climate action.

National planning documents are often only focused on the economic components of development. This is not unique to the region, as UNESCO has sought for years to have a better representation of culture in the Millennium Development and, later, the Sustainable Development Goals. In 2019, draft indicators were developed for culture, which can be reported on through the various goals. Moving forward, it is expected that culture will have its own goal; however, culture should nevertheless be integrated into all goals as a cross-cutting transformational issue and theme. Progress has however been made in the inclusion of culture (and the development of relevant indicators) as a theme under the Global Goal for Adaptation, and the expansion of references to cultural heritage under non-economic losses (UNFCCC, 2024).

Culture is, therefore, not considered a normative element of national planning. Daly (2017) points out that climate or planning policies that fail to consider culture will result in damaging results (see also Flatman, 2009; Murphy et al., 2009). Yet, when culture is included, its integration has often focused on quantifying the economic contribution of cultural phenomena to the islands of the Caribbean.

International organizations such as UNESCO, working at the regional level, have pioneered discussions and development of resource materials and projects addressing climate change at select world heritage properties in the region. However, these are framed largely in terms of impacts to heritage and specifically world heritage, and not necessarily its contribution to societal adaptation to climate change or the data that could be generated from these projects, which could feed into climate action, although these projects were framed as using these world heritage properties as laboratories for studying climate change. The Caribbean Plan of Action for World Heritage 2015 – 2019¹¹⁸ had specifically defined categories for heritage and climate change, with its primary objective in relation to climate change being to reduce the impact of climate change by increasing capacities in risk management.

Others, such as the International National Trusts Organisation (INTO), an important international body for National Heritage Trusts and which many Caribbean National Trusts are members, issued a series of declarations and recommendations on climate change between 2009 and 2017 and participated in the development of a climate adaptation guidance for managers of historic places. The 2021 INTO publication, *“Putting the Local into Global Heritage: Balancing Conservation, Tourism, Development, and Community Interests at the Sites of the World’s National Trusts”*¹¹⁹ focuses on the needs of communities at heritage sites in the context of climate change and other emergencies.

Integrating cultural heritage pathways through cultural data into planning processes is crucial for creating climate action that is locally relevant and appropriate for our island settings and needs in the context of climate action governance (Jigyasu et al., 2013). It also empowers traditional communities, their knowledge and practices, and people who must contend with issues on the ground (Sayre et al., 2017), making these actions human centred. This is particularly important for the islands of the Caribbean and the Indigenous communities, whose vulnerability is characterised by historical practices and processes still being replicated today. Climate action processes that are predominantly top-down can only offer scientific and technical solutions that fail to capture

¹¹⁸ Caribbean Plan of Action for World Heritage 2015 – 2019. Accessed at: <https://whc.unesco.org/en/events/1200/>

¹¹⁹ INTO’s Putting the Local into Global (2021). Accessed at: <https://www.into.org/app/uploads/2021/05/Putting-the-Local-in-Global-Balancing-conservation-tourism-development-and-community-interests-at-the-sites-of-the-worlds-National-Trusts-Jun-21.pdf>

the importance of community-informed and focused adaptation needs and understanding of climatic changes. Integrating culture as such gives voice to communities that have historically been impacted by environmental challenges that are not of their doing but create issues with vulnerability.

Another identified gap lies in what is defined as cultural or cultural data, as defined in Chapter One. Local knowledge was also seen to be a confusing term in relation to culture. So, although culture is not addressed directly in either climate change, emergency, or disaster risk reduction frameworks, national documents may speak of implementing resilient agricultural practices or even suggest the use of local knowledge without linking it to culture. This also falls within authorised discourses on culture and heritage in the Caribbean, where the intangible often does not factor into legislation, and there is a focus on monumental or built heritage. Although cultural policies can address gaps within this discourse on cultural heritage, their recent updates in the Caribbean have focused predominantly on the creative sector.

The difficulties the culture sector faces, stemming from the low priority given, scarce resources, the absence of inventories, and the general lack of documenting heritage and its activities, give rise to specific complexities in relation to its protection¹²⁰. This then results in the sector's incapacity to produce pertinent data that non-culture actors at various societal levels can refer to and utilise. Sector-wide general climate action at the national and regional levels are rare. The challenge with generating data is evident on two levels: the relationship between climate change and impacts on the sector and the development of climate action utilising cultural data to inform responses.

At the former level, and as discussed in Chapter Four, the rate of loss of coastal archaeological sites due to climate-induced hazards is increasing, and many islands in the region have not prioritised undertaking climate vulnerability assessments for their coastal archaeological record. The exception being Antigua and Barbuda, through its Department of the Environment, which has undertaken an extensive survey of coastal sites, with plans for its incorporation in to a culture sector plan (Murphy, 2023). This data has, however, not resulted in any noticeable actions yet.

¹²⁰ See Siegel & Righter, 2011 for a full discussion by island of issues with safeguarding and managing cultural heritage.

Because vulnerability or risk assessments are not prioritised, impacts are not fully understood, nor are climate action strategies being put in place. However, as highlighted, the tourism industry is primarily coastal in the region and highly exposed to climatic challenges, and as such can be used to push through assessments that include archaeological and built heritage in these areas.

With the prioritisation of vulnerability assessments for archaeological and built heritage in response to climate-induced hazards, the sector will be in a better position to develop evidence-based climate action. This can be implemented through community-based initiatives and other partnerships that address the monitoring of this threatened coastal record. Community-based initiatives also have the potential to integrate local knowledge for the development of useful and sustainable strategies for the safeguarding of this heritage (Miller et al., 2024; Richards, 2022). This data-driven approach also creates opportunities for partnerships with sectors such as agriculture, planning, coastal zone management, and tourism.

This approach also presents opportunities to guide the development of a climate action plan for the culture sector, which has the possibility for integration into a wider national adaptation strategy or framework. In such a sectoral action plan, relevant data such as impacting phenomena, climatic trends, projections, impacts, and vulnerabilities can be combined, and opportunities and climate action goals developed for culture to include specific case studies on how this data can be used and entry points for traditional or local knowledge.

At the latter level, the inclusion of cultural data has also been stymied by the issues mentioned above, as suggested by Trinidad and Tobago's Kishan Kumarsingh, Head of Multilateral Environmental Agreements in the Ministry of Planning (personal communication, April 19, 2023). He indicated that while the island republic does look for opportunities to integrate culture in national climate action, such as in planning projects, culture is not specifically mentioned in its climate reporting as the country is still grappling with a suitable approach to collect and integrate this type of data, transfer it into a useable format, and identify who to speak to as this type of data is not subjective, and experiences and opinions vary. He however acknowledged that policy development, especially for climate change, should benefit from broad development and consultation, using *the best available* data or consultation process. He notes then that the best

entry points lie with policy and consultation, and the culture sector should try to better articulate and visualise what this data would look like, how it could be measured, and what it would look like to integrate this data.

Although the gaps seem significant, particularly when viewed within the challenging space within which the culture sector operates in the Anglophone Caribbean, there are even more opportunities emerging for creating synergies that could lead to the beginning of integrating this cultural data, presenting a human approach to addressing anthropogenic-led climate change.

Data for Discussion: Entry Points for Cultural Data

Entry Points for Data from Archaeological Vulnerability Assessments

Vulnerability assessments utilise varying data sources and set out to paint a picture of the extent of risks facing the coastal archaeological record. They therefore have the capacity to support the culture sector in developing needed strategies to address threats presented by climate-induced hazards. Daly (2014, p. 110) points out that vulnerability assessments are vital, as in the absence of the voice of cultural heritage, coastal defences and other hard engineering solutions have the potential to harm the archaeological record as well as the wider landscape and ecosystem. It is therefore important to have sufficient dialogue and inter-disciplinary actions to ensure that human interference in the coastline does not lead to catastrophic results (Edwards & O'Sullivan, 2007).

Data sources that support these assessments include maps, photographs, remote sensing research reports, publications, and archival data. Satellite imagery can identify coastal changes and geographic information systems (GIS) can be used for predictive modelling exercises which work to expose present and future risks and vulnerabilities and develop risk maps for use not only by the heritage community but also by those involved in coastal planning. The better organisation and use of data will also create robust entry points for the involvement of other collaborators, such as communities in developing climate stories to build awareness.

From this position of improved surveying and inventorying and the utilisation of various tools and methodologies, culture actors will also be in a better position to utilise data from other fields, such as paleoenvironmental and other scientific research, in addition to coastal zone management authorities using this data to better study coastal zone changes for example. This collaborative approach not only supports frameworks for interdisciplinary work or generates relevant data, it also presents opportunities for the pooling of resources, truly actualising a multidisciplinary approach to examining the vulnerability of this coastal record.

In using archaeological data or combining it with other relevant data sets, one specific area of convergence is the development of multi-hazard risk assessments in coastal areas, which can guide programming regarding prioritising vulnerable and other sites for present or future climate action in response to hazards, support simulation exercises, and guide the development of strategies that address adaptation actions in coastal zones. Understanding coastal processes from an archaeological perspective also illuminates the risks facing local communities and the longer-term impacts human activity is having on the coastline (Rivera-Collazo & Perdikaris, 2023). This research as such suggests that observing and understanding the risks associated with the coastal archaeological record serves as a proxy for analysing wider threats in the coastal zone posed by climate-induced hazards and helps in the development of holistic multidisciplinary strategies.

The vulnerability assessment undertaken, and the resulting data suggest a high level of vulnerability for coastal archaeological sites with very few climate action strategies in place. This vulnerability of coastal archaeological sites also pulls the curtain back on the health of coastal areas and ecosystems in the Caribbean, specifically in the study area. An important component of the vulnerability assessment presented revealed a high level of development and degradation in coastal areas. Although vulnerability assessments were undertaken on only four islands, it can be deduced that this sample is representative of the issues being faced throughout the study area. The literature review also supports this stance. Key vulnerabilities include loss of structural integrity of built heritage in coastal areas, loss of coastal ecosystems, erosion of foundations, and coastal erosion, inundation, and submersion of archaeological sites.

This research acknowledges that although assessments are vital in developing appropriate responses, there are difficulties in determining the extent of damage and loss that could occur due partly to uncertainty about future climate variability, although projections can nevertheless still be made. It is therefore proposed that assessing the vulnerability of the coastal archaeological record is vital to developing appropriate climate and disaster risk management and adaptation responses to address present and future impacts, as highlighted by Woolf and Wolf (2013; see also Miller et al., 2024). This has been demonstrated in global heritage monitoring projects such as CHERISH, CITiZAN, and the Heritage Scouts Programme (also see Daly, 2017; Miller et al., 2024 for a discussion of other identified projects), where data has been collected on vulnerability that has been fed into various sector strategies.

Archaeological research through these assessments can also contribute to wider landscape and ecosystem assessments. This approach is particularly important given the significant amount of infrastructural development in coastal areas particularly for the tourism sector.

The archaeological record is intertwined with the natural ecosystem of our islands. Past populations did not separate the natural from the cultural and they existed within specific socio-ecological relationships and settings. Settlements, for example, were based on specific landscape identifiers. Degradation in these areas illustrates that the health of our coastal areas and the loss being experienced by the archaeological record can point to important future trajectories. This makes archaeological research data critical to assessing and improving the capacity of Caribbean coastal areas to pursue transformational resilience building.

For adaptation strategies to be effective and sustainable, they require anchoring in legislative, policy, and institutional frameworks and implementation through community-based strategies and initiatives. Vulnerability assessments are therefore valuable in determining the aspects of a system that are vulnerable and why. While this data is generated or honed through an approach that focuses on archaeological sites, translating it into climate action and strategies applicable to coastal zone management, planning, agricultural practices, food and water security, and housing construction becomes the focus.

Opportunities for pursuing or integrating this data in a national agenda can be further examined through a focus on discourse or initiatives involving coastal health, the extent of shoreline erosion, the impact of storms on coastlines, the sensitivity of coastal ecosystems or the natural environment to climate change, the sensitivity of structures to wind damage and coastal inundation and threats to coastal communities and settlements, and the development of shoreline monitoring databases for future management or as part of a multi-data database or strategy which utilises the best available science in the safeguarding and management of the coastal zone.

Good practices for the collection of archaeological data include the Saint Kitts example highlighted, where research in relation to the island's archaeological heritage contributed to the development of a database capable of supporting the work of policymakers. Other examples include the NOAH's ARK project¹²¹ and other projects mentioned throughout this research, which, among other things, explored examples of climate-driven threats to cultural heritage in Europe and other areas and developed an atlas of at-risk sites to assist heritage managers, and devised research and policy recommendations (Brimblecome, 2014; Pearson et al., 2021).

Data in relation to archaeological sites, threats being experienced, and vulnerability assessments can first be used in various ways to support the development of a multi-hazard risk assessment for the sector, heritage at risk maps, a climate action plan or strategy for archaeological and built heritage and specifically sites that are important to an island's national identity. Finally, it supports the crafting and telling of stories and building awareness in relation to climate change, in addition to important sites and spaces being lost due to this change and how to process this loss. Other useful tools include the development of an atlas of at-risk sites, which can be merged with other strategies being implemented on the coastline, such as planning for tourism or integrated coastal zone management. Daly (2014, pp. 91-92) suggests that "there are also opportunities for the combination of cultural heritage data with other sector data," such as combining locations of prehistoric sites with the location of critical food and water resources.

¹²¹ NOAH'S ARK Project: The European Union Framework Programme 6 (FP6) project *Global Climate Change Impact on Built Heritage and Cultural Landscapes* or *Noah's Ark* aimed to assess the overall risk to Europe's monumental heritage posed by climate change (see also Brimblecome and Grossi 2009, Sabbioni et al., 2006). Project accessed at: <https://www.heritageresearch-hub.eu/project/noahs-ark-project/>

By observing the vulnerability of the coastal archaeological record, change can be analysed over the long term, as well as the significance of using these assessments to examine present challenges. The combination with known or important sites supports the building of awareness and uses heritage for climate social action. In the same way, vulnerability assessments of the archaeological records helps the development of community-based actions that contribute to monitoring the effects of climate change and present bottom-up solutions or strategies that are likely to be more sustainable.

Research on the dynamics of climate and coastal change in the region's coastal areas allows archaeologists to contribute to discourse regarding the health of coastlines and integrated coastal zone management and planning, among other interesting areas of convergence. This approach is supported by examining how coastal sites have been impacted over time and in what ways. In summary, a healthy ecosystem naturally mitigates against occurrences and lessens the impact of climate-induced hazards and resulting disasters, increasing society's resilience to them.

Entry Points for Data based on Archaeological Research

Coastal archaeological sites serve as laboratories to better observe and understand the effects of climate stressors in coastal areas and test innovative climate action strategies. As an example, understanding past human settlements and their response to coastal changes influenced by climate-induced hazards helps us contextualise present-day geomorphological transformations and their impact on coastal communities and visualise possible responses.

Information from these sites highlights that archaeology not only serves archaeologists in understanding the past but is also relevant to re-grounding communities through past strategies, reducing social vulnerabilities, and increasing community resilience (Rivera-Collazo, 2020). This knowledge is particularly valuable for increasing awareness of archaeological research in the region and making it applicable to contemporary Caribbean communities, heritage actors and policymakers, while addressing a global issue that has severe ramifications for the region. The identification of how past communities responded to food and water insecurities within this

climate variability setting is also particularly applicable to the implementation of actions within the post-disaster context in the region and an increase in dry weather extremes.

Ortman (2019), as do others, believes that although there has been an increase in recent years of archaeological research and exciting results to address contemporary issues such as climate change, they have had little impact on public policy. Ortman continues by saying that “as the most extensive compendium of human experiences there is, it seems only natural that the results of archaeological research should have an impact on discussions concerning contemporary issues” (2019, p. 1). Precisely the pathway envisioned for the use of archaeological data emanating from research in the region.

Within the Caribbean, there are many challenges facing the culture sector, and archaeology is often an unknown area, even for many persons in non-culture technical fields. Society often sees archaeologists as the unknown or as people who come to mysteriously dig somewhere, and in very few instances is the research made relevant to them. As it is generally unknown, the utility of archaeology in dealing with issues such as climate change will be even more unknown. This low awareness and accompanying low priority of not just archaeology but generally the entire culture sector beyond cultural festivals in the region presents the first and most significant challenge. This can, however, be addressed by making archaeological research more relevant to society in small, innovative, and meaningful ways, specifically through community-based or citizen science initiatives and using archaeology to communicate climate stories.

To illustrate the critical importance of considering this approach, this research makes the case for the integration of this data through proposing that the archaeological community and other heritage actors first promote previous archaeological work in meaningful and interesting ways for the public. This could focus on how past communities responded to climatic challenges. There are many heritage platforms available virtually or through the work of heritage organizations to have this conversation with members of the wider Caribbean public. Another specific example is based on using sites that may have some national importance to communicate about climate change and loss of identity and heritage and national stories. The change being experienced can also be communicated through the site’s interpretation. There are tremendous opportunities, particularly

with funding, to pursue these initiatives, mainly when a *whole ecosystem approach* is utilised. By way of illustration, the significant number of pre-Columbian and historic burial spaces being impacted by coastal inundation, erosion, and rising sea levels present an interesting opportunity and discussion point to better articulate this area.

Other valuable entry points for archaeological data include its utilisation in establishing historical trends in climatic variability. This presents an opportunity to add the human element to studying and establishing past climatic trends. Archaeology allows a face to be placed on paleoclimatic trends and modelling, and this supports individuals and communities in visualizing climate change in more impactful ways. Hauser (2021, p. 192) noted that archaeological research that mapped water usage in eighteenth-century Dominica had value for developing contemporary policies on resilience through, for example, noting “how contemporary social relations shape our interpretations of the archaeological record...we can [then] also recast our focus on how the experience of those caught up in circumstances beyond their control shaped the archaeological record...[the archaeological record] then addresses present-day concerns [such as the environment] and provides an essential set of data about everyday forms of resilience.”

The Saint Kitts and Nevis project mentioned throughout this research highlights specific entry points in different areas. It was a collaborative project between state and non-state actors which allowed the contribution of archaeology to be placed in the spotlight. Generating data in relation to monitoring archaeological sites allowed for a ripple effect to be generated in terms of reaching out to more persons. The data emanating from the project and measuring the impacts of coastal erosion on archaeological heritage as a proxy for the environment, allowed this data (database of shoreline data) to be available to policymakers to support data-informed decisions. By making the connection to livelihoods and the archaeology of these communities, a human face was placed on this impact. This is particularly relevant as islanders in the Caribbean have a unique relationship with their beach and coastal areas as a space for social and economic activities (Byer, 2022). These areas are essential spaces in the definition of cultural and national identities and provide opportunities for making the connection between past and future responses, building climate awareness, and crafting climate narratives with a community focus and voice.

Archaeology also supports a better understanding of Indigenous technologies and strategies identified through research that could be utilised today to support coastal communities to be in harmony with the natural environment, supporting balance in socio-ecological systems. This approach also creates opportunities for data-informed decision-making, something that directly relates to communities at the local level. As suggested by Van de Noort (2013, p. 19), “climate change archaeology, however, does not suggest that the past offers direct parallels to present and future situations...and instead suggests that certain elements of adaptive strategies followed in the past can help in building the resilience” of contemporary societies. Archaeological research in the Caribbean, can therefore, serve as a “repository of adaptive pathways on the part of past human populations in the region, as long-term insights on the dynamic nature of shoreline change and the ways in which people from the past adapted to it, are made possible by archaeology” (Van de Noort, 2013, p. 19).

Archaeological research as such has the capacity to improve the body of data supporting climate action. Its role in climate action in the Caribbean can therefore be actualised through understanding long-term environmental change, traditional adaptation strategies evident in the archaeological record, enhancing public engagement and policy support and promoting interdisciplinary research. These all contribute to modelling future climate scenarios and planning for long-term climate action, reviving or adapting Indigenous technologies, and protecting heritage through strengthening community identity and engagement, particularly through culturally relevant and inclusive climate policies and actions anchored in public support and political will for climate action by demonstrating that people have adapted before and can do so again.

Entry Points for Data from Traditional Knowledge Systems

As the final data set proposed in this research, this Chapter concludes by analysing how ethnographic studies of climate change and communities offer crucial insights that point to opportunities and roadblocks in the application of practical solutions. It also interrogates how local

and Indigenous knowledge may be mobilised for climate action and strengthen social and ecological resilience in the region.

Climate change poses a significant risk to the islands of the Caribbean and island states and Indigenous societies worldwide. As is the case globally, Indigenous and local communities in the Caribbean anchor their decisions and actions on their knowledge systems infused with contemporary innovations. These systems offer long-term, cross-generational observations and analyses of the physical environment based on cultural worldviews, and for many Indigenous and local communities, their knowledge systems are essential to the ongoing safeguarding of cultural heritage (Pearson et al., 2021). Through the ethnographic study presented, this research carefully identified traditional knowledge systems in collaboration with communities while examining strategies developed and used over time that may be applicable for future action and could be integrated into a climate action governance framework.

There are no parameters for defining Indigenous knowledge, as it essentially consists of ways of living and doing by these communities built upon over generations. Many of these knowledge and practices can however be viewed as specific, and require caution when viewed without their localised contexts, and although this knowledge can seem abstract in many instances, a deeper study within its context provides opportunities for intersections with climate action at the local, national, and regional levels. Because culture is fundamentally connected to religious beliefs and social practices, traditional knowledge systems should be considered an important component in disaster risk and adaptation planning and how people perceive and respond to hazards. This approach supports a bottom-up solution that has proven to be more sustainable and provides opportunities for community ownership of actions and knowledge processes.

As highlighted, there is a significant body of research that points to the involvement of Indigenous peoples and local communities globally contributing to how contemporary societies address the climate crisis, noting that these communities observe and interpret climate phenomena differently and utilise approaches that may not produce quantitative data as expected by climate scientists

(Argawal, 1995; Brace & Geoghegan, 2010; Jigyasu et al., 2013; Maldonado, 2014; Nakashima et al., 2012, 2018).

Although there are an increasing number of case studies where traditional knowledge is used in relation to climate action, such as the application of forest management or ancient water management strategies, these are applied on an ad hoc basis and often applied through programming instead of it being part of a wider strategy or policy to address issues with climatic challenges. Those who have a challenge with this type of data refer to it not being easily quantified or accessible to be integrated into policy and planning or to develop methodologies for application. Within the present context, how the data is used and how communities are engaged often exacerbates the marginalization and vulnerability of these communities. These can also lead to unjustifiable ecological stereotypes.

Ramsay (2013, p. 4) indicates that climate change adaptation strategies most often identified for small islands are “sea defences, flood-proof houses, hurricane resistant buildings, early warning systems for extreme events, zoning of land near rivers and coasts, improved water management, improved risk management, ensuring adequate insurance coverage, planting more resilient crops and conservation of biodiversity.” However, all these strategies and their application are anchored in traditional knowledge, which continues to be transmitted today. They are also options that are intimately linked to the local knowledge of islanders from the past to the present.

Central to the ethnographic study presented in this research is the question: What place does an ethnographic examination of climate change adaptation have to do with the future? How does the past engage us in planning for the future with something so extensive and destructive as climate change? The ethnographic and other data presented make clear that the cultural traditions and ways of knowing and doing by these communities, when woven together, provide an important tapestry of culturally relevant adaptation pathways for addressing ongoing and future climate change, not just in these geographic locations, but for island societies, and globally.

However, it is important to consider that some of these knowledge and practices have been eroded because of the ways in which heritage is used that are out of sync with Indigenous knowledge and practices or stifle traditional adaptation practices, making it difficult for these communities to continue managing future and accelerated change.

Presently, Indigenous communities are not sufficiently engaged in the Anglophone Caribbean, and studies that document their traditional responses do not make them usable for any form of strategic planning and policymaking. Various initiatives and voices, to include those within these communities, have called for the documentation of Indigenous knowledge and practices knowledge and practices relevant to responding to climate change. There has, however, been very little traction in this area. When one factors the obstacles in better engaging Indigenous communities in this discourse, consideration must be made of historical injustices and the still very extractive narrative and approach to conducting research, where communities in the region are seen as a source of information instead of being involved as rights holders and collaborators in defining research goals and outcomes, through collaborative learning and decision-making to apply pathways to solutions.

This research pursued an approach of identifying with these communities ways in which their voices could be better heard and contribute to discourse. This research was also hard-pressed to identify examples where Indigenous and local knowledge were being applied to or integrated in present-day climate action or solutions in the region. As an example, do the planners, builders, or architects of the region consult communities and their knowledge in relation to their work? Although many traditional knowledge systems remain and are being transmitted and practiced by communities, the region has experienced significant knowledge loss historically from the processes mentioned throughout this research (Perdikaris & Boger, 2022; Hofman et al., 2021a; MacDonald & Ferdinand, 2023; Scarlett, 2022).

Under colonialism, millions of persons were enslaved from Africa and indentured from Europe and Asia. As such, the imposition and integration of this newer knowledge system is juxtaposed against

the loss of significant portions of the region's earlier Indigenous knowledge. The Caribbean's Indigenous communities, for example, continue to occupy and adapt environments and rely heavily on traditional knowledge systems, which constitute an essential aspect of social memory that is undervalued and disappearing in the region due to a significant part of it being transmitted orally. Traditional knowledge transfer systems can therefore also play an important role in how inter-generational knowledge is transmitted, an example being the *Krotu* system (traditional meeting) in Suriname. In addition to the context of knowledge loss, Indigenous communities continue to face impediments to achieving climate justice. This prior context has severely restricted their capacity to draw on past knowledge and apply it to present and future climate action (Douglass & Cooper, 2020; Richards et al., 2023), contributing to negative perceptions and attitudes regarding the value of local and Indigenous knowledge.

Examining the social adaptability and broader resilience of past communities and their landscapes to the changing climate is considered useful in implementing current actions or analyses in relation to future climate action. Indeed, the Caribbean region has been acknowledged as one that has undergone almost continual adaptation and transformation over a significant period in response to changes in the natural environment and corresponding social adaptation. While Indigenous peoples have had a long relationship with their environment and have developed valuable practices for managing environmental instability, this research acknowledges that not all Indigenous cultural practices are positive. Some have indeed had detrimental effects on the environment.

Although in use by traditional and rural communities in the Caribbean as part of their normal response systems or way of life, focused attempts at applying traditional knowledge in relation to mitigating the impact of natural hazards have been documented in few studies in the region, such as the application of Indigenous knowledge to pollination conservation practices in Antigua, intercropping and composting in Puerto Rico, the use of short cycle cassava in Guyana, the protection of traditional maize and bean crops in Cuba, raised agricultural fields in Guyana (Richards et al., 2023; UNESCO, 2020), and traditional cropping systems for food security in

Jamaica (Barker et al., 2016; Barker & Beckford, 2006; Beckford & Barker, 2007; Gamble et al., 2010).

It is not enough however, to examine past human societies and look for inspiration in developing solutions for today's challenges, as the issues of the past and the people who responded were responding within their unique socio-ecological system. Found (2016) suggests that because adaptive systems can experience shocks and adjust accordingly, new systems must be developed, or there should be improvements in existing ones. These systems will then be capable of managing threats or shocks posed by ongoing changing climate, and this will be reflected in their function, structure, feedback, and identity. When applied to the knowledge of local and Indigenous communities, it refers to the capacity of these persons and communities to experience these shocks while utilising their knowledge and networks to adjust. The ethnohistorical and ethnographical data provided in Chapter Six highlight the capacity of this data to become relevant to future adaptation by highlighting where this maladaptation or adaptation has taken place, as well as point to the capacity of the system to manage change based on prior adjustment.

A significant challenge lies in the documentation of knowledge practices relevant to climate change adaptation, as many practices are passed on orally. The application of traditional knowledge to climate action can be visualised as a system of adaptive cycles and demonstrates the relationship between change and adaptation at different levels. We know that in responding to severe environmental change, past and present populations utilised knowledge for adaptation at different scales, which resulted in disruption, development, or reorganisation. This means that communities either made changes, became part of the response, which is a form of ongoing adaptation, remained static, or made periodic adaptations or adjustments, disintegrated, and new knowledge responses were created or integrated with existing responses.

In undertaking this research, it became clear that distinctions were necessary in relation to coping versus adaptation strategies, where coping referred to smaller and temporary actions that may or may not necessitate outright change and which may or may not be embedded in cultural practices

and traditions. Adaptation strategies would then refer to those actions that reflect change in or reorganisation of practices, systems, or the application of knowledge needed for survival.

Bynoe (2016, p. 250) writes that “our local and Indigenous knowledge, experience, values, attitudes, and beliefs in the Caribbean influence how persons accept and judge risk in relation to broader environmental change and, thus, how we respond and adapt.” While Caribbean communities have survived severe environmental change over many years and have applied Indigenous and local knowledge in response to identifying successful or unsuccessful solutions or adaptations to the changing climate over several generations, their knowledge and experiences are rarely acknowledged in broader discussions and actions at the national level. Nor are their voices heard, particularly when they may be in contravention of established narratives on climate change or other ecological issues (Bynoe, 2016; MacDonald & Ferdinand, 2023).

Because traditional knowledge manifests itself more as a way of life instead of a collection of actions or strategies, this knowledge can be challenging to articulate. Nevertheless, dialogue between Indigenous peoples, those responsible for culture and climate, and environmental scientists can support the co-production of knowledge to address risks posed by climate-induced hazards and build resilience.

The ongoing use of this knowledge with relevant innovations demonstrates its continued use, and by innovating, we continue to emulate what past communities did when they received, practiced and transmitted inter-generational knowledge and practices. Specific entry points that can be harnessed and applied for the future with appropriate innovation and which can advance the Indigenous and local knowledge for climate action discourse from the abstract to being embedded in multi-scalar actions include but are not limited to focusing on ecosystems, agriculture, coastal zone, water management, and housing construction techniques. These are discussed in the concluding text of this section. In all instances, the development of methodologies or pathways through policy, planning, and programming will require dialogue, the identification and elaboration

of intersections, and the development of methodologies and pilot initiatives to support application and visibility.

The region's coastal zones are among the most vulnerable spaces to climate-induced hazards. These areas also experience high levels of development and ecosystem degradation. The Caribbean's coastal zone is an area where a large percentage of its population lives and works, where a significant amount of critical infrastructure, including tourism infrastructure, exists, and where ninety percent of historic towns are located. Beaches are also important spaces for the social and economic well-being of Caribbean islanders, and many communities living in coastal zones rely on fishing or tourism; the impacts of climate change will be profound in these spaces.

Because some local communities have existed in these spaces for several generations, there are a host of survival and traditional livelihood adaptation strategies that could be considered in relation to, for example, early warning systems, surviving amidst coastal hazards, and living in harmony with the coastal environment. The use of such knowledge principles can substantially support ongoing efforts to increase the resilience of coastal communities. An illustration is presented from Guyana, where the re-introduction of past Indigenous practices to coastal communities helped build their resilience to living on the coast (Richards et al., 2023). Likewise, construction companies in the region today are utilizing traditional technologies for prefabricated housing to manage strong winds associated with hurricanes and to better capture rainwater for harvesting for water-poor islands or islands experiencing more frequent drought. Nature-based solutions are also emerging as the way forward for the region.

Specific traditional strategies in coastal areas that can be built on or transferred include observations relevant to the sea, the use of local materials for housing construction, specific ecological care of coastal and even land-based ecosystems which also serve as a source of livelihoods and food resources, and coastal fishing and farming practices. Through these specific strategies, wider coastal planning can be supported through the maintenance of coastal ecosystem defences such as mangroves, coral reefs, seagrass beds, and designated fishing areas.

Another consideration is the use of thatch house construction to manage rising temperatures and the impact of sea salt. These can then lead to specific public awareness or educational activities that encourage respect and consideration for Indigenous and local knowledge as valid and help communities contribute to building resilient coastal spaces.

Traditional knowledge relevant to coastal areas create societal awareness of environmental change and how to respond, in addition to developing knowledge-sharing programmes that focus on local communities as a way of building awareness and promoting a knowledge system in relation to climate-induced hazards. The utilisation of Indigenous knowledge as part of coastal management strategies supports the safeguarding of the ecosystems of the islands of the region. In the area of policy, specific recommendations can be made for the inclusion of these knowledge systems into areas such as coastal zone planning, the development of early warning systems, housing construction, fisheries, water management, and agricultural planning.

The agricultural sector in the Caribbean is the sector that references traditional knowledge and practices the most, although couched as permaculture. Here, traditional land, water, and pest management practices persist, along with ways of planting crops and the types of crops that are grown. These have benefited from a long history of compounded observations. Yet, when modernising the sector is discussed, there is very little focus on how traditional knowledge and practices can be interwoven with agricultural science to innovate in relation to ongoing climate challenges. Farmers however have been known to revert to these traditional practices when faced with environmental challenges and what they know works. Even with these limited integrations, the sector nevertheless remains one of the best opportunities for the promotion of this local knowledge at the policy level and on-the-ground programming. This is perhaps due to the fact that traditional knowledge is most often connected to a rural way of life, and many farmers live and farm in these locations.

In addition to coastal areas, urban areas are also expected to bear a significant portion of the challenges that will arise due to the ongoing effects of climate warming. Higher temperatures,

drought, the unavailability of water, and increases in urban flooding are just some of the challenges that are expected to be exacerbated in the future. In this case, the integration of traditional knowledge practices serves to alleviate some of the issues of quickly expanding urban centres and should be factored into planning policies.

In terms of housing, traditional housing construction techniques are anchored in a respect for nature, are climate-aware, and reflect the culture and tradition of communities, hence providing opportunities for stronger resilience. The construction techniques elaborated throughout this research reflect houses that can better manage rising temperatures, heavy winds associated with tropical cyclones, or have been elevated in ways that mitigate flooding in areas that are prone to such impacts. The materials used were also local and facilitated quick rebuilding and material replacement. The current trend in the Caribbean is that concrete houses reflect socio-economic progression in society, and more traditional or vernacular houses are used by those living at the lower end of this socio-economic spectrum. These ways of thinking require greater awareness to address negative perceptions regarding the application of traditional knowledge and practices to contemporary housing construction, where it is felt that houses will look the same as they did in the past. Instead, the region can be served best through a focus on the strategies, practice, technology and approach in relation to how the building was constructed, or the shape of the roofs can be integrated with modern construction techniques and materials.

In housing construction, builders and architects' associations could be better involved in promoting designs that are in harmony with the Caribbean's environment and its many variations in relation to natural hazards. A useful entry point presents itself through building codes. A World Bank report on building climate resilience in the housing sector (Benavidez, 2021) highlights that many Caribbean islands are quite advanced and have put in place building codes and standards that could manage stronger climate risks. This started in the 1980s with the Caribbean Uniform Building Code, which fed into the earliest building codes of the Eastern Caribbean, and later the Organization of Eastern Caribbean States (OECS) Secretariat developed a model building code based on the work undertaken in the 1980s, with the latest edition dating to 2016. Although these

building codes and standards are useful in considering the integration of traditional knowledge and practices, these are not referenced in pre-existing codes or strategies. However, Benavidez (2021) points out that adopting codes and strategies not unique to the Caribbean context runs the risk of relegating Indigenous or vernacular construction practices to the vulnerabilities of the informal sector and building code development and maintenance processes should entail knowledge of local relevant vernacular construction.

Adger et al. (2013, p. 112) note that formal and informal knowledge systems are not entirely distinct from each other as all are expressions of knowledge that combine formal and informal aspects. Local knowledge systems incorporate elements of scientific knowledge, and scientific knowledge is itself profoundly cultural and inflected by informal knowledge systems (Henderson & Seekamp, 2018). As such, traditional knowledge and practices in relation to severe environmental change provide a foundation for locally appropriate sustainable development solutions, which is an ideal situation for the islands of the Caribbean.

Ethnographic data has revealed that through genuine consultations between the Indigenous communities and practitioners with policymakers, there can be better programming, planning, and policy in relation to projects being implemented in the Caribbean, specifically in the identified sectors, as well as considerations of development impacts informed by Indigenous knowledge. As Caribbean nations face ongoing and accelerated climate change, traditional knowledge bearers and practitioners have a vital role to play in supporting the region's resilience, and the role of the broader culture sector and its various actors remains crucial to facilitating these needed multi-scalar actions.

The approach of combining contemporary Western science and technology and Indigenous and local knowledge should however be more carefully considered. There is a need to recognize the valuable elements that exist in both areas and that there is wisdom in adopting elements from the two. This of course also acknowledges that Indigenous knowledge is not a solution for all issues having to do with climate action. Integrating Indigenous knowledge systems and scientific

knowledge needs to be more deeply examined within the context of the Caribbean. Indigenous knowledge must also be validated to promote its integration and be generated in formats that support understanding and application. For this to be done, it may require articulation in more contemporary ways.

Identifying Synergies and Opportunities for Integrating Cultural Data into Climate Action

Following the areas of concern identified in the previous section, this section reviews the opportunities that exist for bridging the gaps between culture and climate action or to better integrate or align cultural data into climate action frameworks in the Caribbean. It also identifies where synergies might be possible through the frameworks of other fields such as development, tourism, coastal zone management, agriculture, urban planning, or the natural environment.

Within the regional context, for this discourse to be further developed or progress significantly beyond the abstract, the possibility for culture to contribute valuable data needs to be better articulated. Currently, the relationship between the two could be better developed in the climate literature as the methods for studying culture are still primarily narrative based, as suggested by Adger et al. (2013), although this has progressed significantly in the last five years. With this statement, Adger et al. clarify that the focus on the qualitative instead of the quantitative excludes cultural heritage from much of the significant climate change dialogue because of the approach. It is also noted that at times the focus is on nuanced responses to climate change instead of utilising a more data-driven approach. Adger et al. (2013) however acknowledge that occasionally, culture is engaged indirectly through proxy data sets, such as in paleoenvironmental studies. This narrative-based context described earlier is currently where the Anglophone Caribbean finds itself.

Climate action calls for establishing mitigation targets, particularly in reducing greenhouse gas emissions. This means that heritage is often left out in the Caribbean with no specific targets set. While this is an area requiring further research in the region, the culture sector globally has made strides in formulating tangible climate actions and more substantial contributions to the ongoing climate action discourse. Progress made in integrating cultural heritage as a thematic area under the global adaptation goal is an example. Archaeology can add valuable data to this discourse, and

as this dialogue evolves, the heritage community continues identifying opportunities for using cultural data to address climate challenges. This is the path on which the Caribbean must set itself.

While the progress at the international level is evident, regional and national-level discourse that recognises the transversal nature of culture and the possibility of including its data is lacking. This perception is not surprising, as even in post-disaster contexts, it has been challenging to include culture as an area for assessment, much less recognising this transversal role. For example, other sectors form part of this discourse at the national level for climate action, but not culture.

In many islands, heritage practitioners, policymakers, or even Indigenous communities are not empowered to initiate or find pathways into this dialogue. Nor are they clear about what steps to take and the data that might be useful, although more and more useful templates are being developed globally to nurture this intersection. As a further example, while it is acknowledged that Indigenous communities or societies have a long-term relationship observing their natural environment and are constantly utilising forms of ecosystem phenology, responses, and adaptation, their knowledge is infrequently or not at all called upon by societal actors in the Anglophone Caribbean. This means that they are not called upon to share knowledge and to be a part of discourse which identifies ways in which this knowledge can be integrated, used or scaled up or down depending on the local context.

These suggestions are not exhaustive but suggest some areas of convergence that exist or can be visualised. To do this, this section pulls from cross-references within the relevant policy frameworks on climate change and cultural heritage previously discussed in Chapter Two. The goal being to identify those initiatives that demonstrate good intersections between cultural heritage and climate action, as well as actors that bring expertise and are able to engage in this area. As such, this section identifies several key areas in identifying opportunities for synergies in programming across sectors and through national development planning frameworks where they exist. As highlighted by Found (2016, p. 37) “the basis of effective adaptation to the Caribbean’s changing climate is a well-functioning, interconnected system of dynamic relationships and the utilisation of data at all scales.” Although opportunities exist for these synergies, a framework that encourages consultation with the culture sector is required for these to be actualised. In many

cases, the relevant actors have not given thought to how this cross-sectoral approach might be envisioned.

Like climate change, cultural heritage is truly a transversal issue and is relevant to every area of society. As highlighted, one of the greatest opportunities for synergies exists in national development documents, which identify how countries will approach development planning in alignment with the sustainable development agenda. This is examined through various cross-cutting themes and the identification of issues that could derail sustainable development, such as climate change.

The Caribbean Community (CARICOM), which all the independent islands of the Anglophone Caribbean are a part of, has a Regional Culture Policy that was developed in 1994 (amended 1996) and needs a critical update. Because of this outdated status, the policy lacks vital references to disaster risk management, severe environmental instability or natural hazards impacting culture or the changing climate as areas of concern, and synergies with other sectors. While these references are missing, the policy acknowledges that global issues can have a significant impact on the region. In elaborating its context for the regional policy, the document states that it is geared towards the development of a Caribbean person that is “aware of the importance of living in harmony with the environment” (1994, p. 19).

Specifically, under its policy goals for the sub-section on cultural heritage, *Preservation and Protection*, it states “ensuring the necessary legislation is in place to protect and recover patrimony, [as well as providing] for the management and conservation of the region’s cultural heritage.” Under Oral Traditions, it specifically states, “support and encourage research into and analysis of this body of folk-wisdom for the insights it may provide into present individual and social issues.” The policy also seeks “to bring considerations of culture into the assessment of the roles of the various agents of development.” Particularly as it relates to traditional cultural practices, the role they can play in “designing and implementing programmes to deal with health issues and problems” is mentioned (1996, p. 47).

The specific component on *Culture and the Environment* recognises the Caribbean environment as pivotal in the global environmental system, and the role of “our cultural environmental practices

in maintaining our environment and [the place for] cultural considerations and implications in attempting to work out solutions to environmental problems” (1996, p. 49), and the need for culturally accommodating solutions.

However, the only action point of import mentioned is Short/Medium Term Action ‘H,’ which speaks to “Member States becoming signatories to the relevant international conventions concerning the environment.” An update of this policy to integrate important intersections between culture and climate change is needed for the next update of this document or the creation of a new one. However, its authority within a sea of other national cultural policies has perhaps become obsolete, yet it nevertheless presents a joint platform for all regional culture actors responsible for policy to coalesce around addressing regional and or global issues that impact the culture sector regionally, climate change being one of these important themes.

The vital importance of systematic linkages between culture and climate change was also highlighted for the LAC region at the UNESCO World Conference on Cultural Policies and Sustainable Development.¹²² For the LAC region, it was highlighted that cultural policies remained largely vertical and sectoral in their approach. However, there was some impetus to pursue or foster a multisectoral policy that “ventilated the linkages between culture and other areas, such as harnessing culture to support climate action, disaster risk reduction, food security, and enhancing urban and territorial planning through culture-informed models” (2022, p. 5), such as the focus of this research.

Cultural policies in the Caribbean represent a mix and match of priorities of a particular island. Some focus predominantly on the creative economy, while others prioritise the tangible and intangible heritage as being important for the tourism sector. In recent years, the focus has been on the better integration of the creative economy in these documents. As highlighted, national culture policies across the study area are at varying stages of being updated, and present opportunities for the inclusion of these transversal issues in line with global recommendations. Many of the region’s archaeological and built heritage sites are also important to the tourism

¹²² Report of the Regional Consultations in Preparation of the UNESCO World Conference on Cultural Policies and Sustainable Development – Mondiacult 2022

sector, and this is a missed opportunity on the part of the culture sector for more meaningful interaction in relation to climate action at multiple levels.

These areas of convergence can prove valuable to the culture sector, particularly within the context of scarce resources, which the sector is quite familiar with. However, areas of convergence could also diminish the sector's voice, particularly when teamed with sectors with more 'powerful voices,' such as tourism or planning.

The limited inclusion of integrating culture and other policies or sectors is more related to a lack of awareness of the transversal role of culture than to a deliberate attempt not to make the connection. Many cultural policies speak of creating an inter-sectoral approach to cultural development through establishing visible linkages with other key sectors, such as the environment. However, the reality is that these areas have not been fleshed out thoroughly, and neither have actions indicated how to achieve these linkages. A small but meaningful entry point is for the culture sector to lobby for the inclusion of one or two indicators that target climate action in relation to intersections between culture and climate change unique to the sector in question.

As an illustration, Barbados' culture policy specifically mentions the need to research practices surrounding agriculture over the years. It recognises the importance of those practices in designing and implementing modern agricultural programmes (2010, p. 26, currently being updated), and so an indicator to measure this could be the documentation of traditional agricultural practices that support climate resilience.

Culture can be mentioned either explicitly or indirectly in national documents and climate plans. Direct references take the form of clear acknowledgments in these documents, the creation of new initiatives, or the incorporation of culture in the metrics used to evaluate the impacts of climate change or track the consequences of its actions. A location or setting, such as the coastal zone where Indigenous communities still live, also serves as a dual space for the continuation of Indigenous practices and will indirectly reference cultural values. When it comes to sector plans, this is frequently the case when local and or Indigenous knowledge is referenced.

Because national development documents are overarching documents that outline governments' prioritisation and strategy for achieving national development, they normally comprise sub-plans that are developed for each sector and sometimes indicate alignment of prioritisation across sectors. This means that they provide excellent entry points for cultural data in relation to climate action.

In relation to climate change planning, the review undertaken of all National Adaptation Plans and National Communications submitted to the UNFCCC by Caribbean islands revealed that references to cultural data meant referring to traditional and or Indigenous knowledge. This mention is useful, however, no specific actions are indicated, and although cultural data presents interesting entry points, they are presently not being pursued and utilised. The function of National Adaptation Plans and National Communications are useful as pathways for the integration of cultural data due to their goal of pursuing intersectoral alignment and also subjected to the establishment of targets and monitoring indicators. In the present climate change environment of the islands in the region, it might be ambitious to expect that culture will have its own sectoral adaptation plan thereby identifying it as a priority.

Currently, the ways in which culture is referenced in these national documents do not suggest substantive mainstreaming. Instead, they refer loosely to how cultural practices or cultural landscapes might be impacted and say that Indigenous and traditional knowledge *should* be included or was consulted without any clear indicators alluding to their use or how it was consulted for inclusion. This approach is perhaps linked to the inclusion of a specific question in National Contributions on Indigenous people's knowledge, participation, and strategies that State Parties are required to address in their reports.

Although the documents referenced do not outrightly speak to traditional knowledge and cultural practices, they instead refer to examples of sustainable practices, such as in agriculture and water resources and natural resources management. Examples of these include phrases such as: *organic farming to be used, climate-smart practices to be used for the agricultural sector, use of diversified cropping (strip and mixed), use of agroforestry practices, contour farming and grass barriers to manage soil erosion, rainwater-harvesting systems for irrigation, use of old maps in*

identifying natural water systems, using windbreaks, use of traditional pest management strategies, and finally, documentation of traditional knowledge.

Although references to culture are not being widely reported by other countries globally in these types of documents. Countries such as the United States have integrated these elements into their scheduled reporting. In the 2022 study on national adaptation plans in Lower- and Middle-Income Countries (LMIC) referenced in Chapter Two (Daly et al., 2022), it was found that only plans from Brazil, Colombia, Nepal, Palestine, and Sri Lanka specifically mentioned archaeology, and seventeen countries mentioned impacts and or adaptation for generic heritage resources (2022, p. 3).

Recognising this transversal role of culture, UNESCO (2019) drafted proposed indicators under climate and disaster resilience. The checklist for countries to report on in relation to climate adaptation and resilience provides another valuable pathway for the Caribbean to consider, which could support the integration of the culture and climate action framework. This checklist includes:

“The existence of national disaster risk reduction plans for heritage sites or intangible heritage elements; policy documents on the impacts of climate change and natural disasters on heritage; and specific measures on national and local natural heritage sites to reduce the exposure and vulnerability of people and ecosystems to the risks and hazards of climate change” (UNESCO, 2019).

Proposed indicators included *evidence of* “a review of the impact of climate change on heritage within the last five years; a review of the impact of natural disasters on heritage within the last five years; policies and measures to take into account traditional and local community knowledge in assessing the possible impact of climate adaptation on heritage elements and practices; the number of research results on climate change used to safeguard heritage; and policies or actions to reduce environmental impact at heritage sites (UNESCO, 2019).”

Another useful pathway tool to support the culture and climate action nexus in the region is the *Caribbean Climate Online Risk and Adaptation Tool (CCORAL)*.¹²³ This tool is useful for helping those responsible for decision-making to visualise their actions and initiatives through climate lens so that climate-related loss can be minimised. This online platform is an illustration of how a similar online platform can be created that assists persons, particularly those in planning and policy, to visualize climate action through cultural lens and provide a guidance document developed at the island level. For the CCORAL platform, this integration has not transitioned beyond pilot or one-off activities, so it has not yet functioned for systematic mainstreaming. For culture, the required focus would be for robust mainstreaming through specific entry points over the short to long term.

The following paragraphs detail possibilities or actions being taken at the regional level, which can support the integration of cultural data through the inclusion of traditional knowledge or practices. No specific examples were identified that integrate archaeological data.

In 2017, following Hurricane Maria’s devastation of the island of Dominica, the Prime Minister indicated a post-recovery vision of Dominica being the *first climate-resilient country* in the world. The vehicle for this was the national development document and Dominica’s resilience strategy document. Although the resilience strategy speaks to the inclusion of the Indigenous Kalinago people to ensure that they benefit from development actions, their Indigenous knowledge is nowhere referenced as part of the strategy towards becoming the first climate-resilient country in the world. In this case, the Indigenous community is included in vulnerability discussions, but no reference to their knowledge and traditions being a part of the adaptation and resilience narrative.

An example where national priorities seek alignment with its Indigenous peoples is the Aotearoa New Zealand Framework for National Climate Change Risk Assessment, *Arotakenga Huringa Āhuarangi* (2019) which is organised around Indigenous Māori protocols, as well as the “Guidelines

¹²³ <https://ccoral.caribbeanclimate.bz/> Also see <https://www.caribbeanclimate.bz/caribbean-climate-chage-tools/> for other Caribbean Climate Change Tools, and Risk and adaptation tool to help Caribbean water managers | Climate & Development Knowledge Network. <https://cdkn.org/story/feature-risk-and-adaptation-tool-on-the-way-for-caribbean-water-resources>

for Considering Traditional Knowledges in Climate Change Initiatives” (2014) produced by the United States’ Climate and Traditional Knowledge Workgroup (see also Lazrus et al., 2022).

Although CARICOM has a Climate Change Implementation Plan (2011-2021)¹²⁴ and a Declaration for Climate Action (2015),¹²⁵ these documents do not reference culture in any way. At a United Nations Framework Convention on Climate Change (UNFCCC) expert meeting held in Jamaica in April 2007, participants made myriad suggestions in relation to small island states and climate change, such as integrating climate change in development plans at the national level and “*exploring the role of traditional knowledge*” (Ramsay, 2013). Over a decade later, these actions have not materialised in national and regional documents, planning or programming, and the focus has instead been predominantly on insurance coverage and climate financing, to the exclusion of other vital areas for consideration.

Ramsay (2013) also highlighted that the recommendations emanating from that 2007 meeting include “safeguarding Indigenous knowledge and local coping strategies that relate to climate change adaptation [and promoting] projects that link adaptation with improving food security, water availability, and reducing land degradation,” among others. Parallels can be drawn with application of environmental and heritage impact assessments across the study area. These were not mainstreamed until international development and financing partners made them a requirement for development projects. In the same way, development partners can also insist that the integration of cultural data in line with international climate action reporting requirements be considered, which calls for the integration of the best available science.

Many projects being implemented by regional and international partners in the Caribbean’s space target capacity-building through training and data collection and analysis. This also presents an interesting avenue for integrating and applying cultural data in tandem with climate science data. Countries and development partners are working with various Caribbean islands on projects aimed at sustainable development, climate change adaptation or disaster management programmes, or coastal zone projects (Ramsay, 2013). The Caribbean Community Climate Change Centre

¹²⁴ https://cdkn.org/sites/default/files/files/IP_version-verificar-si-final.pdf

¹²⁵ <https://caricom.org/caricom-declaration-for-climate-action/>

(CCCCC, n.d) has also received substantial funding to implement a variety of adaptation projects.¹²⁶ None of these projects, however, have integrated culture in meaningful ways, even when parallels can be drawn in urban planning, agriculture, water management, and coastal zone management, to name a few of the areas where opportunities lie for an integrated framework and based on the work of these agencies. The Global Environment Facility, for example, has been implementing various long-term projects in the Eastern Caribbean which focus on climate change, biodiversity, and land degradation, all interesting opportunities to integrate local knowledge that seeks to observe, assess, and monitor climate change and adaptation in these projects.

Development partners such as the United Nations have supported various initiatives through the work of its agencies. For example, in the region, the Food and Agriculture Organization (FAO, 2017, 2018) supported national adaptation planning in the agriculture and fisheries sector, and the United Nations Development Programme (UNDP) implemented projects that tackle climate change and hazards in communities across the region. In recent years, this agency has implemented projects targeting Indigenous communities in Dominica¹²⁷ through its *Strengthening Sustainable Livelihoods and Resilience in the Kalinago Territory*, which aimed at “strengthening livelihoods and resilience through the focus areas of sustainable agricultural production and practices, designing and implementing community reforestation programmes to protect livelihoods and water catchment areas, developing a gender-sensitive tourism strategy and boosting institutional capacity (UNDP, n.d).”

Other projects¹²⁸ include *Climate Promise* and *Enabling a Gender-Responsive Disaster Recovery, Climate and Environmental Resilience in the Caribbean*, which support leveraging sector-level entry points and upscaling islands’ priority actions, the *Climate Resilient Agriculture for Integrated Landscape Management*, and the project for *National Sargassum Management*. Unfortunately, as is generally the case in many of these projects, there is very little consultation during project design or implementation, which excludes vital opportunities to partner with these communities for the

¹²⁶ See ‘Projects’ at <https://www.caribbeanclimate.bz/>

¹²⁷ <https://easterncaribbean.un.org/en/125423-undp-helping-build-resilient-livelihoods-kalinago-territory>. See also Strengthening Sustainable Livelihoods and Resilience in the Kalinago Territory | United Nations Development Programme.

<https://www.undp.org/barbados/projects/strengthening-sustainable-livelihoods-and-resilience-kalinago-territory>

¹²⁸ <https://www.undp.org/barbados/projects>

documentation of traditional knowledge and practices regarding how these can be enhanced and integrated into projects. As such, very often in the region, practices are introduced from areas outside the Caribbean, which disregards local knowledge and localised context as a bridge between sectors.

UNESCO is another United Nations organization working in the region presenting opportunities for the integration of culture and climate change. Culture is UNESCO's mandate, and recent projects in the area of climate change include the development of a national strategy for the culture sector in partnership with CDEMA, ongoing workshops to bring together culture and disaster management and climate change actors, pilot projects at select world heritage properties throughout the region with the aim to highlight how disaster risk management and climate change strategies have been integrated in to the management of these properties, and finally the development of the not as yet approved CARICOM Plan of Action for building disaster resilience in the Caribbean's culture sector.

The Caribbean Community Climate Change Centre (5Cs) implements much of the region's climate action programming, strengthening of climate monitoring networks, climate modelling, and climate risk assessment tools. This organisation is therefore an important partner in advancing the agenda for the inclusion of cultural data for climate change adaptation and should strengthen its policies and capacity to better engage knowledge from Indigenous and other local communities and the wider culture sector.

Other notable organizations capable of contributing to this space to some degree in the region include the University of the West Indies (spread across several islands), the World Bank, the United States Aid Agency (USAID), the Nature Conservancy, the Centre for Resources Management and Environment Studies (CERMES), the Caribbean Disaster Emergency Management Agency (CDEMA), the Caribbean Agricultural Research and Development Institute (CARDI) and the Caribbean Natural Resources Institute (CANARI). However, actors involved in development must exercise caution to avoid pursuing this work as an extractive data mining process and using and promoting top-down approaches to the exclusion of local and Indigenous knowledge exchange.

CANARI has supported national ecosystem assessments such as the Grenada National Ecosystem Assessment and Report 2023, which emphasises the engagement of a wide range of actors, such as local and Indigenous knowledge practitioners.¹²⁹ The approach utilised is based on inclusiveness being central to effective mainstreaming. Magni (2017) suggests that using scientific knowledge would not be enough to understand socio-ecological relationships, and further states that “historical and practical knowledge of locals is invaluable to the NEA’s success.” As part of the national ecosystem assessment of Grenada, cultural data referenced include the reconstruction of Grenada’s past environment as part of this process. It also details local knowledge that contributes to ecosystem assessment and resilience. The assessment also highlighted the correlation between Amerindian archaeological sites and mangroves or wetland environments, where all eighty-nine recorded pre-Columbian sites are within 500m of a wetland (Hanna, 2018). The assessment further highlighted that many traditional practices persist in Grenadian culture, and many legacies have been retained and are based on Indigenous ecological knowledge (2023, p. 84). It also details local knowledge in relation to Grenada’s ecosystems and climate resilience, and notes that policies that govern ecosystems need to consider cultural data actively, as culture is key to these socio-ecological relationships, and so this Indigenous knowledge and its rights holders must be included in the policy-making process.

Although culture determines our relationship with the natural environment, the processes to support the integration of cultural data and the generation of knowledge from these frameworks are flawed and present many gaps, as they are based on national government agencies and other actors as well as external partners who are not based in a country but are funding projects at the local, national and regional levels and determining research agendas.

The Caribbean Meteorological Organization (CMO) is another regional institution that creates opportunities for programming synergies. The CMO has sought to better integrate the voice of Indigenous peoples in the region through internships, knowledge exchange, climate-smart advisories based on collaboration with Indigenous farmers, reporting on moon phases in bulletins, and encouraging other regional institutions such as the Caribbean Tourism Organization (CTO),

¹²⁹ <https://canari.org/grenada-national-ecosystem-report/>

CARPHA, CDEMA to better integrate Indigenous voices and actions in their processes related to climate action across the region and its various sectors.

The Local Communities and Indigenous Peoples Platform (LCIPP)¹³⁰ was established under the UNFCCC and aims to “strengthen the knowledge, technologies, practices, and efforts of local communities and Indigenous peoples related to climate change response to facilitate the exchange of experiences and the sharing of good practices and lessons learned on climate disaster mitigation and adaptation in a holistic and integrated manner (UNFCCC, n.d).” However, a key component of this platform is supporting a better integration of Indigenous peoples’ voices in the UNFCCC process. The extent to which Indigenous communities from the Caribbean participate in this platform is however unknown, as no answers in the affirmative were received in this regard.

The government of Dominica recently received funding from the Caribbean Development Bank (CDB) for the project *Building Resilience and Adaptive Capacity to Climate Change and Disaster Risk in the Kalinago Territory*¹³¹. As part of the activities for this project, the development of a Kalinago Territory Development Plan and Disaster Risk Management (DRM) and Climate Change Adaptation (CCA) plans are foreseen to include public awareness and materials for the entire Kalinago Territory. Projects such as these are becoming commonplace and provide the opportunity for the inclusion of cultural data and specifically the traditional knowledge of the Kalinago people. This inclusion is, of course, dependent on opportunities being provided for this knowledge exchange to take place in culturally respectful contexts.

Another approach presenting opportunities is the *Reducing Emissions from Deforestation and Forest Degradation (REDD+)* implementation framework¹³² that has been put into action in Suriname. It is an interesting entry point for cultural data with intersections through the ministry with responsibility for land and forestry management, Indigenous communities, and organisations working in this area (see Figure 41). Using the Suriname model as an illustration, there are

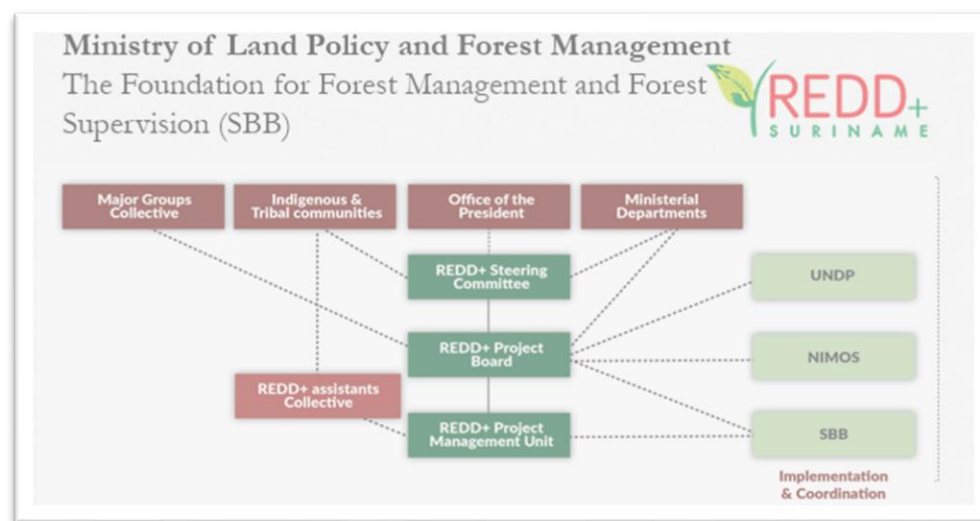
¹³⁰ <https://lcipp.unfccc.int/>

¹³¹ See *Building Resilience and Adaptive Capacity to Climate Change and Disaster Risk in the Kalinago Territory Project* | Caribbean Development Bank. Accessed at: <https://www.caribank.org/work-with-us/procurement/procurement-notices/building-resilience-and-adaptive-capacity-climate-change-and-disaster-risk-kalinago-territory>

¹³² Countries established the ‘REDD+’ framework to protect forests as part of the Paris Agreement. ‘REDD’ stands for ‘Reducing emissions from deforestation and forest degradation in developing countries. The ‘+’ stands for additional forest-related activities that protect the climate, namely sustainable management of forests and the conservation and enhancement of forest carbon stocks.

opportunities for the integration of Indigenous knowledge and practices at many points and for uptake by local, regional, and development partners and mainstreamed into policies and programming at varying levels.

Figure 41. Suriname Model for REDD+ Implementation



Source: Suriname Ministry of Land Policy and Forest Management (See Footnote 133)

The Caribbean region has undertaken actions in various sectors, to include enacting policies and strategies aimed at protecting coastal resources, and mitigating climate-induced hazards such as coastal flooding, storm surges, and hurricanes (Ramsay, 2013). Progress has however been slow in relation to climate disaster risk mitigation and adaptation planning and programming in the heritage sector. So, the natural deduction is if the sector is not generating or utilising its own data, should there be a realistic expectation that it will be taken up by others or integrated with other sectors.

As the vulnerability assessments presented in Chapter Four and numerous other reports on climate change in the Caribbean have suggested, there is a significant amount of vulnerability in the coastal zone, and additional research is needed on interesting starting points for engaging this

dialogue at multiple layers. The safeguarding of traditional industries and livelihoods in coastal areas, local flooding and other coastal effects, as well as heritage being lost and how communities experience this loss, should also be explored.

Additional approaches to integrating cultural data or opportunities for synergies as discussed earlier in this chapter, can centre on the construction industry, where reconstruction needs careful consideration and communication with planning and land use departments. Although culture is presently only included in normative discourse, such as how things should be, the opportunities exist for its inclusion in more meaningful ways. These limited integrations can however be utilised as a starting point to stimulate collaborations among government sectors and engage policymakers, and culture sector actors in developing coherent and meaningful climate action. Moreover, identifying which and how broader government actors define culture can help the sector to mainstream climate action and explore creative and relevant ways to impact society.

Found (2016) writes that the effectiveness of climate action is dependent on the inclusion of more localised response and enhanced through participation at all scales or levels. This means that although adaptation is seen as being planned at the national or island-wide level, for it to be effective, it should be anchored in local and Indigenous knowledge.

Proposed Cultural Pathways

This research does not suggest that *only* archaeology and traditional knowledge systems are useful as cultural data or pathways for climate action but seeks to produce useful actions and tools linking culture and climate change discourse and action in agreeing that the past should be analysed for the present in the Caribbean (Adger et al., 2013; Rivera-Collazo, 2022). Although the amount of archaeological research on climate change has increased in recent years, this work has not made a policy dent, particularly in the Anglophone Caribbean, because there is a substantial amount of policy to influence. Kohler and Rockman (2020) also suggest that few archaeologists meaningfully contribute work that is readily translatable into useful lessons for the present.

From the in-depth study undertaken for this dissertation and based on the analysis of policy documents, the likeliest sectoral pathways for the integration of cultural data seem to be physical

development and planning, agriculture, tourism, and coastal zone management. Joint programming projects would be useful here and should be pursued, which could then support the evolution of policy.

Earlier in this chapter, the limited attention to or mention of culture in climate change frameworks and *vice versa* in the Caribbean was reinforced, and this research has discussed the dissonance at multiple levels. At the level of the culture sector, there is only a discussion about how the changing climate impacts heritage. Missing from this discussion is practical work to identify and mitigate climate-disaster impacts on heritage, as well as discussions on how said heritage can better support climate action. To illustrate this point, Siegel's 2015 work on historical ecology in the Caribbean comprised multidisciplinary collaborations and produced valuable data that was limited in its use by those outside of the heritage field. This limited use suggests that the sector needs to first align itself in terms of generating and applying this data. From the perspective of this research, climate challenges and the need for action, present culture with three areas or opportunities for improved integration and usage of its data:

1. *Policy development and planning* where policy architecture exists and can be adapted to suit the scope and needs of culture.
2. *Partnerships*, where interests and commitments exist for the integration of culture and climate action. This requires cultivating partnership networks with other institutions, actors, and initiatives already engaged in climate action, enhancing existing partnerships with communities, and developing national and regional partnerships.
3. *Programming and capacity development* where the culture sector improves the generation of data at the sector level, creates awareness amongst sector actors, and enables the development of methodologies, tools, and a framework for the development of these pathways at various scales.

This last point leads directly to a central tenet of this research that of low awareness that has guided the poor or limited generation of cultural data that can serve non-culture actors and sectors.

The next level of discordance stems from this limited generation of data for non-culture actors, which results in data not being developed in a relatable or usable format, limited dialogue between

sectors, and poor awareness of any contribution cultural heritage can make. Numerous factors shape this discourse at the local, national, regional, or international levels.

The evidence suggests that although the islands of the region have covered much ground in their climate change reporting, there is still a dearth of national, to include adaptation, plans and climate policies. In that case, it seems natural to deduce that opportunities to integrate cultural data will remain stymied as many of these documents have not been developed and so culture cannot yet be integrated in them. This means that the region is not yet at the place to report meaningfully on how culture is being used. The opportunities remain however to include cultural actions or mentions in documents yet to be or in the process of being formulated, and as mentioned previously, agriculture, planning, land degradation, land use issues, tourism, and coastal zone management are critical entry points for culture in climate action.

Using the data presented throughout this dissertation and in response to the primary research question posed, *how can culturally derived data add value to or be integrated within climate change discourse and action in the Caribbean?* This research proposes four pathways for consideration.

The *first* suggests a ‘Caribbean Heritage in Climate Planning platform’ modelled off the Heritage in Climate Planning Observatory proposed by the HiCLIP project study of the Climate Heritage Network¹³³ but with specific adaptations in methodologies to better capture the heritage and climate action nexus in the Caribbean and based on the region’s specific context and needs. Because the mainstreaming of cultural data in climate change planning requires practical activities to help persons visualise how these collaborations might work and what the data could look like particularly when in use, this could be combined with the development of a tool similar to the CCORAL online platform tool mentioned previously, that would help decision-makers and other actors to visualise climate action at the sector level through culture lens. This action would specifically require significant effort from culture actors, with the inclusion of other actors who could support data generation.

¹³³ Heritage in Climate Planning: A Pilot Project for Understanding the Inclusion of Culture in Climate Actions. Guzman, P. and Daly, C. (2021) *Cultural Heritage in Climate Planning; The HiCLIP Pilot Project for Understanding the Integration of Culture into Climate Action*. A report on the Climate Heritage Network WG4 HiCLIP project. ICOMOS

Beckford (2018) suggested the creation of a *Caribbean Local and Traditional Knowledge Network* to actualise regional climate action objectives through the utilisation of traditional knowledge as untapped cultural capital. By integrating this knowledge with contemporary science, there will be more awareness to promote regional efforts to combat climate change. Such a network would also support the inclusion of the best available science.

The *second* proposed pathway focuses on creating biographies on island climate-related disasters that are connected to the archaeological record and Indigenous knowledge and practices. It suggests documenting archaeological and Indigenous knowledge via cycles of adaptation, by presenting this knowledge and how it is applied in a visually appealing manner. This pathway focuses on the Indigenous and local communities of the Caribbean to illustrate this example.

This biographical approach supports the development of narratives around how the community is *affected* by climate change, what are the many levels of *adaptation strategies* that have been developed which could involve people moving between islands or within communities, as well as the utilisation of social networks, and the movement and procurement of, for example goods, food, and services. The focus here is on how the risk was managed, and what *changes or transformations* could affect adaptation (such as for example monoculture, relocation, interruptions to Indigenous traditions, and loss of land). Constructing such biographies permits a detailed analysis of responses and strategies to a single (a volcanic eruption), ongoing (climate change), or a series of natural phenomena (back-to-back hurricanes over several years) and establishes relationships and correlations. This information can be fine-tuned to support culture-related climate action in any sector.

The *third* pathway (see Figure 42) posits cultural data as leading the climate action discourse by visualising the effects of and adaptation to climate change purely through cultural lens. Here, *the proposed framework* is anchored in the collaborative model of humans and the natural environment (socio-ecological relationship) and their exchanges through space and time (past, present, future) through *human ecodynamics*. It proposes exploring the Caribbean's adaptive framework through its cultural heritage. As an illustration, in this pathway, the information presented earlier on research in Saint Kitts is used as an example and is set off in square brackets.

Figure 42. Adaptive Framework Primarily based on Cultural Heritage

Regional, national, or local vulnerability: *articulated through culture lens* [Project sought to measure the impacts of coastal erosion on the environment using the area's rich archaeological heritage]

Linking prehistoric and historic development and human ecodynamics *to vulnerability and adaptation through time* [specific focus on the archaeological heritage and livelihoods of current communities]

Synergies between cultural heritage and national policies and institutions: *between the formal and the informal: how do/could existing formal policies and strategies (national development documents, resilience strategies, physical development plans, land use and coastal zone planning documents, national conservation spaces/parks; role of local and traditional knowledge in social adaptation* [This project was a collaborative one between the government, civil society, and community members, and it contributed valuable data in relation to monitoring archaeological sites in tandem with local communities]

Integrating culture through archaeology and traditional knowledge, and climate science: *what should a national adaptation strategy look like that's unique (regionally developed) to the islands of the Caribbean, how could this work, and what is the value in utilising the cultural heritage of the region?* [The project generated data that resulted in the creation of a shoreline database to help policymakers make more data-informed decisions, provide an assessment of the state of the coastline, and capture perspectives on coastal erosion to better protect the archaeological record and community livelihoods]

The *fourth* and final pathway elaborated (Table 22) utilises a multi-sectoral approach and demonstrates to policymakers and culture actors the possible intersections and synergies across sectors for integrating cultural data or clarifying the mainstreaming of culture in climate action, although imitations can occur in how cultural heritage is understood and defined. Capacity-building is needed, as well as programming pilots across sectors for practical visualisations at the

local, national, and regional levels. This pathway is meant to be visualised and actualised as progressive steps.

This final pathway depends on intervention at the policy, planning and programming levels. It supports lobbying for policy integrations in relation to culture and climate action and can be pursued at the local and regional levels through the work of Caribbean organizations such as CARICOM, CDEMA, CANARI, 5Cs and other regional or international development partners. As a pathway, it may work best as part of the culture sector's development of data to feed into national consultations for the integration of cultural data into climate action planning.

To advance the dialogue at the regional level and make this knowledge useful in national planning, certain key actions are needed under the recurrent themes of community-based participation, such as those exercised by the DUNAS project in Puerto Rico in direct response to coastal erosion. This initiative provides a good example of a response to climate-induced hazards. It utilizes an academic curriculum structure for obligatory student community service and knowledge transfer and exchange between local and Indigenous knowledge and government approaches in order to support sustainability.

Table 22. Multi-sectoral Pathway for Integrating Cultural Data

Culture or Non-Culture Value	Legislative Framework or Strategy	Generate Cultural data	Partnerships	Create Templates and Methodologies
All forms of cultural heritage	Update outdated heritage legislations, policies and action plans to integrate climate change and climate action	Document useful cultural data relevant to climate action at sector level	Identify non-culture partners for climate action.	Develop good practices and case studies
		Better engage Indigenous and local knowledge for climate action	Pursue multi-sectoral opportunities (i.e. land-use planning, agriculture)	Develop and implement targeted pilot initiatives
				Document learning experiences
	References to culture in coastal zone management plans	Undertake monitoring and assessments of coastal sites to generate data	Partnerships between Coastal Zone Unit, Culture Actors, Local communities, those responsible for coastal ecosystem	Development of Integrated Coastal Zone Plans which utilize multisectoral data

Table 22 (continued). Multi-sectoral Pathway for Integrating Cultural Data

Culture or Non-Culture Value	Legislative Framework or Strategy	Generate Cultural data	Partnerships	Create Templates and Methodologies
Iconic or monumental sites for climate action	Inclusion in the national tourism framework	Generate climate stories in relation to how these sites are impacted by climate change Develop citizen science initiatives around local communities and these sites	Forge partnerships with tourism and other key actors to support these sites	Build public awareness around these narratives
General	National Adaptation Plans or National Contributions	Report on use of cultural data	Various culture partners to generate relevant data for reporting	Develop online platform which allows culture lens to be applied to climate action across sectors to support reporting Data is in a format that is usable by non-culture actors

Source: Developed by Author

The implementation of the REDD+ programme in Suriname encourages the use of pre-existing data (i.e., anthropological, ecosystem services, ethnohistorical) that can be used as complementary data sets. Through *collaborations*, the relevant governance structure is able to recognize and integrate archaeological and paleoenvironmental data with other government research across the natural sciences, such as through extractive industries - oil, limestone quarrying and bauxite - and finally, through *scientific research* in areas such as land use adaption strategies where paleoenvironmental and archaeological data can be identified for specific areas, examining settlement patterns, and participatory mapping of ecosystem services, providing a wealth of data about contemporary and historical land use.

Those in the culture sector can then establish networks related to climate action to establish the connection between archaeological sites, traditional knowledge and areas such as agriculture, biodiversity, and other ecosystems-related areas. In this way, it becomes clear who is doing what in relation to using cultural data to support the development of policy and other needed actions.

Integrating traditional knowledge into climate change policy can result in the creation of practical, affordable, participatory, and sustainable climate action. This approach means that in order to plan for the changing climate through coastal planning, hazard forecasting, and ecosystem utilisation, careful consideration must be given to how best to apply cultural data within a particular context on a larger scale or at the national level. An interdisciplinary process that places a high value on collaboration with the communities and individuals who are the rights holders, owners and custodians of this knowledge must be used to determine what is useful in this situation.

Successful policy creation and execution will depend on collaborations with a few of the major organisations. Existing mechanisms for partnership with communities, practitioners, and other intangible cultural heritage actors should be enhanced or strengthened, and tools and training programmes that assist partners in implementing policy or modifying frameworks to suit local conditions should be developed in conjunction with the policy development process.

CHAPTER EIGHT

A CULTURE-DRIVEN PARADIGM SHIFT IN CLIMATE ACTION

This dissertation has journeyed archaeologically and ethnographically in search of (path)ways in which cultural approaches, through data and processes, can shape and or enrich climate action at the levels of *planning, policy, and programming* in the Caribbean, and specifically in the study area of this research, *the Anglophone Caribbean*.

Archaeological, because the cultural traditions and practices of the past are manifested in the archaeological record; and ethnographical, because these knowledge, cultural traditions, and practices have contextualised this archaeological record, and have been transmitted over generations. Today, they enrich our Indigenous and local knowledge and will formulate the archaeological record of the future.

When this research started, the Caribbean was an understudied area. It remains so, despite the advances that have been made in other regions of the world and increased global references to culture in climate action (Daly, 2017; Fatorić & Biesbroek, 2020). The region is nevertheless slowly awakening to this new paradigm in relation to the intersections between heritage and climate action, and the world wide web has served to bring information and case studies that much closer.

This final Chapter provides a synopsis of this research, delving into the broader contributions and implications, identifying remaining gaps and synergies, highlighting insights in relation to this research, and closing with future research considerations and directions for this study area. As such, previous chapters will be briefly revisited to provide a summary to answer the research questions posed in Chapter One, reflecting on the strengths and weaknesses of a culturally integrated or culturally led approach to climate action in the Anglophone Caribbean.

Region-wide much is said of integrating cross-cutting issues such as gender mainstreaming or a human security approach into development planning, programming, or policymaking. Although

globally there is a robust discussion and thrust by international culture organizations on the integration of culture in climate action and discourse, little mention is made at the local level of culture beyond the creative sector, despite its transversal role in society and human development. Culture is a critical component of how we respond and is thus a key cross-cutting approach in considering climate action.

On the global stage, Caribbean leaders often speak broadly of the impacts of climate change on the region's natural and cultural heritage. However, these words have not resulted in meaningful actions for cultural heritage. Although this cross-cutting approach concerning culture in climate action is an important area, it nevertheless remains an ambitious goal for the Caribbean and one seemingly not ready for consideration in a region still tied up in acknowledging the effects of climate change or pursuing for example, debates solely focused on climate financing.

By saying this, this research does not suggest that these are not important areas for small islands such as those in the Caribbean. However, the very nature of the threat the region faces calls for a multi-dimensional approach, with culture being a key and not a peripheral component. Recent advances in the integration of culture into non-economic loss and damage discourse (UNFCCC, 2024) present an interesting way forward for the region, which has had a strong vocal presence in the Warsaw International Mechanism for Loss and Damage.

While previous chapters presented data from archaeological research, vulnerability studies, and traditional knowledge useful for pursuing societal climate action, their lack of application or integration into a national action framework demonstrates the complexities for non-culture actors in using cultural data. Even within the culture sector in the region, there is little use of evidence-based approaches utilising cultural data for informing plans, strategies, or solutions at the local, site, sector, or national levels. Its recognition and application by non-culture actors will, therefore, be extremely important but challenged and limited.

Throughout this research, the case of the inherent difficulties in incorporating the social sciences into the discourse on climate change in the region was highlighted multiple times. This limitation has been discussed extensively by Adger et al. (2013) and the National Academies of Sciences, Engineering and Medicine (2023). Brace and Geoghegan (2011, p. 64, 285) suggest that a “strictly

scientific paradigm in climate action processes will lead to misalignments and disconnections resulting in vulnerabilities because adaptation is experienced at the local level through the lived historical and cultural experiences of communities within their landscapes.” This approach allows multiple ways of knowing and building socio-ecological resilience. Culture, therefore, offers a useful framework and pathway for gaining access to this knowledge by facilitating the construction of meaning and directing actions to change.

Recapitulation of Chapters and Research Questions

The primary goal of this research was to comprehend and better illuminate how cultural data may be mobilised in relation to decision-making processes related to climate action in the Caribbean by making clearer how these pathways could be established and how they could be visualised.

The primary research question of this study ***how can culturally derived data add value to or be integrated within climate change discourse and action in the Caribbean*** was specifically formulated to capture a study and a journey that demonstrates that regardless of its complexities in the Anglophone Caribbean, cultural heritage does, in fact have much to offer, particularly in terms of how it highlights how society adapted in the past to show that adaptation is possible. It also defines contemporary contextualisations of how we understand the changing climate, define our vulnerability and our adaptation as a result.

Studying the past through the lens of archaeology and traditional knowledge demonstrates strategies that are applicable today in how we pursue climate action at societal levels. These strategies also provide opportunities for innovation in support of climate action. Traditional knowledge also helps to contextualise this data. It highlights the knowledge and practices that have remained in the social memory of communities simply because they are tried and tested solutions and suggest a socio-ecological intimacy honed from years of experience. By examining the vulnerability of the coastal archaeological record, we can deduce the health of our coastal zones and better develop strategies that utilise multiple layers of data in support of coastal health. Finally, cultural data that emanates from and focuses on community-based and driven initiatives contribute to more climate-literate islanders by personalising the experiences of climate change

and loss, as well as making these actions human-centred in addressing anthropogenic climate change.

The primary research and sub-questions presented highlight that the past informs the future and presents opportunities for innovative climate action, recognizing that culture and its processes are not static. The utilisation of archaeological and ethnographic research does not suggest that these are the only cultural pathways to be considered in addressing climate action but posits them as the pathways to be considered within the context of this research's aims.

In Chapter One, the importance of a new paradigm in relation to how we plan for future climate change and climate action in the Caribbean is framed and discussed through a presentation of the issues based on the aims of this research. This context highlights the limited research in this currently understudied area within the independent islands of the historically colonialism-influenced and demarcated Anglophone Caribbean.

The aim of this research was also not to become restricted in discussing the extent to which climate change is affecting and will continue to affect the Caribbean in the future. This context is a foregone conclusion and has been extensively studied and backed by empirical data. Instead, it sought to delve into the little-known research area of identifying culturally driven pathways for climate action to climate change in the Caribbean through the lens of the region's archaeological record and traditional, to include Indigenous and local, knowledge.

Chapter Two, as a background chapter, demonstrated the interesting ways in which culturally derived data is being used globally, with important implications for the Caribbean region and its progress in this area. Understanding how heritage is mobilised broadly and globally is key, as these areas remain understudied and underutilised in the region and thus present good case studies and templates. The use of culture is, unfortunately, tied up in the historical processes that shape the region's contemporary societies. An example being how historical land use and exploitation have influenced the narratives crafted at multiple scales regarding environmental challenges and vulnerabilities and shaped our socio-ecological relationships today, as well as perceptions regarding environmental challenges and changes.

This acknowledgement was further elaborated in a brief discussion on the injustices of climate change, the coloniality of disaster and disaster capitalism, and its manifestations in how vulnerability is approached, particularly for Indigenous and other local communities in the region today. Heritage as a vehicle for climate action was also examined in recognition of the importance placed on building these cultural pathways and using cultural heritage to better bridge gaps between culture and non-culture actors. The opportunities posed by examining how climate change impacts cultural heritage, the varying cultural responses, and attending data present interesting intersections for how community engagement could be pursued as climate-heritage action. This is particularly relevant if one considers the use of culturally derived data in building climate awareness and literacy and in bringing relevant climate heritage and justice actions to the fore.

Chapter Three presented the various theoretical frameworks, concepts, data processes, and methodologies that underpin this research and examined the place of heritage climate justice and heritage for social action narratives in the region.

The theoretical framework of this research centres around an understanding of socio-ecological systems and a discussion of the role of human ecodynamics and cultural data. The application of human ecodynamics allowed the interrogation of a framework that supports a more comprehensive understanding of how the past shapes current and future action within this socio-ecological system. This approach includes an examination of how the past and its actions present themselves through archaeology, tangibly informs us of how persons existed within their environment and adjusted, and how what can be viewed in the archaeological record is being lived by communities today and their landscape dynamics, as posed by the various pathways suggested in the previous chapter.

Including human ecodynamics and the similarly defined historical ecology concepts helped to articulate the role of heritage in resilience and vulnerability and also as a tool for wielding power and disrupting the agency of communities, particularly Indigenous communities. Human ecodynamics provides an interesting way of examining vulnerability and adaptation through time in the Anglophone Caribbean by linking human development with a long-term perspective.

Underlying vulnerabilities and entanglements in how vulnerability and resilience are perceived and even how the words are used, as well as experiences that shaped contemporary responses to climate change, were also examined through concepts such as the coloniality of disasters.

The methodologies pursued reflected the multidisciplinary focus of this research. This included revising numerous documentary texts to clearly show the relevance of archaeological research to climate action, studies, and publications in relation to intersections between climate action and cultural heritage globally and in the region.

This approach required acknowledgment that many past and present research studies are relevant to this topic. This review of various documents is complemented by an ethnographic research component developed and implemented with the support of Indigenous communities in the region, as well as field vulnerability assessments that depend on existing buildings and archaeological heritage inventories.

The central body of research data is presented in Chapters Four to Six, which elucidate how vulnerable our coastal zone is based on the threats being faced by coastal archaeological sites. The adaptive capacity of these sites also sheds light on the health of our coastline and coastal areas and how cultural heritage contributes to knowledge and awareness regarding ongoing and accelerated climate change. The Chapter focusing on vulnerability assessments also extended this analysis of how our archaeological heritage and an understanding of present threats to heritage guides and informs current country-level mitigation responses and strategies in response to climate-induced hazards. Traditional knowledge systems through Indigenous and local knowledge provide critical place-based insights into the changing climate and climate action developed over many years and complement climate scientific approaches by grounding climate action in local expertise, contexts, values and practices.

This dissertation was guided by acknowledging that understanding the vulnerability of systems and resources to climate change as well as how persons adapted to this change in the past are critical steps prior to developing climate action. This area also provided another opportunity to examine the place for community-based and led initiatives, in line with the cultural lens of this research. This provided a valuable basis for discourse on pathways for climate action.

Chapters four to six of the data analysis led to an analysis of ways in which this culturally derived data could be utilised in the region in support of climate action. In this instance, it can be deployed to whittle out meaningful action at the local, national, and regional levels that could enhance present-day Caribbean populations as they did in the past.

Research Insights and Next Steps

The Emirates Declaration of the High-Level Ministerial Dialogue on Culture-based Climate Action acknowledges the threats of climate change to heritage and disruption in the transmission of inter-generational knowledge and practices and the cultural rights of peoples and communities. Added to this are COP28 (2023) and advances in the non-economic loss and damages discourse and the inclusion of cultural heritage as a theme of the global goal on adaptation. These present a new impetus to the integration of cultural heritage in climate action in the Anglophone Caribbean.

For the Caribbean, important next steps include a deeper analysis of the methodology applied in this research to develop and test pathways for action. An observatory, such as a Caribbean Heritage in Climate Planning is needed to support this plan, which looks at how cultural data are included and treated in climate governance. In addition, the culture sector needs to amplify its voice and actions in advocating for cultural data as tools for orienting climate policies and actions to local contexts while actively involving communities. For this to be actualised, the sector needs to get its act together in the region, and more actions are needed to explore the theoretical and practical discourse needed for heritage-based climate action in the region. At present, this is inconsistent to non-existent in the region.

The threats to the Caribbean's coastal areas will increase. Governments tend to respond with planning and policy measures that are historically steeped in processes that create community vulnerability and are top-down. The outcomes demonstrate that governments cannot rely on established planning traditions to integrate culture into climate action. A valuable next step will be the development and testing of the proposed pathways to determine which will be the best fit for the unique context of the region at the national and local levels.

Integrated Coastal Zone Management is one approach that has moved away from this traditional action and seeks to pursue this management in a holistic manner that includes multiple sources of data to inform planning and programming. At present, this wider inter-sectoral collaboration is missing. The present climate crisis has resulted in a sense of urgency in policymaking, calling for simpler and faster decision-making. With this approach, there is limited place for integrated planning processes which include cultural data, which may be seen as complex. This challenge could be seen as a deterrent for non-culture actors responsible for policymaking. As highlighted earlier in this research, many of the Caribbean's capital cities are coastal. They are also historical and so display heritage values. Yet, this is often neglected when pursuing climate action in these spaces.

As this research concludes, one has to continue to grapple with how heritage is viewed in the Caribbean and the sometimes low priority accorded to its safeguarding under different scenarios, the limited resources available, and the fact that policy and legislation in no way address the present realities being experienced by the sector. This research also reflects on the low priority accorded to the sector. In such a setting, one can only wonder if the culture sector can realistically expect cultural data to be integrated even when the pathways are clearly developed.

Reflecting on the responses by some of the communities that helped shape this research, community members noted that natural hazards will always come and will get worse. I also think about what one Garifuna community member said, *we are more developed but less prepared than our ancestors*. Today, the Caribbean is indeed more developed but not necessarily better prepared.

The improved integration of cultural data could also emanate from how adaptation is visualised. Burton (1996) wrote that adaptation could happen through behavioural change or education, research, changing of locations, preventing effects, changing use, modifying events, or bearing or sharing loss. This definition profoundly anchors adaptation as a cultural action.

There is an immense amount of climate change adaptation data available from cultural sources that can be better mobilised. Communities have been responding to the changing climate for a long time, though not at present scales, and past climate change shaped human evolution, landscape transformations, and many of the adaptation strategies that are with us today. Cultural adaptation

is, therefore, climate change adaptation, and there are many lessons from archaeology and traditional knowledge. However, not all communities can draw on this past response. In the Caribbean, there are many cases of disruptions in the transfer of this knowledge and practices through, for example, immersion in popular culture, the impacts of colonialism, and displacement by top-down solutions and approaches.

The perception of natural risks by the first inhabitants of the region is of interest and can bring lessons to our contemporary societies (Lalubie, 2014). Thus, in applying the cultural lens to climate action, archaeology guides us through the perceptions from the past, which became manifested in adaptation strategies in the archaeological record, how this risk is viewed now through vulnerability assessments, and finally, the knowledge of present-day Indigenous communities, our link between the past and the present. The past is decoded to make links with our present perception, particularly as we plan.

It also becomes critical to empower the region's Indigenous and local communities by including their voices in decision-making processes. Documentation of understanding the context of this data and streamlining it through the numerous programmes being implemented at the local and national levels is critical. As the islands of the Anglophone Caribbean continue to grapple with the effects of ongoing and accelerated climate warming, the voices of Indigenous peoples and other local communities provide insights into what environmental and scientific policies and actions are needed to foster resilience across the region. Although no concrete actions and policies have been developed in the Caribbean on the use of archaeological data and traditional knowledge for climate action, this research sought to communicate the value and application of this data as a resource for climate action by promoting useful or concrete examples in the development of climate action and how it can be better leveraged in planning, policy, and programming.

Climate change will continue to unfold on successively larger scales with expanded impacts. Cultural heritage plays a critical role in adjusting to the changing climate. For this to happen, the culture sector must develop and promote a more accessible understanding of cultural heritage that can be brought into conversation with climate action. Models will need to be developed to

support this conversation and provide guidance on how best to integrate cultural heritage into strategies for climate action in the Caribbean.

There are difficulties with these suggestions. According to Douglass and Cooper (2020), Caribbean communities' capacity to develop innovative and sustainable climate action is greatly hampered by the prevailing top-down model of climate policy and the parallel loss and devaluation of Indigenous and local knowledge. In the meantime, safeguarding and reviving intergenerational practices and knowledge can point to possible avenues for climate action. The Caribbean is uniquely positioned to highlight how the past shaped practical strategies for cultural adaptation to the effects of climate change and to expose the global context of environmental injustice for those who suffer the most from it.

Future steps should include a comprehensive review of the literature and the relationship between climate change and cultural heritage in the region, including the actions and extensive documentation of traditional knowledge and practices. This action could better guide the development of policy and programming. Another important future step would be mapping the proxy terms used for cultural data and then considering how these terms intersect with climate change in various documents, at what levels, and where indicators of this engagement might be found.

As documentation improves, it becomes important to develop pilots to test these pathways (entry points for culture) for collaboration in developing climate action for policymakers, practitioners, and others, help orient climate policies and action to consider their local contexts and actively involve local communities, and provide a systematic baseline for the comparative analysis across governance levels and scales and identify good practices. Using visuals as a tool to help communities assess future risk and discuss past and future adaptation, as well as examining how landscapes have been impacted over time, are also important future steps.

The development of a sector strategy for culture amidst ongoing climate change should be pursued as a priority in helping the culture sector generate useful data while being more aware of climate change's effects on the sector. This research's argument for a more explicit inclusion of cultural data can also support the coherency of governance tools and the sustainability of efforts by

tailoring global climate concerns into climate strategies, action, and assessments that consider local contexts and communities such as those existing within small island states.

The interdisciplinary approach posited by this research aimed to make connections between the current understanding of climate action and culture's place in it. It also aimed to overcome some of the cognitive biases at the basis of sectorised planning, which prevent efficient collaborations and, thus, the mainstreaming of cultural heritage and the sector in climate planning. While a future of rapidly intensifying climate-induced hazards is certain, this research highlights several pathways and important considerations that can help us better adapt within the context of our unique local and small island setting.

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Appendix I

National Contributions and Reference to Culture

Island	National Contribution	Submission Year	Reference to Culture and Heritage ¹³⁴
Antigua and Barbuda	NC 3 ¹³⁵	2016	Mentions need to undertake an in-depth assessment of the impacts of climate change on cultural activity. Water challenges noted.
The Bahamas	NC 2 ¹³⁶	2015	The island's culture is mentioned within the context of protecting crabs in the forests of Andros. Bahamas National Trust promotes xeriscaping to increase the use of native plants in landscaping to conserve water.
Barbados	NC 2 ¹³⁷	2018	How climate change will impact foods important to Barbadian culture; permaculture mentioned to be promoted. Impacts on the fishing sector will require altering traditional fishing practices. Improving local knowledge utilized in decision-making is listed as an adaptation option under the tourism sector.
Dominica	NC 3 ¹³⁸	2020	Recognizes climate change as a threat to its unique environment and culture; Mentions climate proofing of the world heritage site of Morne Trois Pitons through its Management Plan, national parks, and forests (2020: 146); a strong tradition of conserving land resources used by the Indigenous peoples dating back to pre-Colombian times and changed with monoculture and now exacerbated by climate change. Using traditional building methods as part of enhancing infrastructure resilience and promotion of sustainable human settlements.
Grenada	NC 2 ¹³⁹	2019	Lists cultural assets and historical values among resources that will be impacted by climate change; mentions adoption of climate-smart agriculture, which uses traditional practices. Fisheries sector is vital to the culture and traditions of many coastal communities; climate change requires a move from coastal tourism to other forms of cultural tourism; cultural factors listed as shaping vulnerabilities.

¹³⁴ Search utilized the following words or stems: *cultur, tradition, indigen, heritage, local knowledge*.

¹³⁵ https://unfccc.int/sites/default/files/resource/atgnc3_0.pdf

¹³⁶ <https://unfccc.int/sites/default/files/resource/bhsnc2.pdf>

¹³⁷ <https://unfccc.int/sites/default/files/resource/Barbados%20SNC%20FINAL%20April%202018.pdf>

¹³⁸ <https://unfccc.int/documents/227871>

¹³⁹ <https://unfccc.int/documents/201190>

Jamaica	NC 3	2018	Small farmers need help to adapt to changes in rainfall patterns brought on by climate change. To cope with the changes, they utilize the rich body of local knowledge available to them. The implementation of future policies and programmes that complement these existing traditional coping mechanisms will be essential in alleviating stresses as well as preventing further degradation of the local knowledge base that supports the survival of these farming communities (2018: 220); Many communities have developed their traditional strategies to adopt to changes, hazards or disasters (2018: 242); beach stabilisation efforts depend on traditional living shoreline structures such as deep-rooted native vegetation such as coconut palm, sea grape, seashore dropseed and panic grass to reduce the rate of beach erosion (2018: 242); A community-based adaptation approach that draws upon local farmer's knowledge and historical context can be instrumental in nurturing the building blocks for resiliency (2018: 11) Loss of archaeological, cultural and heritage attraction sites due to sea-level rise, flooding and hurricanes (2018; 236). For the case study on vulnerability and adaptation, the Greater Treasure Beach Area (GTBA) used, where its cultural heritage assets are listed as likely to be threatened by climate change (2018: 246)
Saint Kitts and Nevis	NC 2 ¹⁴⁰	2016	Adaptation options should be culturally acceptable. They are also listed as an adaptation option: wider adoption and more judicious application of proven, effective, 'traditional' technologies and knowledge. Many vulnerable island communities have had to adapt to weather- and climate-related hazards for generations and, in some cases, have accumulated skills and 'know-how,' which (although considered 'low-tech') have proven to be effective in the past. <i>Examples include (i) the construction of the traditional hipped roof (four-sided), which is resistant to wind damage, including from extreme events like storms and hurricanes (ii) the construction of houses on elevated structures or 'stilts' in low-lying, flood-prone areas as has been practiced widely in Guyana and Belize for generations; and (iii) more effective use of trees and shrubs to provide shade</i> (2016:66)

¹⁴⁰ <https://unfccc.int/documents/64787>

Saint Lucia	NC 3 ¹⁴¹	2017	Loss of cultural heritage from climate change will reduce amenity value for coastal users; disruption of cultural activities; increase knowledge of the environment and cultural factors that affect it to maintain a healthy environment that sustains. To challenge entrenched cultural attitudes, more use should be made of traditional knowledge and folk culture which respected land and nature. Many of the adaptation measures being practiced or promoted are variations of traditional practices that many are familiar with (i.e., rainwater harvesting; agriculture sector needs proper documentation of historical/traditional knowledge (2017:295)
Saint Vincent and the Grenadines	NC 2 ¹⁴²	2016	The vulnerability and adaptation assessment chapter was developed using traditional knowledge, among other sources
Trinidad and Tobago	NC 3 ¹⁴³	2021	Cultural assets could be adversely affected. Resistance to cultural and traditional agricultural practices is listed as a barrier to reforestation and rehabilitation of degraded forested lands; the vulnerability and adaptation assessment and proposed adaptation actions build upon 'local experiences and reflect the views and needs of a range of stakeholders to include Indigenous peoples' (2021:206)

¹⁴¹ <https://unfccc.int/documents/81558>

¹⁴² <https://unfccc.int/documents/141282>

¹⁴³ <https://unfccc.int/documents/416026>

Appendix II

References to DRM and Climate Change in Culture Documents and Frameworks

Island	References to Disaster Risk Management (DRM), Climate Change or Environmental Change
Heritage Legislation	
Antigua and Barbuda	The 2016 Cultural Heritage Protection Bill contains definitions of cultural heritage and under this legislation, the National Parks Authority is responsible for protecting heritage in danger, so it is assumed that climate change and disasters are included as emergencies. The National Parks Act, and the Environmental Protection and Management Act (2019) do not specifically mention tangible cultural heritage. The EPMA states ‘<i>Coordinate the development and implementation of government’s sustainable development, climate change, environment and natural resources management policies and activities</i>’ (2019:x) <i>providing a meaningful entry point for integrated heritage and climate change considerations</i>. The Physical Planning Act (2003) <i>makes provisions for physical development in Antigua and Barbuda to preserve and improve the quality of the physical environment and specifically mentions tangible heritage, but not why it’s important</i>. The Disaster Management Act (2002) does not specifically mention cultural heritage just vulnerable areas.
Barbados	No legislation that only focuses on heritage, although definitions are provided in the Cultural Industries Development Act (2013). The Physical Development Plan 2022 specifically mentions cultural heritage as a stand-a-lone topic and in relation to impacts from the climate crisis. Likewise, the Planning Act 2019 replaces the Town and Country Act and lists culture and heritage as one of its sections however no specific references to climate change or disaster risk management). The National Conservation Commission Act (2000) mentions cultural heritage and its protection and specifically mentions the protection of the seacoast of Barbados from erosion or encroachment by the sea’ (2000:20). The Coastal Zone Management Act (1998) mentions coastal resources and that any area containing archaeological remains or wrecks can be designated as restricted. The Emergency Management Act allows for the designation of vulnerable areas but no details on how plans may affect cultural heritage during disaster emergencies.
Dominica	The National Trust Bill mentions ‘monument to include any building, structure, object, or other work of man or of nature whether above or below the surface of the land or the floor of the sea within the territorial waters of Dominica and any site, cave or excavation’ (1983: section 2. The Physical Planning Act (2002) includes a provision to ‘protect and conserve the cultural heritage of Dominica’ (2002: f). The Development and Planning Corporation Act mentions the ‘preservation of sites and objects of architectural or historic interest’ (1972: section 4). The Emergency Powers (Disasters) Act (1987) does not mention

	cultural heritage either in the designation of vulnerable areas or how it might be affected during disaster response and recovery.
Grenada	The Physical Planning and Development Control Act, No. 25 of 2002 mentions ‘to protect and conserve the natural and cultural heritage of Grenada’ (2002: section e). The Grenada National Trust Ordinance, No. 20 of 1967, mentions that the Trust is a ‘body interested in the preservation of places of historic and architectural interest...’ (1967: Preamble). The National Heritage Protection Act (1990) speaks to the removal of pre-Columbian cultural objects without a permit. The National Parks and Protected Areas Act (1990) declaring protected areas to ‘preserve any historic landmark or any area or object of historic, prehistoric, archaeological, cultural or scientific importance...’ (1990: Section 16). The Emergency Powers Act, No. 17 of 1987 does not mention cultural heritage or how it may be impacted by emergencies. The Planning and Development Authority offers protection to cultural heritage during emergencies through interim preservation, but these focus on development as the emergency.
Jamaica	Jamaica currently has no detailed, specific statement of purpose for protecting tangible cultural heritage. While the Jamaica National Heritage Trust Act delineates the objects of the Trust, Jamaica’s primary heritage authority, this Act does not contain any specific text discussing why heritage values are essential and should be protected. Furthermore, other legislation mentioning cultural heritage contain only broad, vague statements about protecting cultural heritage or natural resources; Forest Act, no. 17 (1996), Article 23(1) (a, i): “(1) The Minister may declare any Crown land to be a protected area if it appears to him to be desirable for the following purposes—(a) protection against storms, winds, rolling stones, floods, landslides; . . .(i) protection of national amenities, flora and fauna”; the Jamaica National Heritage Trust Act and the Natural Resources Conservation Authority Act contain no provisions specifically dealing with how to protect cultural heritage during times of disaster response and recovery. The JNHT legislation is presently being amended.
Saint Kitts and Nevis	While the National Conservation and Environment Protection Act and the National Trust Act state that the identification, protection, and conservation of cultural heritage are objects of their respective Acts, these Acts do not contain any specific text discussing why heritage values are essential and should be protected. Furthermore, the Development Control and Planning Act contains only a broad, vague statement about how the agency will protect cultural heritage. The interim preservation order process in the Development Control and Planning Act authorizes the protection historic sites and buildings in emergencies. Still, these provisions seem more applicable to emergencies during normal development operations rather than a coherent strategy to deal with long-term, large-scale natural disasters.
Saint Lucia	St. Lucia does not have a detailed, specific statement of purpose on protecting tangible cultural heritage. While the St. Lucia National Trust Act, No. 16 of 1975, states that the identification, protection, and conservation of cultural heritage are objects of the Act, it does not contain any specific text discussing why heritage

	values are essential and should be protected. Furthermore, the Physical Planning and Development Act (2005) contains only a broad, vague statement. The Physical Planning and Development Act (2005) authorizes protection of historic sites and buildings in emergencies. Still, these seem more applicable to emergencies within normal development operations than a coherent strategy for long-term, large-scale natural disasters. In addition, while St. Lucia has an Emergency Powers (Disaster) Act, No. 5 of 1995, However, there is likely no detailed outline of how these emergency regulations may affect cultural heritage during disaster response or recovery.
Saint Vincent and the Grenadines	No legislation with a detailed specific statement of purpose on protecting tangible cultural heritage. The National Trust Act (1990) lists the purposes to be served by the National Trust. Still, it makes no statement about why the protection of cultural heritage is critical to the nation's well-being. The National Emergency and Disaster Management Act, No. 15 (2006) grants the government wide-ranging powers to control the access and use of real property through emergency regulations. In particular, the government can declare an area to be an "especially vulnerable area, " allowing it significant control of land-use decisions in that particular space. However, there is no detailed outline of how these emergency provisions may affect cultural heritage during large-scale disaster response or recovery. The Physical Planning and Development Board may also protect cultural heritage in certain situations through building preservation orders. However, emergencies contemplated by the Town and Country Planning Act arise during normal development processes rather than large-scale natural disasters. Thus, the Town and Country Planning Act has no provisions explicitly dealing with protecting cultural heritage during disaster response and recovery.
The Bahamas	No legislation with a detailed specific statement of purpose on protecting tangible cultural heritage. The Bahamas National Trust Act lists the protection of cultural heritage as one of its purposes. Still, it offers no statement about why the protection of cultural heritage is critical to the nation's well-being. The same may be said for the Clifton Heritage Authority Act and the Bahamas Public Park and Public Beaches Authority Act. Furthermore, the Planning and Subdivision Act notes that preserving historic buildings is essential, but that is not why they should be saved. The Disaster Preparedness and Response Act (2006) grants the Prime Minister the power to control the access and use of real property during emergencies, designate especially vulnerable areas, and prepare particular area precautionary plans that may impact cultural heritage. No detailed outline of how these emergency regulations, designations, or plans may affect cultural heritage during large-scale disaster response or recovery. The Minister of the Environment may also protect cultural heritage in certain situations through preservation orders. Such orders, however, derive from emergencies arising during normal development processes rather than large-scale natural disasters. Thus, the Planning and Subdivision Act contains no

	provisions explicitly protecting cultural heritage during disaster response and recovery.
Trinidad and Tobago	No legislation with a detailed specific statement of purpose on protecting tangible cultural heritage. The National Trust Act (1991) lists the purposes to be served by the National Trust. Still, it makes no statement about why the protection of cultural heritage is critical to the nation's well-being. Furthermore, the Environmental Management Act (2000) does not list the protection of cultural heritage as among its purposes, although historic resources would undoubtedly be affected. The Disaster Measures Act, Chap. 16:50 of the 1978 Act grants the government the power to control the access and use of real property through emergency regulations. However, there is no detailed outline of how these emergency regulations may affect cultural heritage during large-scale disaster response or recovery. The National Protected Areas Policy (2011) The National Planning Authority may also protect cultural heritage in certain situations through immediate compliance orders. Still, emergencies contemplated by the Planning and Facilitation of Development Act arise during normal development processes rather than large-scale natural disasters. Thus, the Planning and Facilitation of Development Act has no provisions explicitly dealing with protecting cultural heritage during disaster response and recovery.
Cultural Policies	
Barbados	Specifically mentions the need to research practices surrounding agriculture over the years, recognizing the importance of those practices in designing and implementing modern agricultural programmes (26). ¹⁴⁴
Grenada	In its Section 15 (2012:40) ¹⁴⁵ , specifically mentions protection and preservation of natural environment as an element of cultural development; From time of ancestors, there was appreciation of the need to interact positively with the environment: In cultural history an awareness of the presence of streams and rivers, of building houses on the banks of rivers, of how and where we dispose of garbage; Modern life has made persons less mindful of environment and this has caused havoc on societies during hurricanes and heavy rains; Environmental awareness was basis of engagement in agriculture. Communities knew when and where to plant and when to reap; Must acknowledge that agriculture has been the main source of economic activity of the majority of Caribbean people for centuries and recall that many beliefs, attitudes and practices have grown around it; In search for economic solutions using agriculture, there is a call to look back at old traditions and assess their value in the present. <i>Actions to be taken:</i> Give direction for the collaboration between the Division of Culture and the Ministry of Agriculture to provide incentives for farmers to experiment with traditional

¹⁴⁴ National Cultural Policy for Barbados 2010 (presently being updated)

¹⁴⁵ National Cultural Policy for Grenada 2012 (pending update)

	agricultural practices as solutions to modern sustainability; Encourage schools and community groups in activities related to environmental protection and the cultural practices related to it; Support the preservation of, and, where appropriate, the development of the Rain Forest, Dry Forests and Swamp Lands; Establish a cadre of local researchers with the specific task of researching local traditional foods and their nutritional values and documenting local indigenous knowledge.
Jamaica	Mentions as one of its policy strategies, the promotion of areas of convergence with other sectors such as the environment, and policy goals to leverage culture to drive equitable and sustainable development ¹⁴⁶
Saint Kitts and Nevis ¹⁴⁷	No specific references or intersections
Trinidad and Tobago National Culture Policy 2020 – 2025	Severe environmental challenges and weather patterns are listed as part of the global challenges in the regional context of the policy (10); the sector is threatened by several environmental factors (12); culture is mentioned as a powerful means of exploring and addressing significant challenges such as environmental issues which require addressing individual philosophies and belief systems (27);
Cultural Transformation Policy 2023 - 2027	Definitions of culture; no mention of climate change; details cultural transformation through curriculum enhancement
Management Plans at World Heritage Properties	
Antigua: Nelson's Dockyard	The Disaster Management Plan is a working document, with much of the Tropical Cyclone Preparedness Plan completed. Other sections, such as earthquakes, tsunamis, fire, death, etc., must be completed. The National Parks Authority (NPA) has elaborated a Risk Preparedness and Response Manual specific to the Naval Dockyard. This is being implemented and assists the Park staff in facing natural threats. Specific individual actions are being undertaken in relation to the impact of climate-induced hazards at the property
Barbados: Historic Bridgetown and its Garrison	Chapter on Risk Assessment with a Risk Assessment Register. In 2021 – 2022 climate change part included as draft
Saint Lucia: Pitons Management Area	Needs to be updated to include Risks and Climate Change
Saint Kitts and Nevis: Brimstone Hill Fortress National Park (BHFNP)	Saint Kitts and Nevis has a Climate Change Strategy and a Disaster Risk Strategy, however the BHFNP is not dealt with specifically in either strategy. Also, BHFNP does not itself have a Climate Change or Disaster Risk Management Plan. The Management Plan does not specifically mention this hazard. The National Conservation and Environmental Protection Act 1987 (NCEPA) provides consideration for the protection of the BHFNP; however, it does not provide a

¹⁴⁶ National Policy on Culture and Creative Economy of Jamaica 2017 – 2027 (Pending Cabinet of Jamaica approval)

¹⁴⁷ Saint Kitts and Nevis National Cultural Policy, 2017. Accessed 3 July 2024 at <https://www.culture.gov.kn/wp-content/uploads/2018/08/DoC-St.-Kitts-Nevis-National-Cultural-Policy-SKN-NCP...27.5.18.pdf>

	DRM plan. In 2021 as a part of a UNESCO pilot initiative at select world heritage sites in the region, a DRM and Climate Change Plan and Key Actions was developed. Its implementation status is unknown. Prior to this UNESCO sponsored exercise, there has been no Climate Change Risk Profile or Disaster Risk Profile, or Climate Change/Disaster Risk Management Plan done for BHFNP.
Dominica: Morne Trois Pitons National Park	Sections on Natural Hazards and a Chapter on an Analysis of Issues, which includes climate change
Jamaica: Blue and John Crow Mountains National Park (BJCMNP)	Management Plan does not have a major focus on DRM and Climate Change, however work in forested areas works on building resilience to climate change; acknowledges the need to integrate Indigenous knowledge into the development, planning and management systems of the property; draft DRM and Climate Change being developed by site manager, Jamaica Conservation and Development Trust (JCDDT)
Jamaica: The Archaeological Ensemble of 17 th Century Port Royal	There is a draft Port Royal and the Palisadoes Protected National Heritage Management Plan 2022 – 2027 that addresses climate change and disaster risk management in terms of engaging with the community, the protection and monitoring of all forms of cultural heritage in the event of climate change and other natural hazards

Appendix III

Ethnographic Research Questions

Traditional Knowledge, Practices and Climate Change in the Caribbean

This research project focused on the following Indigenous communities of the Caribbean:

The Garifuna of Saint Vincent and the Grenadines (2) the Kalinago of the Commonwealth of Dominica and Saint Vincent and the Grenadines, and (3) the Maroons of Jamaica (Charles and Moore Towns)

Your answers will help to:

- Understand how climate change is understood and observed by traditional communities
- Understand how communities used traditional knowledge to understand climate change and mitigate and adapt
- Identify the degree of change noted by these communities and how impact is perceived
- Identify – based on the past – what are the important considerations for future climate change adaptation
- How can traditional knowledge and practices be mobilised to better understand and fight climate change or to co-manage the environment?

Please answer the following questions as best as possible.

1. How do you/your community define the natural environment?
2. What does climate change look like to you/your community?
3. How does climate change impact your community?
4. Are there things in the atmosphere, traditional forecasting, plants, and animals that you/your community use to identify severe changes in the environment/extreme weather events?
5. Do these help you to know when to plant, sow, harvest, fish, what kind of fish, how to construct a particular dwelling?
6. Is there traditional knowledge about natural environmental disturbances that are only transmitted orally or through rituals?
7. Are there plants or activities used to restore balances in nature or between human and nature
8. Have you noticed the following changes? If yes, what is the community/individual response to this change? What is the cause:
 - *Less fish/marine life; Habitat damage/less vegetation; Sea-level change; Disappearance of certain flora/fauna; Change in coastal areas (to include coastal erosion); Increased*

incidences of flooding, rain, historical flooding events; Significant increase in pests; Unpredictable seasons, bad weather; Higher temperatures

9. Have you noticed an increase in severe weather events or flooding? What is being done to manage these impacts?
10. What changes have you made in your communities and your ways of doing things in relation to droughts, flooding, hurricanes, coastal erosion, coastal flooding?
11. Are you aware of any time in the past when your ancestors or communities had to relocate from coastal areas and why?
12. Have severe weather systems or any other reasons influenced where or when you do your farming or fishing?
13. What are the historical practices which helped assure your/your community's food security or water, forest, and fire management?
14. What are the traditional practices used by your ancestors worth reviving which could strengthen how you adjust to these climate changes (i.e., better relationship with biodiversity and natural resources)?
15. Have any of your traditions changed or been altered because of climate change, seasonal changes, changes to the natural environment?
16. Are there practices linked to locations that had to be relocated due to changes to the natural environment
17. What can be learnt from how things were or are being done by your community in response to these changes (farming, housing construction, water conservation etc.)?
18. Are there any practices done by your ancestors that you still utilize in relation to the natural environment?

This original list of questions presented above were discussed with the Caribbean Amerindian Organization (CAO) and representatives from the various communities participating in this study. The feedback allowed a whittling down, eliminating, or merging of questions into five central questions:

1. What do you think climate change is and how does it impact you and your community?
2. Are there any knowledge, practices, and strategies that you recall your ancestors using to deal with these changes (communities were further prompted in relation to the chosen areas after giving initial responses)
3. Are any of these still being practiced by you or your community today?
4. Are any [knowledge, practices and strategies] relevant if there is an increase in these challenges for the future?
5. Do you believe traditional knowledge is useful for adjusting to climate change

Appendix IV

Summary

This study contributes to the present discourse on climate action in the Caribbean through the lens of cultural heritage. It seeks to identify the place for cultural data in climate action in the Caribbean through understanding cultural pathways based on archaeological and ethnographic research. As such, it looks at archaeology from the perspective of adaptation strategies from the past, evident in the archaeological record today and in ethnographic data. It interrogates this knowledge passed down through time, which contributes to the archaeological record of the future. By examining the types of data that can emerge from these areas, it undertakes a deep dive into how this data could be integrated into wider climate action responses and strategies. As such, it seeks to connect actions to achieve goals in relation to policy, planning, and programming.

This research presents and zooms in on cultural pathways as a framework and a process that is transformational and multi-actor in its orientation. In doing so, it suggests that the pathways include multiple actors with conflicting goals, interests, and contested values, and also as a metaphor for broad directions of change that represent different strategic aims. The outcome of this study identifies how this data is of value to the system and how it could be better integrated. Cultural data is used because culture is who we are and guides how we respond. As such, it should be better articulated as a point of value in national processes tackling global change, such as the climate crisis. The primary goal of this research is thus to better comprehend and illuminate how cultural data may be mobilized in relation to decision-making processes related to climate action in the Caribbean by making clearer how these pathways could be established and what they would look like.

To chart this pathway, this research undertakes a journey by first discussing the challenge. It highlights the limited research in this understudied area in the Anglophone Caribbean in identifying culturally driven pathways for societal adaptation to climate change through the lens of the region's archaeological record and Indigenous and local knowledge. To anchor this study, a review is

necessary of the demonstrated ways in which culturally derived data is being used globally with specific implications for the region, particularly in relation to the injustices of climate change and the coloniality of disaster and disaster capitalism, and its manifestations in how vulnerability is approached, particularly for Indigenous and other local communities. Heritage as a vehicle for social climate action was also examined in recognition of the importance placed on building these cultural pathways and using culture to better bridge gaps between culture and non-culture actors. In addition, the opportunities posed by examining how climate change impacts culture, the varying cultural responses, and attending data present interesting intersections for how community engagement could be pursued as climate-heritage social action. This approach is particularly relevant if one considers the use of culturally derived data in building climate awareness and literacy and in bringing relevant climate heritage social and justice actions to the fore.

The theoretical framework of this research centres around an understanding of socio-ecological systems and a discussion of the role of human ecodynamics and cultural data. The application of human ecodynamics allows the interrogation of a framework that supports a more comprehensive understanding of how the past shapes lived experiences within socio-ecological systems and relationships in the region. This concept articulates the role of heritage in resilience and vulnerability and as a tool for wielding power and disrupting the agency of communities, particularly Indigenous communities. Human ecodynamics provides an interesting way of examining vulnerability and adaptation through time in the Anglophone Caribbean by linking human development with a long-term perspective.

The research data presented elucidate how vulnerable the Caribbean's coastline is based on the threats being faced by coastal archaeological sites. The adaptive capacity of these sites also sheds light on the health of our coastline and coastal areas and how culture contributes to knowledge and awareness regarding the changing climate. The Chapter focusing on vulnerability assessments extends this analysis of how our archaeological heritage and an understanding of present threats to heritage guides and informs actions and strategies against climate-induced hazards. By incorporating traditional knowledge, our responses become more robust and support more sustainable and people-centred solutions to the threat posed by the climate crisis.

This area also provided an opportunity to examine the place for community-based and led initiatives, in line with the cultural lens of this research, which provides a valuable basis for discourse on pathways for climate action. Cultural data that emanate from and focus on community-based and -driven initiatives contribute to more climate-literate islanders by personalizing the experiences of climate change and loss, and by making these actions human-centred in addressing anthropogenic climate change.

Samenvatting

Dit onderzoek wenst bij te dragen tot de huidige regionale gedachtewisseling betreffende de planning van aanpassingen aan de klimaatverandering in het Caribisch gebied, gezien door de lens van het cultureel erfgoed. De plaats van culturele elementen in de klimaatmitigatie in het Caribisch gebied wordt in deze studie bepaald door het begrijpen van culturele trajecten gebaseerd op archeologisch en etnografisch onderzoek. Als zodanig beschouwt dit onderzoek de archeologie vanuit het perspectief van aanpassingsstrategieën uit het verleden, aantoonbaar door thans bekende archeologische vondsten als wel etnografische gegevens. Deze studie bevraagt de kennis die door de tijd heen is doorgegeven en bijdraagt tot het archeologisch erfgoed van de toekomst. Door de verschillende soorten gegevens afkomstig uit deze onderzoeksvelden diepgaand te bestuderen, analyseert deze studie hoe deze gegevens kunnen worden geïntegreerd in veelomvattende acties en strategieën op het gebied van klimaatmitigatie. Op deze manier probeert dit werk klimaatacties met betrekking tot beleid, planning en programmering te verbinden.

Deze studie presenteert en brengt culturele trajecten in beeld als structuurkader en als een proces dat in oriëntatie naast transformatiegericht te zijn, veel participanten telt. Hierbij wordt aangegeven dat de verschillende trajecten meerdere actoren omvatten met tegenstrijdige doelen, belangen en omstreden waarden, en ook dienen als een metafoor voor de veelomvattende veranderingstendensen die de verschillende strategische doelen vertegenwoordigen. De uitkomst van dit onderzoek bepaalt hoe deze gegevens van waarde zijn voor het systeem en hoe dit beter kan worden geïntegreerd. Culturele gegevens worden gebruikt omdat cultuur betreft wie we zijn en dus bepaalt hoe we reageren. Met andere woorden, dit zou beter uitgesproken moeten worden als een punt van waarde in de nationale processen om mondiale veranderingen zoals de klimaatcrisis aan te pakken. Het primaire doel van deze studie is dan ook het beter begrijpen en verhelderen hoe culturele gegevens kunnen worden gemobiliseerd met betrekking tot de besluitvormingsprocessen rond klimaatactie in het Caribisch gebied door duidelijker te maken hoe deze trajecten tot stand zouden kunnen worden gebracht en hoe ze eruit zouden zien.

Om dit traject in kaart te brengen, definieert de huidige studie allereerst de bestaande uitdaging. Zij legt de nadruk op het beperkte onderzoek van dit onderbelichte terrein in het Engelstalig Caribisch

gebied door cultureel gestuurde trajecten te identificeren die dienen tot sociale aanpassing aan de klimaatverandering door de lens van het archeologisch erfgoed van de regio naast Inheemse en lokale kennis. Om deze studie te verankeren, is een overzicht noodzakelijk van de aantoonbare manieren waarop cultureel afgeleide gegevens wereldwijd worden gebruikt met specifieke implicaties voor de regio, speciaal in verband met de onrechtvaardigheden van klimaatverandering en het onheil gerelateerd aan de kolonialiteit en het rampenkapitalisme, en hoe de uitingen ervan zoals kwetsbaarheid wordt benaderd speciaal met betrekking tot Inheemse en lokale gemeenschappen. Erfgoed als middel voor sociale klimaatactie is ook onderzocht, hierbij het belang erkennend dat gehecht kan worden aan het opbouwen en gebruik van deze culturele trajecten naast het gebruik van cultuur om de kloof tussen culturele en niet-culturele participanten beter te overbruggen. Bovendien bieden de mogelijkheden gevormd door het onderzoek naar hoe cultuur beïnvloed wordt door klimaatverandering, de verschillende soorten culturele weerklank en de begeleidende gegevens belangwekkende snijpunten voor hoe gemeenschapsbetrokkenheid beoefend kan worden als klimaat en erfgoed gerelateerde sociale actie. Deze aanpak is specifiek relevant wanneer men het gebruik van cultureel afgeleide gegevens ten aanzien van het opbouwen van klimaatbewustzijn en klimaatgeletterdheid in acht neemt en toepasselijke klimaat en erfgoed gerelateerde sociale en justitiële acties onder de aandacht brengt.

Het theoretisch kader van dit onderzoek concentreert zich rond het begrip van sociaalecologische systemen en uiteenzetting van de rol van de menselijke ecodynamiek en culturele gegevens. De toepassing van de menselijke ecodynamiek maakt gebruikmaking van een kader mogelijk dat een omvangrijker begrip van hoe het verleden ervaringen binnen sociaalecologische systemen en verwantschappen in de regio heeft vormgegeven. Hierbij wordt duidelijk de rol van erfgoed in zowel veerkracht als kwetsbaarheid bezien en tevens als instrument voor het uitoefenen van macht en het ontwrichten van de werking van gemeenschappen, speciaal die van Inheemse bevolkingen. De menselijke ecodynamiek biedt een belangwekkende manier om door de tijd heen kwetsbaarheid en aanpassing in het Engelstalig Caribisch gebied te bestuderen door de menselijke ontwikkeling te koppelen aan een langetermijnperspectief.

De gepresenteerde onderzoeksgegevens verduidelijken hoe kwetsbaar de kustlijn van het Caribisch gebied is gebaseerd op de bedreigingen die archeologische vindplaatsen langs de kust ervaren. Het aanpassingsvermogen van deze vindplaatsen werpt ook licht op de gezondheidstoestand van onze kustlijn en kustgebieden en hoe cultuur bijdraagt tot kennis en bewustzijn betreffende het veranderende klimaat. Het hoofdstuk dat gewijd is aan kwetsbaarheidsbeoordeling breidt deze analyse uit van het archeologisch erfgoed en begrip van de huidige bedreigingen naar hedendaagse klimaatmitigatie en strategieën tegen klimaat gerelateerde gevaren. Door traditionele kennis te integreren worden onze reacties robuuster en ondersteunen ze duurzamer en mensgerichter oplossingen voor de dreiging die uitgaat van de klimaatcrisis.

Dit onderzoek verschaftte ook de gelegenheid om gemeenschapsgebaseerde en -geleide initiatieven rond klimaatactie met een culturele inslag te bestuderen. Door de ervaringen van klimaatverandering en verlies te personaliseren, dragen deze initiatieven bij aan het bewustzijn van de meer klimaatgeletterde eilandbewoners waarbij tevens de mens bij deze acties meer centraal wordt geplaatst.

CURRICULUM VITAE

Andrea Richards is an archaeologist from Jamaica and Barbados in the Caribbean, specializing in heritage and emergencies. She obtained her Bachelor of Arts degree in History and Archaeology from the University of the West Indies Mona Campus and holds a Master's degree in Public Archaeology from the University College London's Institute of Archaeology, where her thesis research focused on the attitudes of the Jamaican public towards its archaeological heritage. Andrea has worked throughout the region as an archaeologist and is presently a lecturer in archaeology at the University of the West Indies Cave Hill Campus. She has also worked in varying roles for UNESCO at its headquarters in Paris, Jordan, the Regional Office for Southern Africa, Brasilia, and the Caribbean, focusing on both tangible and intangible heritage. Her most recent engagements have focused on heritage impacted by emergencies, including the climate crisis. Andrea's interest in using heritage as a system and tool for climate action and her project work on the place for intangible heritage in managing the impacts of natural hazards led her research toward the place for cultural heritage in addressing severe environmental change. This interest also formed the subject of her doctoral dissertation at Leiden University under the Caribbean Transdisciplinary Research Project. She has provided a number of presentations in public and professional settings and participated in outreach activities that highlight the impact of climate-induced hazards on the Caribbean's heritage and the importance of pursuing frameworks which integrate cultural data in climate action.