Perceptions of climate change and climate change policies within the tourism sector in Mauritius

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Abstract

Tourism in small island developing states (SIDS) is particularly vulnerable to climate change. The phenomenon is predicted to reduce the demand for tourism in SIDS as temperatures at these destinations become uncomfortably hot and temperate destinations close to tourists' countries of origin become more appealing. Climate change is also expected to have significant economic implications for the tourism industry in island nations due to sea level rise, storm surges and more intense cyclones which can damage coastal infrastructure, disrupt tourism operations, contribute to environmental degradation and create a less attractive image of the destination. These impacts may be reduced through a planned adaptation approach which is guided by national policies and mediated by authorities. However, the complex and uncertain nature of climate change requires more than only expert opinions to ensure that implemented policies are effective.

Tourism is the most important export-oriented economic activity in Mauritius. However, rapid tourism development has led to environmental degradation in coastal areas. Climate change is predicted to exacerbate these conditions and further deteriorate the environmental attributes on which tourism depends. This research examines the climate change risk perceptions among stakeholders within the tourism sector in Mauritius. It also explores their perceptions of the public policies which guide the management of climate change impacts, their policy preferences and the factors which they view as barriers to an effective approach to climate change.

A conceptual framework based on the literature on risk perceptions was developed to guide this research and a mixed method approach comprising a self-administered survey and semi-structured interviews was adopted for data collection. Information was gathered regarding stakeholders' level of concern about climate change, their past experience of climate change impacts, sources of information, levels of trust in institutional responses, and their preferred approach to managing climate change impacts.

Results revealed that climate change is perceived as representing significant risks for Mauritius, both for the participants on a personal level and for the tourism industry. Climate change is viewed as a phenomenon which leads to unpredictable and potentially fatal consequences, and

therefore, as having high catastrophic potential. Past experience and a lack of confidence in government institutions' capacity to successfully manage the impacts strongly influenced these perceptions. Stakeholders' preferred policy options included education, raising awareness, stricter regulations for environmental conservation and mitigation of greenhouse emissions. The majority of participants demonstrated a lack of awareness of the importance of adaptation in Mauritius, and therefore viewed the current institutional approach, which appropriately focuses on adaptation, as being inadequate or insufficient. It is recommended that communication among tourism stakeholders is strengthened and information about adaptation is disseminated to stakeholders through sources perceived as being credible.

Keywords: climate change, tourism, risk perceptions, policy, Small Island Developing States, Mauritius.

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List of Abbreviations

AHRIM	Association des Hôteliers et Restaurateurs de l'île Maurice (Association of hoteliers and restaurateurs of Mauritius)
CCCCC	Caribbean Community Climate Change Centre
GDP	Gross Domestic Product
GHG	Greenhouse Gas
IOC	Indian Ocean Commission
IPCC	Intergovernmental Panel on Climate Change
NAMA	Nationally Appropriate Mitigation Actions
SARF	Social Amplification of Risk
SIDS	Small Island Developing States
SPREP	Secretariat of the Pacific Regional Environment Programme
TPI	Tourism Penetration Index
UNEP	United Nations Environment Programme
UN-OHRLLS	United Nations Office of the High Representative for the Least developed countries, Land-locked developing countries and Small Island Developing States
UNWTO	United Nations World Trade Organisation
VMCA	Voluntary Marine Conservation Area
WMO	World Meteorological Organisation

Chapter 1 Introduction

The detrimental effects of climate change on tourism in Small Island Developing States (SIDS) are expected to substantially increase in the coming decades. In these countries, tourism is at risk mainly because the industry's infrastructure is often concentrated along the coast and its operations heavily depend on environmental attributes such as the quality of beaches and reefs. Being low lying with long coastlines, most SIDS are especially susceptible to beach erosion and storm surges which may result from climate change-induced sea-level rise and more intense and frequent cyclones (Belle & Bramwell, 2005). For many SIDS, climate change impacts on the tourism industry may lead to serious consequences for their national economies.

Mauritius is an island nation located in the Indian Ocean which forms part of the SIDS and has a booming tourism industry. While about half a million tourists visited Mauritius in 1994 (Statistics Mauritius, 2015a, p. 11), this number has doubled over the last twenty years to reach about 1.15 million tourists in 2015 (Statistics Mauritius, 2016a, p. 1). In addition to generating more income, the growing tourist numbers are leading to the development of increased coastal infrastructure, thereby also increasing the number of assets which are potentially at risk of climate change. To ensure its economic sustainability, it is therefore crucial for the tourism industry of Mauritius to build its adaptive capacity.

Adaptation to climate change is the process of adjusting, individually or collectively, to observed or expected climatic variability, including extreme weather events, to reduce the vulnerability of a system, a community or a region. It entails behavioural and institutional changes to reduce potential impacts of climate change as well as to benefit from opportunities which may arise from the changing conditions (Huq, Rahman, Konate, Sokona, & Reid, 2003). In practice, adaptation is a cross-sectoral, multi-scalar and dynamic process for which a conducive policy environment at the national level is crucial. Through appropriate public policies, government agencies have the ability to facilitate adaptation (Becken & Hay, 2007).

The complexity and uncertainty associated with climate change require public policies to be adaptive as well. Several researchers argue that technical and expert knowledge, on which the

policy making process conventionally relies, is insufficient for the management of climate change risks. They emphasise the importance of integrating the knowledge and experiences of individuals, organisations and institutions into policy formulation (Brunner & Lynch, 2013; Camacho, 2009; Folke, Hahn, Olsson, & Norberg, 2005). One way to achieve this is through the study of risk perceptions.

Risk perceptions are shaped by various cognitive, socio-cultural, economic and political factors (Dobbie & Brown, 2014). They influence behavioural intentions and are strong predictors of stakeholder engagement with different government policy options (Shi, Visschers, & Siegrist, 2015). This is particularly important for long term, uncertain and intangible environmental phenomena such as climate change. Research into risk perceptions can generate useful information for the management of risks based on the knowledge of stakeholders who have experienced consequences of climate change in the past. Hence, it is necessary to understand risk perceptions to determine the social willingness to mitigate and adapt to climate change, to inform policies and to identify gaps in risk communication.

1.1 Motivation for the study

Research has shown that rapid and unsustainable tourism development in the past few decades has substantially disturbed coastal processes in Mauritius, leading to accelerated beach erosion, damage to marine ecosystems (Duvat, 2009) and therefore, increased vulnerability to climate change. The extent to which Mauritius is successful in building a climate-resilient tourism industry depends on the formulation and implementation of appropriate public policies. The effectiveness of implemented policies in turn depends on the extent to which stakeholders consider climate change as risky, accept the policies and engage with them (E. Wong, Jiang, Klint, Dominey-Howes, & DeLacy, 2013).

Research into stakeholders' risk perceptions conducted in other SIDS has provided meaningful insight into different aspects of the management of climate change impacts. For example, research by Shakeela and Becken (2015) in Maldives revealed that the government, with its short term economic perspective, acts as an attenuator of risk perceptions among tourism leaders. Gössling and Schumacher (2010) found that tourism managers in Seychelles were highly willing to implement mitigation measures and supported the concept of a carbon neutral destination.

Risk perception research in the Pacific islands also identified barriers to climate change adaptation and factors limiting the institutional capacity in addressing the issue (E. Wong, Jiang, Klint, Dominey-Howes, et al., 2013). As a result of an extensive literature review, a gap was identified in research relating to climate change perceptions in Mauritius. Therefore, little is known about the views of stakeholders within the tourism industry with respect to climate change risks, and about their engagement with climate change policies. This study aims to address this knowledge gap.

1.2 Research aim and objectives

This research aims to gain a better understanding of how stakeholders within the tourism sector in Mauritius view climate change and the climate change policies to inform decision-making in the future.

To achieve this aim, this study's objectives are to:

- Explore tourism stakeholders' perceptions of climate change risks and identify the main factors shaping them.
- Explore tourism stakeholder perceptions of the public policies in place to address climate change risks and determine their public policy preferences for climate change management.
- Identify the tourism stakeholder-perceived barriers to efficient climate change mitigation and adaptation.
- Make recommendations to inform future policy formulation.

1.3 Research approach

The multi-dimensional nature of risk perception has led to the development of different theoretical approaches which aim to understand it. According to Helgeson, van der Linden, and Chabay (2012), three theoretical frameworks are most commonly used to understand the perception of risk: the psychometric paradigm (Slovic, 1987), cultural theory (Douglas &

Wildavsky, 1983) and the social amplification of risk framework (SARF) (R. E. Kasperson et al., 1988). These three theoretical approaches have their origins in different disciplines and offer different perspectives on public perception of risk. The psychometric paradigm argues that risk perception is a psychological construct; cultural theory posits that it is socially and culturally constructed and the SARF argues that communication significantly influences perception of risks.

An ideal framework would incorporate the perspectives from the three theoretical approaches (Dobbie & Brown, 2014). In the literature, some authors have developed frameworks which integrate these theoretical frameworks (e.g. Dobbie & Brown, 2014; Harrington & Elliott, 2015). However, none of these frameworks strongly suited the aim of this research. Therefore, a new conceptual framework was developed to understand stakeholders' perceptions of climate change within the Mauritian tourism sector.

This research adopts a mixed method strategy. Purposive interviews were conducted with government officials at the national and regional levels, hotel operators, representatives from non-governmental organisations (NGOs) and academics from two universities. Participants completed a self-administered questionnaire which comprised of Likert and other ordinal scales. Semi-structured interviews were then conducted with the same participants to obtain more in-depth information on the responses to climate change risks, participants' policy preferences and the perceived barriers to the management of climate change risks. The data that was collected was analysed by qualitative methods such as data exploration and reduction to identify the most significant aspects, trends and patterns as well as diverging opinions.

1.4 Outline of this thesis

Including this introduction, this thesis is organised into eight chapters. Chapter 2 provides background information on the vulnerability of SIDS to climate change and the interactions between tourism and climate change. It also describes the history, economy and environment of Mauritius.

Chapter 3 explores the interactions between tourism and climate change through a literature review. The risks of reduced tourism demand in SIDS due to climate change are identified, the

economic implications for SIDS are outlined and current practices in the management of climate change for tourism in SIDS are described with an emphasis on adaptation. The importance of including stakeholder views and risk perceptions into policy formulation for climate change is then highlighted.

Chapter 4 then reviews the literature related to the three theoretical approaches commonly used for studying risk perception. Their application in research about climate change is explored and their strengths and weaknesses are outlined. A conceptual framework is then developed to achieve the second research objective, that is, to identify the factors which shape climate change risk perceptions within the tourism industry in Mauritius.

Chapter 5 describes the methodology used for data collection and analysis, and the sample group interviewed. Chapter 6 presents the findings of this research and Chapter 7 discusses these findings in relation to the theoretical background of risk perception, the conceptual framework developed in Chapter 4 and the broader literature around factors influencing risk perception. Chapter 8 concludes this thesis, makes policy recommendations which integrate stakeholder policy preferences with scientific literature and suggests areas for future research.

Chapter 2 Background

This chapter provides relevant background information to contextualise this research and identify its salient aspects. It is divided into three main sections. Section 2.1 describes how climate change is exacerbating the common developmental and environmental challenges of SIDS and highlights that coastal communities and infrastructure will be the most severely impacted in the near future. Section 2.2 focuses on tourism. It identifies trends within the global tourism industry, describes the three levels of development of island tourism and discusses the relationship between tourism and climate change. Finally, Section 2.3 situates this research within time, location and culture by describing the history, system of governance, population, economy and natural environment of Mauritius. In particular, characteristics of the Mauritian tourism sector and governmental institutions' response to climate change are outlined and provide justification for this research.

2.1 Small Island Developing States (SIDS)

SIDS are a group of 38 countries, and one territory, which share similar environmental and socio-economic vulnerabilities, and which lobby collectively in the international arena. A list of the SIDS is provided in Appendix 1. Although not all SIDS are islands (e.g. Guinea-Bissau, Guyana and Suriname), small (e.g. Papua New Guinea), or developing (e.g. Singapore), most of them are small, remote, coastal masses of land which have limited natural resources, growing populations and fragile ecosystems (UN-OHRLLS, 2011). Due to their geographical locations, many SIDS are exposed to tsunamis, tropical cyclones and the storm surges and floods associated with these phenomena. These features interact to create specific development challenges in addition to those faced by other developing nations.

Predicted environmental impacts of climate change for SIDS include sea-level rise, more frequent extreme weather events, increased average air and sea temperatures, loss of terrestrial and marine biodiversity, and unstable rainfall patterns leading to water scarcity. The extent to which climate change is responsible for producing these impacts cannot be easily quantified in SIDS due to the presence of a series of other anthropogenic pressures on their natural systems (Nurse et al., 2014). However, the Intergovernmental Panel on Climate Change (IPCC) demonstrates high certainty about climate change severely affecting these island nations in the

near future. These impacts are in fact already being observed in varying degrees in SIDS around the world (Nurse et al., 2014).

Due to a number of factors, environmental impacts of climate change can lead to substantial socio-economic consequences in SIDS. Firstly, these countries cannot develop economies of scale due to their small sizes. Secondly, population growth and unsustainable development practices are increasing the pressure on their natural resources. These conditions, in addition to their limited institutional and human resource capacities, restrict adaptation efforts in SIDS (P. P. Wong, 2011). As such, climate change can potentially impact all economic sectors in SIDS. In particular, through more frequent and intense weather events, climate change threatens the populations, settlements, agriculture, and infrastructure, including those associated with tourism, that have been established along coastal areas of SIDS (Nurse et al., 2014).

2.2 Tourism

Tourism is defined as an activity whereby a visitor takes a trip "to a main destination outside his/her usual environment, for less than a year, for any main purpose (business, leisure or other personal purpose) other than to be employed by a resident entity in the country or place visited" (United Nations, 2010, p. 10). According to Scheyvens and Momsen (2008), tourism is "the world's largest industry" (p. 22) and has significantly contributed to the economic advancement of developing countries, especially SIDS (Pratt, 2015; Scheyvens & Momsen, 2008).

Since 2010, the growth rates of international tourism have been exceeding expectations. While the United Nations World Tourism Organization (UNWTO) forecasted an annual growth rate of 3.8% for the period 2010-2020, international tourism increased by 4.4% in 2014. International tourist arrivals peaked at 1.135 billion (UNWTO, 2015, p. 2), and international tourism receipts and international transport services generated around US$ 1.5 trillion (UNWTO, 2015, p. 10). As illustrated in Figure 2.1, international tourist arrivals have more than doubled in two decades. In 2015, international tourism again grew beyond projections at a rate of 4.4%, with 1.184 billion international arrivals (UNWTO, 2016, p. 1). Tourism is a booming economic sector in spite of the slow global economic growth and political instability, as well as health emergencies, in certain parts of the world.

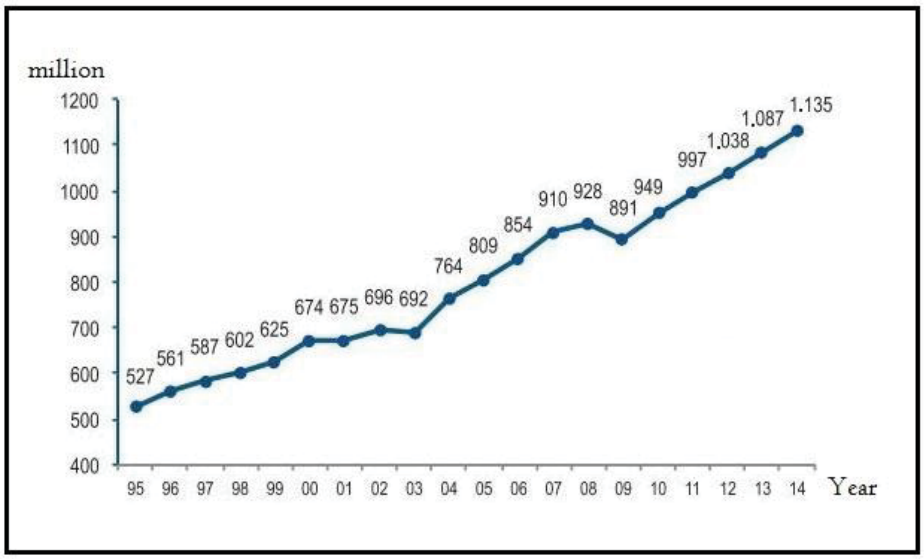

Figure 2.1 International tourist arrivals from 1995 to 2014 (UNWTO, 2015).

In general, islands tend to be associated with the image of sun, sand and sea, and therefore are portrayed as exotic tourism destinations. However, tourism is not a prominent activity in all islands. The development of tourism as an economic pathway in SIDS varies in scale between the different countries. Based on the Tourism Penetration Index (TPI), which utilises parameters such as population density, number of tourists and tourist expenditures among others, island nations' tourism industries can be categorised as being most, intermediately or least developed (McElroy, 2003, 2006, 2015). These categorisations correspond to a mature, rapidly growing and an emerging tourism sector, respectively. Islands in these different groups tend to share similar characteristics, as elaborated in Table 2.1.

Table 2.1 Characteristics of the three levels of tourism development in islands (McElroy, 2015).

Most developed	Intermediate	Least developed
• Heavily dependent on tourism. • Heavily invest in advertising to increase the number of tourists during the low season. • Geographically close to affluent markets such as the U.S., Europe and Asia. • Possess good infrastructure, transport networks and communication services. • Have human-made attractions in addition to natural ones. • Have a large number of cruise ships. • Tourists stay at the destinations for short periods of time (6.6 nights on average).	• Increasing dependence on tourism as their economies diversify from traditional sectors, often due to the loss of preferential markets. • Scale of tourism growing rapidly, especially in terms of infrastructure, transport and other facilities. • Increasing international popularity. • Investment into human-made attractions such as shopping. • Offer a variety of tourism products such as diving, wildlife exploration and ecotourism. • Length of tourists' stays is declining (8.7 nights) as these islands evolve towards mass tourism.	• Economies depend minimally on tourism. Other sectors include agriculture, fishing, spices, farming, etc. • Limited promotion of the island as a tourism destination. • Relatively remote from affluent markets. • Facilities and infrastructure supporting tourism are small-scale. • Have few human-made tourist attractions. • Tourists from cruise ships are very limited. • Tourists stay for longer periods of time at the destination (10 nights).
Examples of SIDS[1]		
Maldives Cook Islands.	Bahamas Seychelles Fiji New Caledonia	Comoros Tuvalu Samoa Tonga

[1] Only islands with less than 1 million inhabitants were considered in the study. Therefore, Mauritius was excluded.

Island tourism is dominated by a small group of overseas territories of developed countries such as St Maarten (Netherlands), Aruba (Netherlands), the UK Virgin Islands, and Bermuda (UK). Most of these overseas territories are located within the Caribbean region and have the most developed tourism industries (McElroy, 2006). The majority of the SIDS categorised using the TPI have intermediately or least developed tourism sectors. However, tourism in Maldives and the Cook Islands has evolved from being intermediately developed to most-developed in only one decade (McElroy, 2015). The TPI values of several other SIDS have also increased over the last decade, suggesting that tourism in many of these islands is expanding rapidly.

SIDS are in fact among the most tourism-dependent countries of the world (Scheyvens & Momsen, 2008). However, while aggressive specialisation in tourism may be the only factor boosting a small island's economy (Scheyvens & Momsen, 2008), it often leads to environmental damage and social disturbances that reduce the quality of the destination (McElroy, 2006). Furthermore, since the economies of SIDS with intermediately developed tourism industries are usually in transition, these islands have the additional challenge of ensuring efficient resource distribution between traditional and rapidly growing modern activities. Consequently, they often experience planning difficulties and face conflicts between stakeholders (McElroy, 2015).

2.2.1 Tourism and climate change

Tourism and climate change share a complex two-way relationship. Tourism is at risk of climate change because climate is an essential resource for tourism. It is both a driver of tourism demand and a requirement for the industry's operations (Becken & Hay, 2007). As such, international tourism demand significantly depends on natural seasonality and on the climate in both tourists' home countries and destination countries (Butler, 2001). Demand is further affected by destination image (Beerli & Martín, 2004), which is also influenced by climate (O'Leary & Deegan, 2005). With respect to tourism operations, a suitable climate is important to sustain the supply of food and water as well as tourism products such as snow cover and marine and terrestrial ecosystems. It is also required to ensure the safety of tourists, especially in cyclone-prone areas such as many SIDS (Scott & Lemieux, 2010). As Scott and Lemieux (2010) argue,

climate is a macro-scale factor which can potentially impact several other macro-scale factors in the tourism system.

At the same time, tourism-related activities are large consumers of fossil fuels and contribute substantially to greenhouse gas (GHG) emissions, thereby exacerbating the risks to the industry (Becken & Hay, 2007). Because tourism involves a wide range of activities, it is particularly difficult to calculate its contribution to global GHG emissions. However, it has been estimated that, in 2005, global tourism activities emitted between 3.9% and 6.0% of global GHG emissions, the majority of which originated from air, car and other transport sources (UNWTO, UNEP, & WMO, 2008, p. 33). According to Scott, Peeters, and Gössling (2010), "if tourism were a country for example, its CO_2 emissions would rank fifth, after the United States, China, the European Union and Russia" (p. 396).

In the short term, CO_2 emissions from tourism activities are expected to increase faster than the industry can evolve towards sustainability. It is estimated that by 2035, CO_2 emissions from global tourism will increase by 161% (UNWTO et al., 2008, p. 33). International tourism is predicted to continue its linear growth and current trends suggest that the number of long haul trips, average trip distance and the frequency of holidays are all increasing. In contrast, the duration of holidays exhibit a decreasing trend, suggesting that tourists are travelling more often and for shorter periods of time. As a result, air transport, which is the most fossil fuel intensive means of transport, is expected to increase substantially (UNWTO et al., 2008).

2.3 Mauritius

The Republic of Mauritius is an African island nation of volcanic origin constituting of several islands, namely Mauritius, Rodrigues, Agaléga and St Brandon. The group of islands is located in the Indian Ocean, about 2,300 km to the east of Mozambique, and about 800 km from Madagascar. In total, the islands have a land area of 2,040 km^2. Covering an area of 1,865 km^2 (Florens, 2013, p. 41) the island of Mauritius is the largest, most developed and most populated island of the republic. It governs the other islands. Figures 2.2 and 2.3 illustrate the geographical position of Mauritius in the Indian Ocean and a map of the island of Mauritius, respectively.

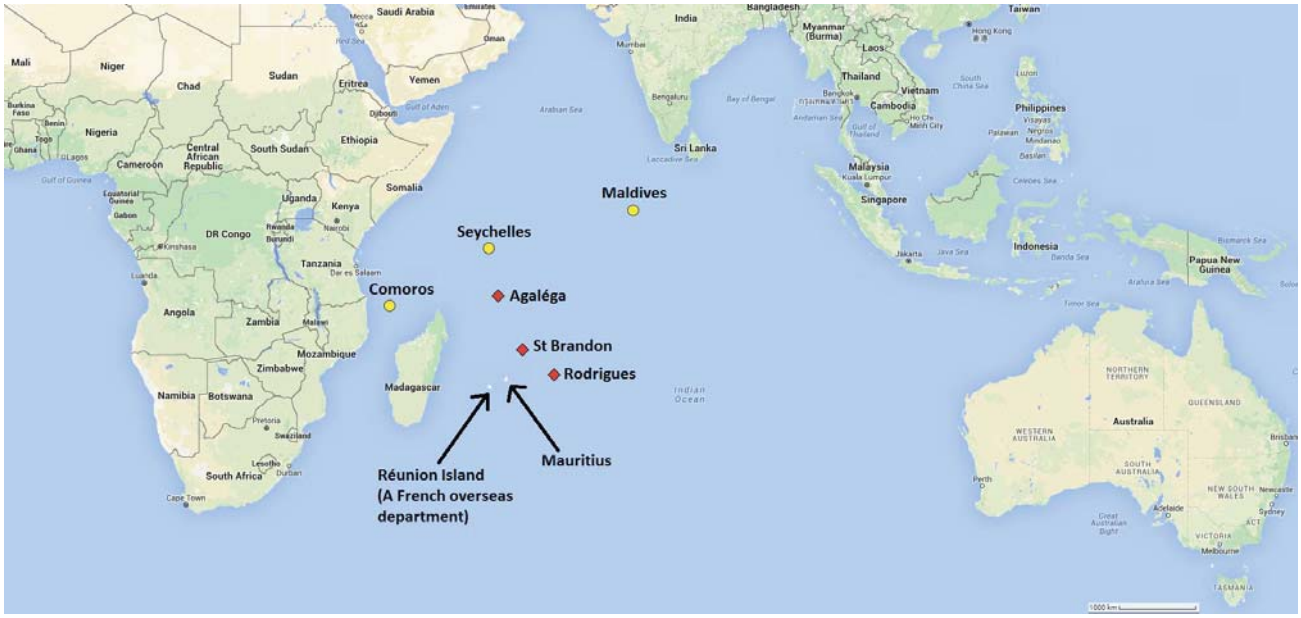

Figure 2.2 Map of the Indian Ocean showing Mauritius, its outer islands (red) and other islands of the region (yellow). Adapted from Google Maps (2016).

Figure 2.3 A topographic map of Mauritius (Mauritius Attractions, n.d.).

2.3.1 Climate and natural environment

Located between the Tropic of Capricorn and the equator, Mauritius enjoys a mild climate throughout the year and shows little variation between its two seasons. From November to April, Mauritius experiences a warm humid summer season with a mean temperature of 24.7°C. January and February are the hottest months with the average maximum temperature during the day reaching 29.2°C. The cooler and drier winter months extend from June to September with a mean temperature of 20.4°C. During July and August, the average temperature during the night can drop to a minimum of 16.4°C. May and October are transition months.

Most rainfall occurs during the summer with February and March being the wettest months of the year. Annual rainfall averaged 2010 mm between 1971 and 2000 (Mauritius Meteorological Services, n.d.-a). Mauritius constitutes a coastal plain sloping up to a central plateau which is between 275 m to 730 m in elevation (Duncan, 2009, p. 621). Coastal regions are drier and warmer than the central plateau due to the difference in altitude. Mauritius also receives South East Trade Winds and is located within the cyclone belt of the Indian Ocean.

Mauritius faces numerous environmental challenges. As a result of forest clearance for agriculture and settlement, the island today retains less than 2% of its native forest cover (Florens, 2013, p. 42), as illustrated in Figure 2.4. Consequently, Mauritius has lost the majority of its rich biodiversity. Most of the surviving species of native plants and animals are found in isolated patches of forest located in difficult to access areas such as mountains and are under some level of threat to extinction according to the IUCN Red List (Florens, 2013). Historic accounts show that the climate of Mauritius gradually became drier and warmer over the centuries (MacMillan, 2000), suggesting that the ecological function of forests to regulate the climate of the island has been greatly reduced due to large scale deforestation, making Mauritius more exposed to external climatic fluctuations.

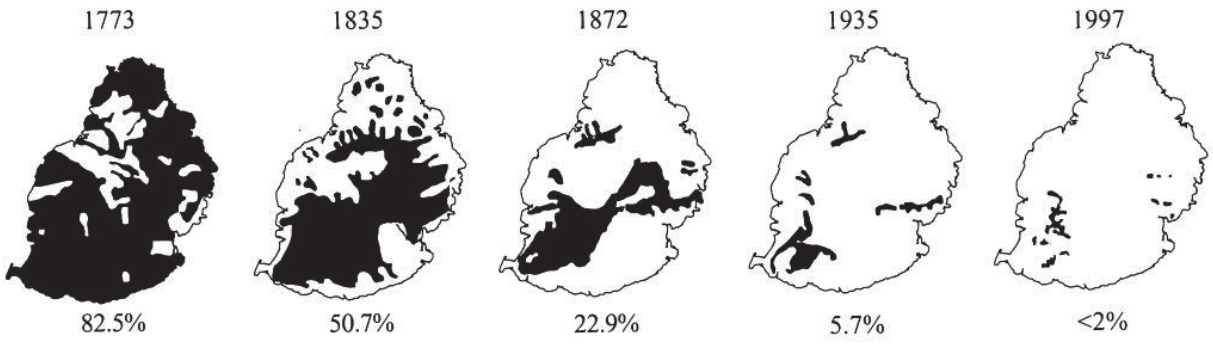

Figure 2.4 Native forest cover in Mauritius (Florens, 2013, p. 42).

2.3.2 History and culture

Mauritius has been occupied by humans for less than 400 years. It experienced three periods of colonisation before obtaining its independence in 1968. The island was first colonised by the Dutch in 1638. Large scale damage to terrestrial biodiversity ensued as they brought slaves from Madagascar to clear the island's indigenous forests for the valuable ebony trees (Frankel, 2010). The Dutch abandoned Mauritius in 1710, leaving behind an ecologically devastated island. They had driven several animal species to extinction, including the dodo, a large flightless bird endemic to Mauritius, making the island an example of human-induced species extinction among the global community of ecologists (Florens, 2013).

Eleven years later, in 1721, the French settled on the island. They cultivated sugar for export and more slaves were brought from Africa for the task. The French occupied Mauritius, then known as Ile de France, for almost a century before losing it to the British in a naval battle in 1810, during the French Revolutionary Wars (Lingayah, 2015). Following the abolishment of slavery in Mauritius in 1834, the British brought indentured labourers from India to expand the sugar industry established on the island by the French. Over a period of 75 years, half a million indentured labourers arrived in Mauritius and sugar cultivation and trade flourished. Mauritius remained a British colony for more than 150 years before becoming an independent nation in 1968 and a Republic in 1992 (Frankel, 2010).

Mauritius is very diverse ethnically. In addition to the African slaves and Indian indentured workers brought to the island by colonisers, people from Europe, East Asia, especially China,

and Africa freely immigrated to the island over the centuries. As a result, the population of Mauritius is multicultural, multi-religious and multi-lingual. However, the two official languages of Mauritius are English and French, a legacy of its colonial past. English is the most commonly used language in official settings and is the means of instruction in public educational institutions. French is used to a lesser extent in official settings, but is predominantly used in the media. The most widely spoken language is Mauritian Creole, which is French-based. Most Mauritians are at least bilingual (Vibha & Singh, 2014).

2.3.3 System of governance

Mauritius is governed through a framework of parliamentary democracy based on the Westminster model. General elections are held at regular intervals, usually every five years, to elect representatives of the unicameral parliament, known as the National Assembly. The leader of the elected political party is then appointed as the prime minister and becomes the head of the government until the next election. However, in cases where a political alliance is elected and forms the government, the leaders of the different political parties forming the alliance may each act as the prime minister for an agreed period of time.

Mauritius has a non-executive president who is appointed by the National Assembly for a five-year term. The National Assembly consists of a maximum of 70 members, of which 62 are elected. The remaining 8 members are appointed according to a system known as the 'best loser system'. The 'best losers' are selected based on their ethnicities to ensure equitable representation of, as far as possible, all the different ethnic groups (The Commonwealth, 2016).

The Government of Mauritius has 23 ministries which are mainly engaged in the formulation and implementation of legal and policy frameworks. The local government is comprised of the City Council of Port Louis, four municipal councils and nine district councils. The district councils administer numerous village councils. The city council and the municipal and district councils are primarily engaged in service provision and maintenance of facilities.

2.3.4 Demographics

According to the latest census data, in 2011, the Republic of Mauritius had 1.233 million inhabitants, of which 1.192 million resided on the island of Mauritius. The island has more

females than males at a ratio of 100 females to 97 males. The latest national census data of Mauritius indicate that the population is increasing at a decreasing rate, and therefore, Mauritius has an ageing population. Nevertheless, between 2000 and 2011, the population of the Republic of Mauritius increased by 4.6%. Figure 2.5 illustrates population increase in the Republic of Mauritius over a century. The growth rate during the same period on the island of Mauritius was slightly lower at 4.3% (Statistics Mauritius, 2011).

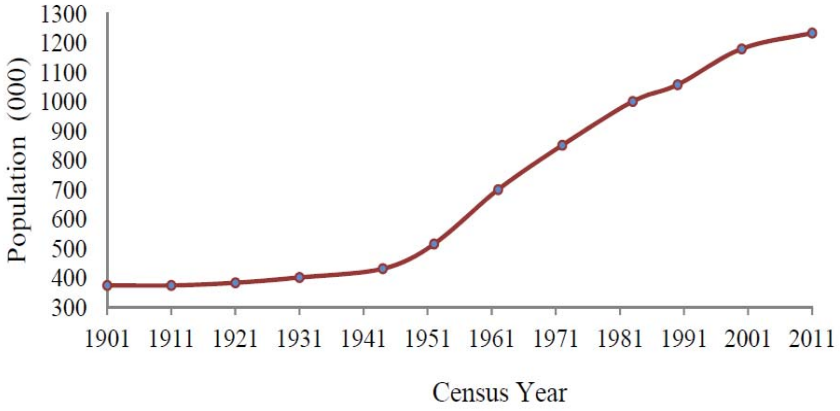

Figure 2.5 Population of the Republic of Mauritius (Statistics Mauritius, 2011).

Its small size and growing population make Mauritius one of the most densely populated countries in the world. With a population density of 621 people/km^2 in 2015, Mauritius ranks as the thirteenth most densely populated country (The World Bank, 2016b). However, 40% of the population lives in urban areas, which represent only 8% of the land. There, the population density is 3000 people/km^2 (Statistics Mauritius, 2011).

Quality of life indicators show that the standard of living in Mauritius is rising. Literacy rates and life expectancy are increasing while the rate of infant mortality is decreasing. However, the unemployment rate is fairly constant at around 8% (Statistics Mauritius, 2016b). According to the UN's Human Development Index (HDI), Mauritius has high human development and is currently ranked 63rd out of 188 countries (UNDP, 2015). Among SIDS, Mauritius ranks 5th in terms of the HDI.

2.3.5 Economy

The rising standard of living in Mauritius is due to its impressive economic performance. In 2014, Mauritius had the most competitive economy in Sub-Saharan Africa (Kalumiya & Kannan, 2015). Following its independence, the country diversified its economy, which was once entirely dependent on sugarcane cultivation, to encompass textiles, tourism, financial services and information and communication technology. A combination of factors contributed to making this transition successful. Political stability allowed the establishment of good institutions which, aided by the ethnic links Mauritius has with China, led to the effective development of an Export Processing Zone. Mauritius has also fully exploited its preferential markets in Europe and India (African Development Bank, 2014). Trade liberalisation led to the erosion of these preferential trade rates and subsequently, to greater development in the services sector in Mauritius.

In 2014, Mauritius had a GDP of US$ 12.6 billion and a per capita GDP of US$ 10,016.6 (The World Bank, 2014, 2016b). Figure 2.6 compares the per capita GDP of Mauritius with other African SIDS and the world over three decades. From 2011 to 2014, the GDP growth rate of Mauritius remained around 3.5% but is projected to slightly increase to 3.7% in 2016 (The World Bank, 2016c). Table 2.2 compares the contribution of the major economic activities to the GDP of Mauritius in 2008 and 2013. Only three groups of activities are demonstrating growth. These are firstly public administration, health, education and social work, secondly finance, real estate and business services and lastly, transport, storage and communication. The services sector is the fastest growing economic sector in Mauritius.

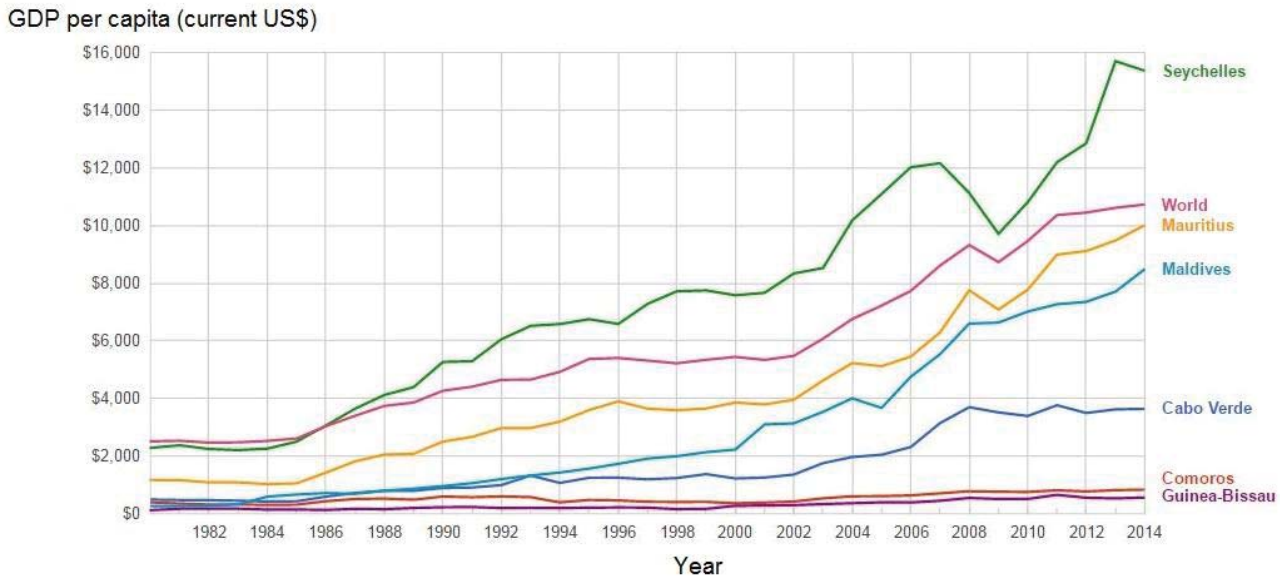

Figure 2.6 Per capita GDP of Mauritius, other African SIDS and the world (Google Public Data, 2016).

Table 2.2 Percentage contribution of different economic sectors to the GDP of Mauritius in 2011 and 2013 (Phiri & Kannan, 2014, p. 4)

Economic activity	2008	2013
Agriculture, hunting, forestry and fishing	4.1	3.4
Manufacturing	19.4	16.5
Electricity, gas and water	1.9	1.5
Construction	6.8	4.8
Wholesale and retail trade	19.8	19
hotels and restaurants	*7.9*	*6.6*
Transport, storage and communication	9.8	10.1
Finance, real estate and business services	21	22.8
Public administration, education, health and social work	5.7	6.6
Other services	11.4	14.1

2.3.5.1 Tourism

Using the TPI, the tourism industry of Mauritius would be classified as being intermediately developed. Tourism is in fact the largest export-oriented enterprise of Mauritius and therefore a major source of foreign exchange revenue for the country. Tourism exhibited positive growth rates in 2014 and 2015 (Statistics Mauritius, 2015b). Although Table 2.2 shows that the contribution of hotels and restaurants to GDP has decreased from 2008 to 2013, tourism remains a very important economic sector for Mauritius. Table 2.3 provides an overview of the industry's current performance.

Table 2.3 Indicators of tourism performance in Mauritius (Statistics Mauritius, 2016a).

Tourist arrivals in 2015	1,151,723
By air	*97.3%*
By sea	*2.7%*
Increase in tourist arrivals as compared to 2014	10.9%
Tourism earnings (approx.) in 2015	US$ 1.67 billion (Rs 50 billion)
Employment in sector (% of total employed labour force) in 2015	5.5%
Average length of stay in 2015	10.6 nights
Average length of stay in 2014	10.9 nights
Number of licensed hotels	115
'Large' hotels[2]	*55*
Room capacity	13,617
Bed capacity	28,732
Room occupancy in 2015	70%
Room occupancy in 2014	65%
Bed occupancy in 2015	63%
Bed occupancy in 2014	58%

[2] 'Large' hotels are hotels located on the beach and having more than 80 rooms. They represent 48% of total licensed hotels but 76% of total room capacity (Statistics Mauritius, 2016a).

Mauritius offers the conventional 3S (sun, sea and sand) tourism products that are characteristic of islands. Prayag (2011) provides a detailed account of the evolution of tourism in Mauritius and relates how, from 2000 to 2008, growth in tourism consistently declined as the industry entered a phase of stagnation. To boost the sector, substantial investment was made into environmental enhancement, upgrading hotel facilities, building new hotels and extensive advertising. Prayag (2011) also describes how the island's strategy has been to create a reputation for quality to attract affluent tourists for luxury tourism.

The government's vision to attract 2 million tourists by 2015 (which has been revised to 2020) indicates that the country is now focussing on achieving mass tourism. As illustrated in Figure 2.7, Mauritius is expanding its tourism market, which has traditionally been Europe, to China and India. In 2015, Mauritius had 26,220 and 10,978 more tourists from China and India, respectively, than in 2014. As Prayag (2011) warns, this overemphasis on tourist numbers may soon lead the industry to another stage of stagnation as the environmental attributes on which it depends degrade due to various pressures, including climate change, and changing tourist behaviours.

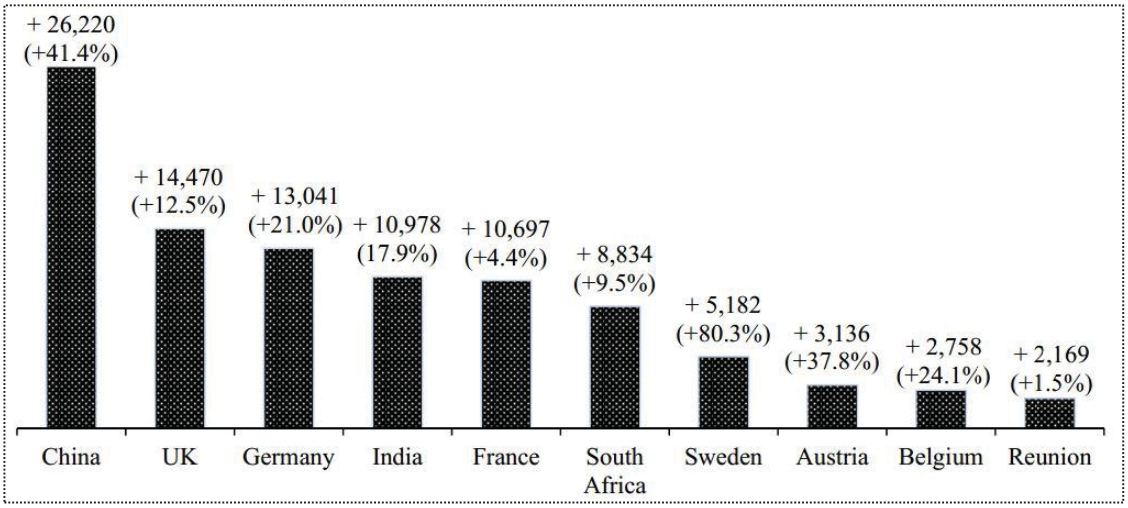

Figure 2.7 Number and percentage increase in tourist arrivalsfrom the different markets in 2015 as compared to 2014 (Statistics Mauritius, 2016a).

2.3.6 Response to climate change

Data from 1970 to 2012 demonstrate that total annual rainfall is decreasing while the annual average atmospheric temperature is increasing in Mauritius. Figures 2.8 and 2.9 illustrate these trends. These changes are consistent with the predictions of the IPCC about climate change related weather patterns for islands. The island is in fact already facing water scarcity during its drier months. Population growth and development, which is often unsustainable, will undeniably further increase the demand for freshwater in the future (Ministry of Environment and Sustainable Development, 2011). Additionally, Mauritius is experiencing several other environmental impacts which are indicative of climate change, including sea level rise and coastal erosion, increased sea surface temperatures leading to coral bleaching, and more frequent flash floods. Chapters 6 and 7 utilise local stakeholder inputs to elaborate further on these impacts and their implications for tourism in Mauritius.

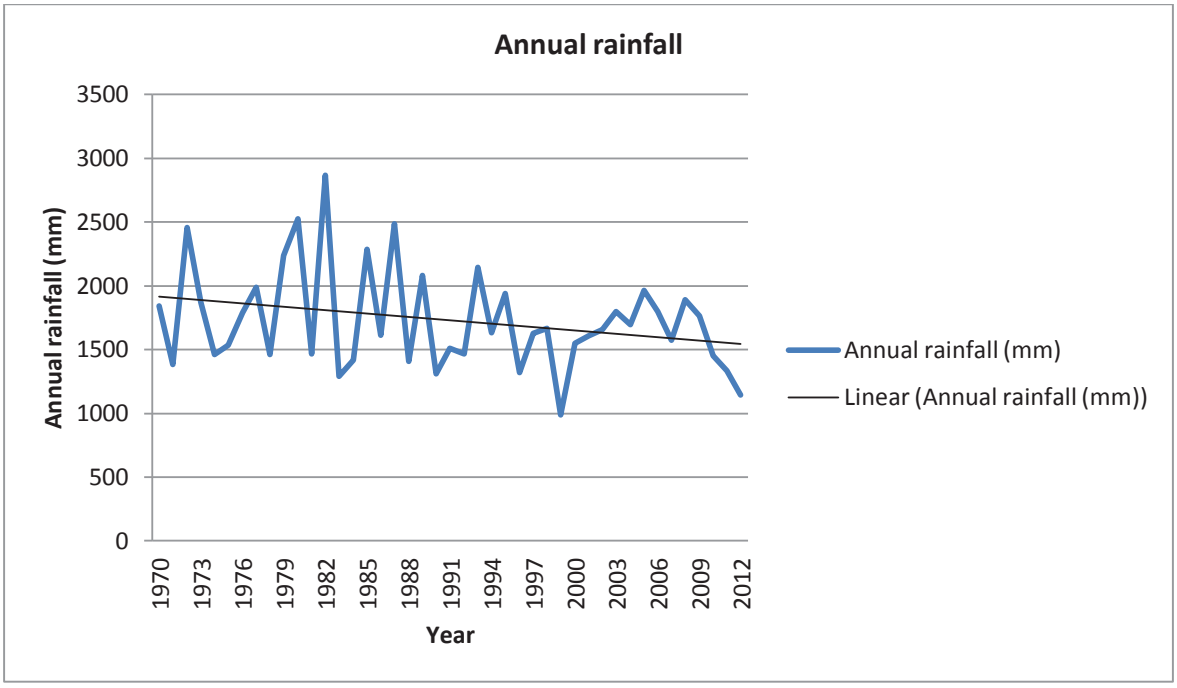

Figure 2.8 Trend in annual rainfall from 1970 to 2012. Data from The World Bank (2016a).

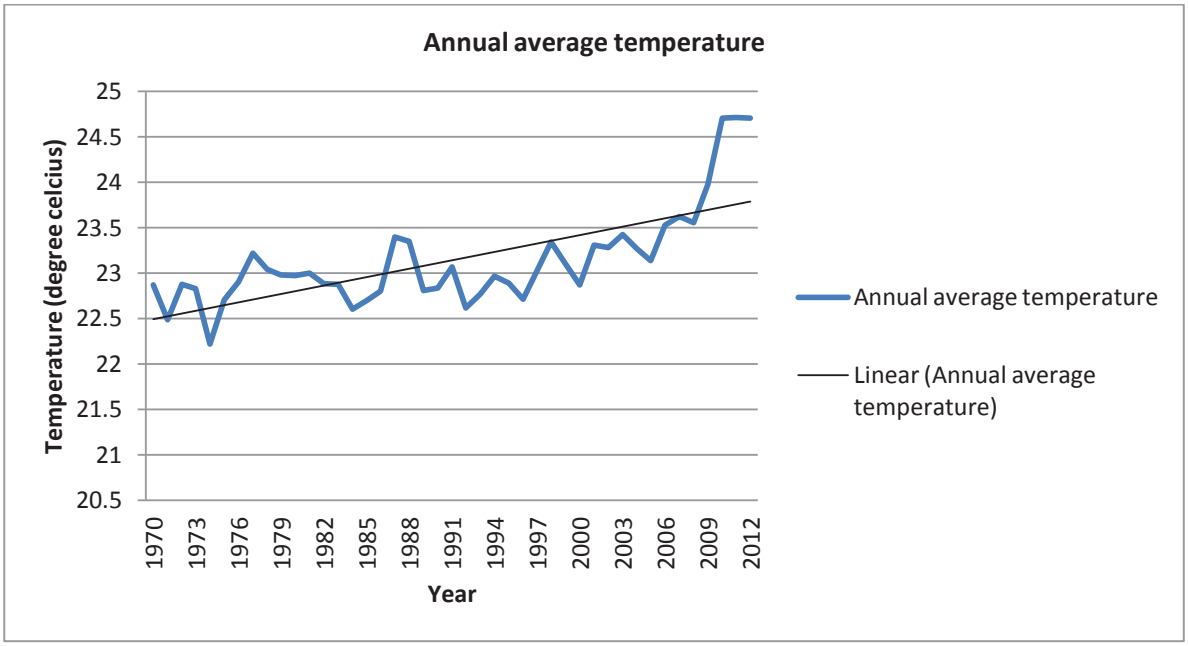

Figure 2.9 Trend in annual average temperature from 1970 to 2012. Data from The World Bank (2016a).

Governmental institutions' response to climate change in Mauritius has evolved considerably since 1991, when the first committee focusing primarily on climate change – the National Climate Committee – was created (Gray & Lalljee, 2013). In 2010, a Climate Change Division was established within the Ministry of Environment and Sustainable Development, and this division is the institutional body currently overseeing the management of climate change impacts in Mauritius. One of the key deliverables of the Climate Change Division was the National Climate Change Adaptation Policy Framework (NCCAPF). Developed in 2012 under the Africa Adaptation Programme, it is the guiding policy framework for climate change adaptation in Mauritius (Ministry of Environment and Sustainable Development, 2012).

The framework is comprised of four main parts. The first part, a national climate change adaptation policy, contains policy directives for key economic sectors. The second part, a climate change adaptation strategy and action plan, provides the estimated costs of projected climate change impacts on key economic activities and contains a list of strategies and actions to minimise them. Appendix 6 shows the policies, strategies and actions for tourism and coastal management as outlined in the NCCAPF. Key adaptation measures for tourism and coastal environments under the NCCAPF include the extension of coastal setbacks from 30m to 45m,

the protection and rehabilitation of tourism attractions such as beaches, the integration of tourism development in natural resource management plans, and the development of a strategic plan for sustainability through consultation with tourism stakeholders.

The NCCAPF also contains a climate change adaptation investment program outlining the investment requirements and timeframes for the actions identified in the previous sections of the document. The total investment required for tourism was estimated at approximately half a billion Mauritian Rupees, which is equivalent to about US$17 million at current exchange rates. The last section provides additional guidance on specific projects. The NCCAPF also contains indicators of adaptation for each economic sector, guidance for the implementation of specific projects and provides a platform for cross-sectoral coordination. Overall the NCCAPF is a comprehensive policy framework which, if implemented efficiently, has the potential to significantly reduce the country's vulnerability to climate change.

2.4 Conclusion

SIDS are island nations which have similar developmental limitations and vulnerabilities to external pressures. They are highly susceptible to climate change, which can affect virtually all sectors of their economies. One important economic activity that is particularly at risk from climate change is tourism. SIDS, several of which are long haul destinations, specialise in coastal tourism and are among the countries that rely the most on this industry as a source of foreign revenue. In many of these islands, sea level rise, extreme weather events, unusual rainfall patterns, and other climate change impacts are already being observed. Consequences for tourism are imminent.

Global tourism is a highly resilient industry. It recovered quickly from the global economic crisis in 2009, has since been exhibiting positive growth and is projected to continue growing linearly. The Tourism Penetration Index indicates that although most SIDS have intermediately or least developed tourism industries, several are rapidly expanding this economic sector. Mauritius is a rapidly developing island nation which forms part of the SIDS and which significantly depends on tourism for foreign exchange revenue. Mauritius offers the traditional sun, sand and sea products that are typical of island tourism. While initially focussing on establishing luxury tourism for the European market, Mauritius is now aiming to achieve mass tourism by 2020 and

is penetrating other markets such as China and India. Currently, the number of annual tourist arrivals in Mauritius is equivalent to the population size of the island.

The natural environment of Mauritius is highly degraded due to its colonial past, rapid population growth and unsustainable development patterns. Climate change is expected to exacerbate the pressures on the island's natural resources in the near future. Changing weather patterns, more specifically rainfall and atmospheric temperature, are indicating that climate change is already impacting Mauritius. The Climate Change Division within the Ministry of Environment, Sustainable Development and Disaster and Beach Management is responsible for managing the impacts of climate change in Mauritius and the NCCAPF is the guiding policy framework for climate change adaptation. It is a comprehensive framework which contains policy directives, strategies and action plans for the country's key economic sectors. The NCCAPF identifies several adaptation measures, such as the extension of coastal setbacks and the protection of beaches, which are required to maintain the sustainability of tourism.

Chapter 3 Management of climate change for tourism in SIDS

This chapter reviews the literature pertaining to climate change management in SIDS to provide a better understanding of the main themes of this research and to highlight the need for the development of country-specific climate change policies which consider local perspectives. It is divided into four sections. The first section describes how climate change is predicted to influence future tourism demand in SIDS. The second section outlines the current and future economic implications of climate change for tourism in these island nations and the third section explores the dimensions of climate change management in SIDS at the regional and national levels. Lastly, the fourth section examines the relationship between stakeholder risk perceptions of climate change and effective management of climate change at the national level. The chapter concludes by summarising perspectives from the literature and by highlighting the contributions of research into risk perceptions for the policy process.

3.1 Economic implications of climate change for SIDS

The success of a tourism destination, and a country's tourism industry, hinges upon the number of tourists visiting it. In the literature, several factors that influence the decision making process for destination choice have been identified. These include mainly the image of the destination (Beerli & Martín, 2004), travel distance and costs (Bigano, Hamilton, & Tol, 2006), satisfaction from previous visits and perceived satisfaction for future visits (Prayag & Ryan, 2012). Other factors include political stability of the destination country, poverty aversion (Bigano et al., 2006), personal safety and environmental conditions (Gössling, Scott, Hall, Ceron, & Dubois, 2012). Climate change can potentially affect several of these factors and simulation models have been used to predict how climate change will influence global tourism trends in the future.

Using two different models, Hamilton, Maddison, and Tol (2005) and Amelung, Nicholls, and Viner (2007) revealed that climate change will cause a spatial shift in tourism towards the poles as temperature in both origin and destination countries become warmer. Consequently, tourism demand for tropical and sub-tropical regions, where most SIDS are located, is projected to decline as temperate countries become more attractive destinations to their own citizens and tourist populations in neighbouring countries (Hamilton & Lau, 2005). Amelung et al. (2007) argue that in addition to spatial shifts, climate change will also cause temporal shifts in tourism.

Temperature rises are expected to increase the length of the summer season in temperate countries, and thereby reduce the period for international tourist travel to warmer regions. Tourist arrivals may drop rapidly in countries relying extensively on their image of sun, sand and sea, such as SIDS, if they become uncomfortably hot in summer due to climate change. They would also not be compensated during the rest of the year because of the longer summer season in tourists' countries of origin (Amelung et al., 2007). Thus, these models suggest that global temperature rise, as a consequence of climate change, will reduce the attractiveness of SIDS as tourism hotspots.

However, critics of these models argue that these predictions are not representative of climate change since they consider only one aspect of the phenomenon, that is, temperature (Gössling et al., 2012; Moore, 2010). Gössling et al. (2012) argue that climate change will not significantly alter tourism demand patterns since destination choice depends on many additional factors such as travel time, the quality of facilities and services, security, and perceived safety, among others. This argument is not completely valid for SIDS. Most of these island nations are long-haul destinations whose tourism industry's fixed assets are concentrated along coasts. The quality of facilities and service as well as tourists' security in SIDS will most certainly be reduced due to climate change. While coastal infrastructures are already being damaged during extreme weather events (Organisation of Eastern Caribbean States, 2004), tourists' safety are at risk of higher incidence of vector-borne diseases as a result of increased temperature (Russell, 2011).

As an alternative to the use of simulation models to determine future tourism demand, Gössling et al. (2012) recommend research into tourist perceptions and responses. Such research has already indicated that climate change can decrease the demand of destinations which are impacted. In Germany, Hamilton and Lau (2005) found that climate was deemed the most important destination attribute by tourists travelling to various countries. The majority of tourists surveyed acknowledged enquiring about the weather conditions at their destination countries prior to their departure. Similarly, for Barbados, Uyarra et al. (2005) found that 80% of surveyed tourists would be unwilling to revisit the island at the same price in the event of damage to beaches (p. 11). Climatic variability can affect the tourism demand and operations at any destination. However, climate is particularly important for small islands, whose appeal as

tourism hotspots depends significantly on their environmental attributes and climatic conditions (Scott & Lemieux, 2010).

Climatic variability, and ultimately climate change, can reduce tourism demand on SIDS both directly and indirectly for various reasons, such as lower quality of facilities, higher risks of disease, adverse weather conditions at the destinations, favourable weather conditions at source countries and damage to important environmental attractions. Therefore, it is crucial for SIDS to anticipate reductions in tourism demand in the long term and engage in adaptation at an early stage to ensure the industry's economic viability.

As outlined in the previous chapter, due to various factors, the economies of SIDS are more vulnerable than those of other developing nations. In the coming decades, climate change is predicted to further burden their economies mainly because the costs of environmental damage are very large in comparison with the size of their economies (Nurse et al., 2014). In response to the increasing threats that climate change poses to the Pacific and Caribbean SIDS, research to anticipate the economic impacts of climate change on tourism in these groups of islands has increased during the last decade. For Caribbean SIDS, Bueno, Herzfeld, Stanton, and Ackerman (2008) and Sookram (2009) found that the small islands will collectively suffer economic losses in the range of billions of US$ under both best-case scenarios and worst-case scenarios (business as usual) of climate change as soon as 2025. These alarmingly high estimates were obtained by considering only the direct impacts of climate change on tourism in their analyses. Bueno et al. (2008) used hurricane damages, tourist expenditure and sea-level rise while Sookram (2009) used temperature and precipitation changes, damages from extreme events and sea-level rise as variables. If the other direct and indirect impacts of climate change, such as higher insurance premiums and biodiversity loss, are considered, these economic implications will certainly be more substantial (Cashman, Cumberbatch, & Moore, 2012).

Similar conclusions were reached for Pacific SIDS in a report by the Asian Development Bank (ADB). By downscaling global climate models, the impacts of climate change on key economic sectors of each of the small island nations in the Pacific region were predicted. Under all climate scenarios tested, tourism demand for Pacific islands is expected to fall by one-third by the end of this century. In comparison with 2000, global temperature rise by itself is expected to cause a

reduction between 27% and 34% in revenue from tourism in the Pacific region by 2100 (ADB, 2013, p. 61). However, the report only quantified economic losses from temperature rise and coral bleaching. Therefore, as for the Caribbean region, economic costs in Pacific SIDS will be more significant than currently estimated when other direct and indirect impacts are considered. As will be discussed in the subsequent sections, the need for urgent adaptation for tourism in Pacific and Caribbean SIDS is recognised and significant efforts are already being made to this end.

In contrast, although tourism is an important economic sector for many of the Indian Ocean SIDS, detailed economic assessments of climate change impacts on tourism in these countries have not been produced yet. While the physical aspects of climate change for this region have been predicted by the IPCC (Barros et al., 2015), with the exception of Maldives, the implications of these changes for major economic sectors, including tourism, have not been studied yet. Being one of the lowest lying countries in the world, Maldives face a heightened sense of urgency. A recent report by the Ministry of Tourism of the Republic of Maldives revealed that the country's tourism revenues are predicted to drop between 8.4% and 10.4% by 2020 and between 27% and 33% by 2100 (Hosterman & Smith, 2015, p. 4-2). These results are highly comparable to those obtained by the ADB (2013) for the Pacific region. Nevertheless, they cannot be generalised for the region because of the varying economic and environmental situations of the different SIDS in the Indian Ocean, a factor considered in the ADB's report.

Understanding the economic implications of climate change for tourism is necessary to determine the most appropriate country-specific adaptation and mitigation measures. Since economic analyses include monetising the environmental and social costs and benefits of projects (Harris & Roach, 2013), they can help in deliberating about measures that will efficiently strengthen the adaptive capacity of the tourism industry of SIDS. Studies conducted at the regional level provide important baseline data which can be used to guide more detailed research for each country. For example, in the Caribbean, the research by Sookram (2009) for the region was used to determine the economic impacts of climate change on tourism as well as cost-effective adaptation and mitigation options specific for Aruba and the Bahamas (Economic Commission for Latin America and the Caribbean, 2011). In this field, research is still required

for SIDS of the Indian Ocean, including Mauritius, to determine cost-effective climate change management options for the tourism industry at the national level.

3.2 Climate change management in SIDS

Management of climate change involves reducing the vulnerabilities of populations and biodiversity to climate related risks through two basic processes: mitigation and adaptation. Edenhofer et al. (2014) define climate change mitigation as "human intervention to reduce the sources or enhance the sinks of greenhouse gases" (p. 37). Mitigation aims to decrease emissions of GHG through various measures ranging from increasing the energy efficiency of household appliances to the use of renewable energy sources and the protection of forests. Adaptation is the process of individual or collective adjustment to observed or expected climatic variability, including extreme weather events, to reduce the vulnerability of a system, a community or a region. It entails behavioural and institutional changes to reduce potential impacts of climate change as well as to benefit from opportunities which may arise from the changing conditions (Huq et al., 2003).

Management of climate change in Caribbean and Pacific SIDS is planned and coordinated both at the national and regional levels. At the regional level, response is coordinated by the Caribbean Community Climate Change Centre (CCCCC) and the Secretariat of the Pacific Regional Environment Programme (SPREP), respectively. These organisations are engaged in conducting research to identify the specific vulnerabilities of the islands, implementing programmes and projects to build their resilience, and in providing advice for policy formulation and implementation at the national level (CCCCC, n.d.; Kelman & West, 2009; SPREP, n.d.). They also act as platforms for knowledge and technology transfer between their members.

Such a regional organisation has not yet been established for the Indian Ocean region. However, to a limited extent, the Indian Ocean Commission (IOC) focuses on climate change adaptation. The Mauritius-based IOC has five members: Mauritius, Madagascar, Seychelles, Comoros and the French Department, Reunion Island (Commission de L'Océan Indien, n.d.). A partnership project, known as the Climate Resilient Island Partnership, between the CCCCC, the SPREP, the IOC and the Commonwealth was initiated in 2015 to connect the three regions (United Nations

Department of Economic and Social Affairs, n.d.) to strengthen action against climate change through experience and expertise transfer.

3.2.1 Mitigation

In contrast to developed nations, climate change management in SIDS is more focussed on adaptation than mitigation, mainly because they make a minimal contribution to global GHG emissions (Becken & Clapcott, 2011; E. Wong, Jiang, Klint, Dominey-Howes, et al., 2013). Nevertheless, international mitigation policies have implications for SIDS. Several authors have highlighted the possibility of reductions in tourism demand for SIDS as a result of higher taxes on air travel and tourists' ethical considerations about their emissions (Becken & Clapcott, 2011; Gössling & Schumacher, 2010; E. Wong, Jiang, Klint, Dominey-Howes, et al., 2013). This is particularly important for SIDS such as Mauritius, Fiji, St Lucia, Vanuatu, etc., where a large proportion of tourist arrivals occur through long-haul travel[3] (Burns & Vishan, 2010). Researchers are starting to stress the need for small island nations to include mitigation in national policies. Mitigation in SIDS can deliver dual benefits. Firstly, by adopting renewable sources of energy, the countries can reduce their reliance on fossil fuels, and hence their vulnerability to external fuel prices. Secondly, mitigation can be used as a powerful marketing strategy for tourism whereby the islands can brand themselves as carbon-neutral destinations (Cashman et al., 2012).

However, only four small island nations have submitted their Nationally Appropriate Mitigation Actions (NAMAs) to the UNFCCC. These countries are Antigua and Barbuda, Maldives, the Marshall Islands and Papua New Guinea (UNFCCC, n.d.). Currently, the Copenhagen Green Fund is co-financing two adaptation projects in Maldives and Fiji, respectively, and one mitigation project in which Jamaica and the Dominican Republic are participating (Green Climate Fund, n.d.).As Burns and Vishan (2010) note, SIDS can obtain finance, support and technological knowledge from developed countries to implement their NAMAs through the Copenhagen Green Fund. Thus, most of the SIDS are not fully utilising the international resources available to increase their resilience.

[3] Long-haul travel is defined as travel greater than 3000km in distance. (Short haul: less than 1000km; medium haul: 1000-3000km) (Burns & Vishan, 2010).

3.2.2 Adaptation

According to Becken and Hay (2007), adaptation can be either anticipatory or reactive in nature. Anticipatory adaptation involves planning for climate change impacts and implementing appropriate measures to minimise the risks. In contrast, reactive adaptation involves emergency or remediation measures when impacts are already being experienced (Becken & Hay, 2012). Adaptation can further be categorised as being independent or formally planned. For tourism, independent adaptation refers to actions taken by hotels or other businesses and individuals in the industry based on their perceptions of climate change risks. In contrast, formally planned adaptation relates to the implementation of measures, usually by external parties such as the government, based on policy decisions or plans (Becken & Hay, 2007).

Becken and Hay (2007) argue that independent and formally planned measures are both effective to varying degrees depending on specific contextual circumstances. Nevertheless, in practice, adaptation is a cross-sectoral, multi-scalar and dynamic process for which a conducive policy environment at the national level is crucial (Becken & Hay, 2007; Schott, 2010; E. Wong, Jiang, Klint, DeLacy, et al., 2013). Formally planned adaptation, especially if it adopts an anticipatory approach, can strengthen independent adaptation as well as the overall adaptive capacity of a country.

3.3 Adaptation and stakeholder views

Reviewing the range of potential adverse climate change impacts which will impact SIDS as well as their adaptation strategies, Kelman and West (2009) recommended that context-specific adaptation policies and programmes which consider local experiences should be established for each SIDS. Furthermore, Dowler, Green, Bauer, and Gasperoni (2006) argued that public perceptions should become an integral part of the policy-making process. Public perceptions influence the social acceptance of the policies and to a large extent, determine the success of climate change management (Leiserowitz, 2006).

At the national level, adaptation policies relevant for tourism in most SIDS are incorporated in national adaptation plans that also contain policies for the countries' other major economic activities. Unlike some developed countries, such as New Zealand, they do not usually have

separate and elaborate climate change adaptation plans for tourism (Becken & Clapcott, 2011). For this reason, Becken and Clapcott (2011) argue that often, national policies are not designed specifically for tourism and therefore may be inappropriate or difficult to implement by the industry.

The research by Becken and Clapcott (2011) consisted of analysing the policy environment in Fiji and New Zealand. Through stakeholder workshops and in-depth interviews with members of various institutions, organisations and the private sector, Becken and Clapcott (2011) revealed that, in Fiji, the specific needs of the private sector are not always considered during policy formulation. Importantly, stakeholders identified the need to include tourism in disaster management plans and desired stricter building standards in anticipation of stronger cyclones (Becken & Clapcott, 2011). Thus, through stakeholder input, it was found that the climate change adaptation approach for tourism in Fiji is not holistic.

However, Becken and Clapcott (2011) noted that awareness of climate change was low among industry representatives in Fiji. E. Wong, Jiang, Klint, Dominey-Howes, et al. (2013) obtained similar results by comparing the conduciveness of the policy environment for climate change adaptation in the tourism sector of Fiji, Samoa and Vanuatu. The low rate of awareness of climate change risks and policies among actors of the private sector consequently translates into low commitment towards adaptation efforts. The underlying reasons for this situation in Fiji included political instability and a resultant lack of trust in the capacity of institutions to manage climate change (E. Wong, Jiang, Klint, Dominey-Howes, et al., 2013). This situation indicates that, in addition to the level of awareness among stakeholders, a country's political environment is a determinant factor for successful climate change adaptation.

A lack of awareness among industry stakeholders can hinder adaptation even in the presence of political will and a conducive policy environment, as is the case in Samoa. E. Wong, Jiang, Klint, Dominey-Howes, et al. (2013) conducted purposive interviews with individuals involved in, or knowledgeable about, the policy process in Samoa to determine the conduciveness of the country's policy environment for tourism's adaptation to climate change. The results showed that although the government of Samoa is committed to enhancing the country's adaptive capacity, the private sector is not particularly committed towards this goal. Private sector representatives

either showed low awareness of climate change risks or believed that urgent action is not required, resulting in low engagement with policies. The divergence of views between policy makers and industry actors in Samoa, which was mainly because communication between authorities and the private sector was weak, was thus hindering planned adaptation (E. Wong, Jiang, Klint, Dominey-Howes, et al., 2013).

In contrast, by conducting in-depth interviews with policy makers and through a self-administered questionnaire with tourism business managers in Barbados, Belle and Bramwell (2005) found that representatives from both the private and public sectors are likewise concerned about climate change impacts on tourism. However, industry managers believed that the policies to manage these impacts were inappropriate. To explain this result, Belle and Bramwell (2005) hypothesised that managers are cautious in implementing policy recommendations. A more plausible explanation may be that industry perspectives were not given sufficient consideration during policy formulation, as noted by Becken and Clapcott (2011) in Fiji.

The research by Belle and Bramwell (2005) was limited to exploring policy makers and industry representatives' perspectives of climate change risks and policies. The extent to which industry perspectives are considered during the policy making process was not investigated. Nevertheless, this research highlights the importance of studying the risk perceptions of stakeholders for the effective management of climate change. A decade later, Mycoo (2014) reported that, due to high levels of concern among policy makers and other stakeholders such as scientists and hoteliers, Barbados is proactively enhancing coastal adaptation to maintain its tourism industry. Mycoo (2014) further reported that policy options are thoroughly investigated through economic analysis as well as stakeholder consultation prior to policy formulation. This study indicates that integrating stakeholder views into the policy process indeed increases social acceptance of the policies and engagement with national adaptation efforts, thereby increasing their success.

3.3.1 Stakeholders' risk perceptions

Risk perception is defined as the process of "collecting, selecting, and interpreting signals about uncertain impacts of events, activities, or technologies" (Wachinger, Renn, Begg, & Kuhlicke, 2013, p. 1049). It is a complex process which is created and shaped by various factors that Helgeson et al. (2012) have categorised as cognitive, subconscious, affective, socio-cultural and

individual. More specifically, with respect to climate change, these factors include knowledge, characteristics of the hazards, past experience with the hazards, social and cultural values, trust in institutions, feelings of responsibility, among others (Harrington & Elliott, 2015). Their interactions determine the extent to which individuals perceive climate change as risky, and hence guide their response to the risks. Chapter 4 elaborates further on the theoretical basis of risk perception and how it is conceptualised and used in this research.

There is a growing body of literature focussing on public and stakeholder risk perceptions of climate change. The majority of these studies, both in developed and developing countries, aim to inform the policy process of public policy preferences and the reasons underpinning public support, or the lack hereof, for specific policies (e.g. Bellamy & Hulme, 2011; Bostrom et al., 2012; Leiserowitz, 2006; Shakeela & Becken, 2015). In so doing, these studies also help to identify barriers to policy implementation. For example, in Vanuatu, Klint et al. (2012) found that risk perceptions of native communities and industry managers (the majority of whom are expatriates) diverge considerably. Industry representatives participating in the research showed little concern about climate change impacts on tourism. This lack of awareness in the industry arises from the government's low level of commitment towards climate change management (E. Wong, Jiang, Klint, Dominey-Howes, et al., 2013). Through their lack of interest, the industry is also possibly encouraging policy makers to maintain this situation since, as Leiserowitz (2006) argues, public perceptions can influence governments into addressing pressing concerns.

In addition to identifying similar concerns among the public and private sectors in Barbados, research by Belle and Bramwell (2005) revealed that tourism managers were more certain than policy makers that climate change will decrease the country's attractiveness as a tourism destination. More than a quarter of the interviewed policy makers were uncertain if climate change will affect tourist arrivals to Barbados at all (Belle & Bramwell, 2005). As Belle and Bramwell (2005) argue, industry managers are more familiar with tourist flows and preferences, and have more first-hand experience in managing hazards, than many policy makers. Thus, while research into risk perceptions usually identifies knowledge gaps among the public (e.g. Chowdhury, Haque, & Driedger, 2012; Leiserowitz, 2006), it can also reveal misperceptions among experts who are responsible for formulating policies and managing climate change at the national level.

Perceptions at the level of the national government can be more significant barriers to climate change adaptation than those at the industry level. Through interviews with government officials, tourism industry managers and NGOs in Maldives, Shakeela and Becken (2015) found that all participants were aware of climate change risks to the country and the industry because of their personal experiences with hazards. However, while the Maldivian government stresses the need for adaptation in SIDS in communications with international media, at the national level, climate change is not a priority on their political agenda. Government officials do not believe that Maldives are particularly threatened by climate change. Consequently, climate change adaptation and mitigation are not specifically addressed in policies. This political inertia is creating a false sense of confidence among industry managers, who are unwilling to invest in adaptation and focus only on short term financial gains (Shakeela & Becken, 2015). However, the recent economic analysis conducted by Hosterman and Smith (2015) may change these perceptions since the costs of climate change impacts on tourism in Maldives were estimated to be substantial in the near future.

Through another study of risk perceptions, Gössling and Schumacher (2010) identified a significant policy gap in Seychelles. Using a mixed method approach, Gössling and Schumacher (2010) interviewed industry stakeholders and surveyed tourists to determine the mitigation potential of tourism in Seychelles. The study revealed that tourism managers were highly aware of various climate change impacts on the industry. They were also aware that climate change mitigation can enhance the image of the tourism industry and therefore were willing to use more renewable energy. However, energy conservation and other mitigation initiatives by Seychelles' government are scarce (Seychelles National Climate Change Committee, 2009). Thus, in addition to barriers to policy implementation, research into risk perceptions can inform governments about important areas not covered in public policies but which are of interest to industry managers.

3.4 Conclusion

The impacts of climate change on tourism in SIDS are predicted to have significant economic consequences for these countries in the coming decades. These impacts include damage to coastal infrastructure and important tourist attractions as well as reduced tourism demand as a result of more comfortable winter seasons in tourists' countries of origin and uncomfortably hot

summer seasons in SIDS. Collectively, the effects of climate change may reduce the quality of service and experience offered by SIDS' tourism industry and may alter their perceived attractiveness. International mitigation policies such as taxes on air travel, and ethical consideration about GHG emissions, may further deter tourists from visiting SIDS in the future.

The threats posed by climate change to SIDS are recognised in many of these countries. For Pacific and Caribbean islands, projects and policies to increase the resilience of the SIDS have been developed and implemented at the regional level as well as the national level. Management of climate change is primarily focused on adaptation, mainly in preparation for worsening climatic conditions and also because SIDS contribute a negligible percentage to global GHG emissions. However, mitigation offers currently unexploited opportunities for SIDS to build their adaptive capacity through assistance from developed nations as provided by the UNFCCC.

Despite these international and regional institutions, climate change is insufficiently or ineffectively addressed at the national level in many SIDS. Research into risk perceptions has identified the main factors that hinder climate change mitigation and adaptation in these countries as political instability, a lack of awareness among industry stakeholders and/or policy makers, and prioritisation of short-term economic gains over long-term sustainability. These factors contribute to a lack of commitment towards climate change management. Furthermore, policy gaps arising from a lack of communication between the industry and policy makers limit the potential of SIDS, and of their tourism industries, to adapt to climate change.

The majority of the studies conducted to advance knowledge about climate change management for SIDS are concentrated in the Pacific and Caribbean regions, with the exception of Maldives in the Indian Ocean. Thus, efforts to increase the resilience of Pacific and Caribbean SIDS are more advanced than those for Indian Ocean SIDS, including Mauritius. More specifically, the risk perceptions of climate change of different key stakeholders in the tourism industry and the perceived conduciveness of the policy environment in Mauritius have not been examined. Therefore, this research will address this gap in the literature with the aim of informing the policy process in Mauritius as well as the other Indian Ocean SIDS. The next chapter elaborates on the theoretical perspectives of risk perceptions and outlines the conceptual framework developed to guide this research.

Chapter 4 Theoretical approaches to risk perception

This chapter reviews the literature pertaining to the theoretical basis of risk perceptions. It is divided into four sections. Sections 4.1, 4.2 and 4.3 describe the most commonly utilised theoretical approaches to risk perceptions. Their main assumptions, use in climate change research, and their strengths and weaknesses are outlined to highlight the need to develop a new framework which integrates variables from the three approaches for the exploration of climate change risk perceptions. Section 4.4 then describes the conceptual framework developed to guide this research and outlines its components.

Environmental risk pertains to an individual's, community's or society's vulnerability to extreme natural events. Technical risk assessments are primarily based on the natural hazard's potential magnitude and the probability that it occurs (Ismael-Zadeh, 2014). In contrast, as mentioned in the previous chapter, people's perceptions of risk is a complex process which is created and shaped by various factors (Wachinger et al., 2013). Due to its multi-dimensional nature, risk perceptions have been studied in different disciplines and from different perspectives. According to Helgeson et al. (2012), three theoretical frameworks are most commonly used to understand the perception of risk: the psychometric paradigm (Slovic, 1987), cultural theory (Douglas & Wildavsky, 1983) and the social amplification of risk framework (SARF) (R. E. Kasperson et al., 1988).

The psychometric paradigm argues that risk perception is a psychological construct and concentrates on cognitive factors, such as knowledge, to determine the level of risk associated with hazards. In contrast, cultural theory posits that risk perception is socially and culturally constructed. Studies using cultural theory infer risk perception by investigating the views of individuals depending on their association with different social groups. Lastly, the SARF focuses on the role of communication in shaping risk perception. Under this approach, risk analysis involves determining how communication through personal, social and institutional channels amplifies or attenuates risk perception.

Dobbie and Brown (2014) argue that it is unlikely that a single theory can holistically frame studies about risk perception. An ideal framework would incorporate the perspectives from all

three approaches. Numerous integrative frameworks have in fact been developed and utilised in different contexts (Dobbie & Brown, 2014; Harrington & Elliott, 2015; Renn & Benighaus, 2013; Wachinger et al., 2010). However, none of these frameworks strongly suited the aim of this research. Therefore, a new conceptual framework was developed to understand stakeholders' perceptions of climate change within the Mauritian tourism sector.

4.1 The Psychometric paradigm

The psychometric paradigm is a quantitative approach which stemmed from research in psychology. It is based on the conventional conception that risk perception is primarily a cognitive process, that is, a psychological activity involving rational information processing (Upham et al., 2009). One of the most important assumptions underlying the psychometric paradigm is that risk is inherently subjective, that is, it does not exist, and cannot be measured, independent of human cognition and culture (van Winsen et al., 2011). According to this approach, people are able to quantify risks by considering factors such as perceptions and attitudes (for example, knowledge about a hazard, voluntariness to take risks, the perceived controllability of the risks, and feelings of dread), the benefits society receives through a hazardous activity, the costs to society in an average year, and the costs to society in a disastrous year (Slovic, 1987).

With the main argument that the characteristics of hazards shape risk perceptions, Slovic (1987) developed a taxonomy for a number of hazards through a model, known as a cognitive map, constituting of two factors: 'dread risk' and 'unknown risk'. 'Dread risk' relates to the perceived severity of a hazard's consequences and 'unknown risk' pertains to the perceived level of control which can be placed on the risks associated with the hazard (Harrington & Elliott, 2015). The relationship between 'dread risk' and 'unknown risk' is made of 15 characteristics and determines the position of specific hazards on the map, as illustrated in Figure 4.1.

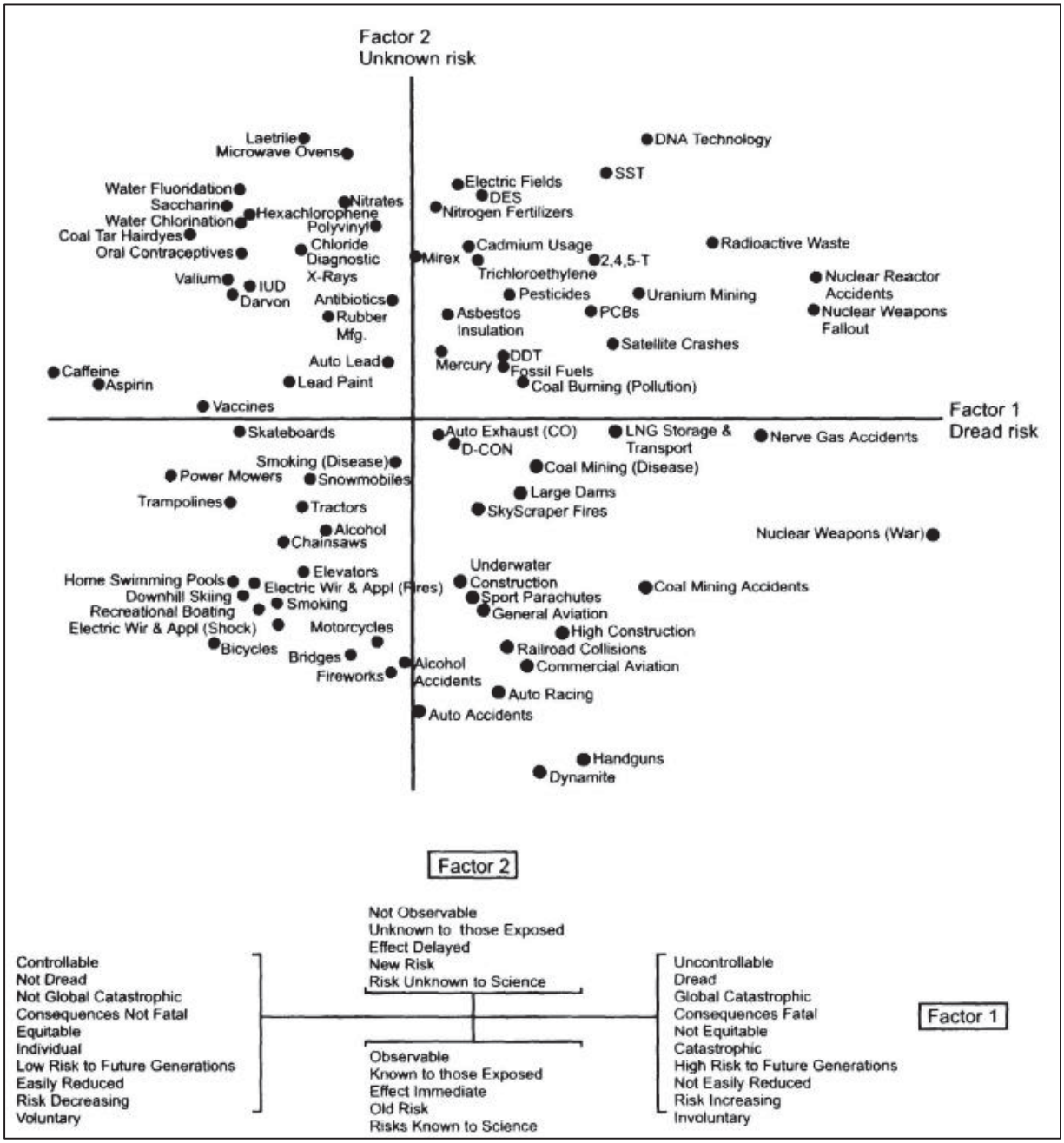

Figure 4.1 The position of 81 hazards on the initial cognitive map (Slovic, 1987).

The psychometric paradigm is commonly used in the field of environmental risks, and increasingly for research on climate change (e.g. Bostrom et al., 2012; Chuk-ling Lai & Tao, 2003; McDaniels, Axelrod, & Slovic, 1996). The framework has also been adapted and applied in various contexts. For example, Chowdhury et al. (2012) modified the psychometric paradigm

to investigate perceptions about climate change-induced heat waves in Canada. Their research revealed significant differences between public and expert perceptions of the risks of heat waves.

Proponents of the psychometric paradigm argue that it offers an appropriate framework for investigating how public perceptions differ from expert knowledge and for comparing views about different hazards (Dobbie & Brown, 2014). Through the characteristics of 'dread risk' and 'unknown risk', the framework provides several key factors which experts and the public consider during their evaluation of different risks (Renn, 2008). These factors, and the cognitive map, help to explain why certain hazards are perceived as highly alarming while others are considered benign. Thus, to some extent, public responses can be predicted (Slovic & Weber, 2002).

However, despite its popularity, the psychometric paradigm has received strong criticism. Firstly, the methodology of the framework has been critiqued because the results produced are not practically useful. Sjöberg (1996), Siegrist, Keller, and Kiers (2005) and several other authors have argued that, since the framework utilises only aggregate data in the form of mean values, it does not consider individual differences in risk perceptions. Consequently, the psychometric paradigm cannot explain why or how the perceptions of risk differ between individuals (van Winsen et al., 2011). This issue limits the applicability of the findings for the policy making process (Sjöberg, 1996).

Secondly, instead of viewing public perceptions as meaningful inputs for risk management, the psychometric paradigm views them as a lack of knowledge with respect to expert knowledge. It recommends that the misperceptions of laypeople must be corrected. However, as Dobbie and Brown (2014) highlighted, the perception of experts is also biased because of their beliefs, values, attitudes and various other factors. Differences between public and expert perceptions should therefore not be systematically attributed to insufficient knowledge.

Lastly, some argue that the main assumption of the psychometric paradigm is flawed. Although the framework includes physical characteristics such as the catastrophic potential of hazards, the psychometric paradigm asserts that risk is essentially subjective. As Hansson (2010) argues, risk is both objective and subjective, that is, it contains both factual as well as psychologically and

socially constructed components. Hansson (2010) further argued that viewing risk as being only subjective or objective oversimplifies the concept and hinders in-depth research into risk analysis. By largely ignoring the objectivity of risk, the psychometric approach offers only a limited understanding of risk perception.

4.2 Cultural theory

Cultural theory was developed from anthropological and political research, and argues that risk perception is primarily mediated through social relations and cultural values, and therefore established collectively (Douglas & Wildavsky, 1983). Similar to the cognitive map of the psychometric paradigm, the framework of cultural theory comprises of a matrix, known as a cultural map, which considers two factors: 'grid' and 'group', as illustrated in Figure 4.2. 'Group' defines the extent to which individuals are bonded together, for example the cohesiveness in a corporation, while 'grid' describes the extent to which roles within the group are externally ascribed to the individuals (Marris, Langford, & O'Riordan, 1998).

The strength of these two dimensions determines the cultural biases, or worldviews, of individuals. Depending on their worldview, individuals may be hierarchist (high group and high grid), individualist (low group and low grid), egalitarian (high group but low grid) or fatalist (low group but high grid) (Marris et al., 1998). Hierarchists believe nature is tolerant and tend to prefer highly structured rules, expert advice and technology to manage the environment. In contrast, individualists believe nature is resilient and favour unlimited economic expansion and personal gains. They usually oppose government regulations which restrict their autonomy. Egalitarians advocate for democratic decision making and for limiting economic growth since they believe the environment is fragile (Leiserowitz, 2006). Finally, fatalists consider nature as being capricious. They believe that events of their lives are beyond their control and that they do not possess enough power to affect the outcomes of situations (Ross, Mirowsky, & Cockerham, 1983).

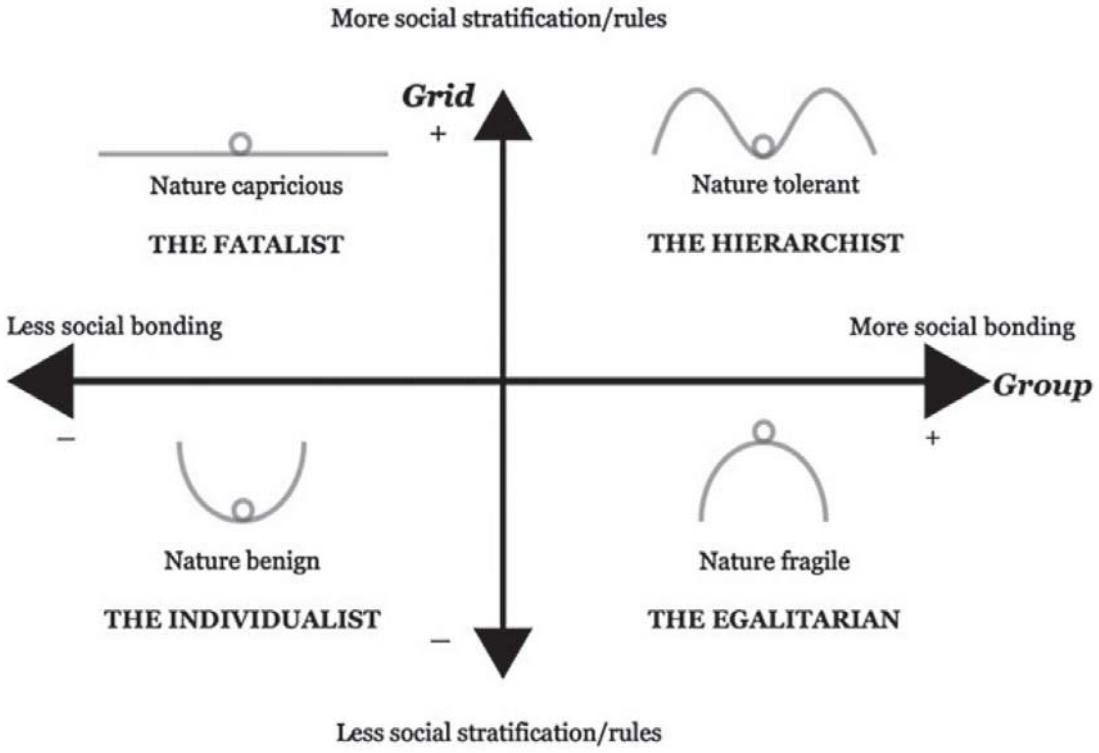

Figure 4.2 A cultural map illustrating the position of the four worldviews and their associated beliefs about nature (McNeeley & Lazrus, 2014).

Marris et al. (1998) argue that cultural theory provides a more appropriate framework for risk analysis than the psychometric paradigm because it considers individual variations in risk perceptions and allows for the identification of factors which underlie worldviews. Cultural theory has indeed been applied to this end in studies on climate change (e.g. Bellamy & Hulme, 2011; Leiserowitz, 2006; Thompson, 2003). Research by Leiserowitz (2006), for example, found that the lack of direct experience with climate change impacts caused most American citizens to believe that climate change will affect only non-human nature in distant locations. The research also revealed that, although pro-egalitarian values influenced policy preferences, American citizens were unwilling to change their behaviour to mitigate climate change. Leiserowitz (2006) therefore recommended that climate change communication should be tailored in a way that challenges the misconceptions of specific audiences in some instances and promotes the strong values held by other individuals.

According to Tansey and O'Riordan (1999), cultural theory explains why, as a function of trust, liability and power, certain risks are more politicised and considered more dangerous than others. McNeeley and Lazrus (2014) argue that cultural theory, by means of its four distinct worldviews, allows the identification of "culture clashes" (p. 509), such as those of climate change believers and deniers, and explains how these arise as differences in values. McNeeley and Lazrus (2014) therefore highlight that cultural theory can significantly contribute to the policy process. This view is shared by Leiserowitz (2006), whose research demonstrated that public policy preferences can be predicted more precisely by using cultural theory than variables such as political beliefs or socio-demographic factors.

However, the validity of cultural theory is debated. Due to the difficulty of operationalising the framework, Sjöberg (2000) remarked that few studies have provided empirical evidence to support it. Kahan (2012) explains that studies usually employ different scales to measure the grid-group worldviews. He argues that the survey questions used to differentiate participants into the four categorisations (hierarchy, fatalism, individualism and egalitarianism) are not comparable, and therefore the scales cannot reliably differentiate participants into particular categories (Kahan, 2012).

Moreover, it is possible for a participant to express more than one worldview. In this case, the individual cannot be placed in a distinct category, especially if he/she presents competing worldviews (Kahan, 2012). Marris et al. (1998) confirmed that although patterns consistent with cultural theory emerged through their research, it is not unusual for individuals to exhibit two or more competing worldviews. Because "it was impossible to categorize (most) respondents according to their world view", Marris et al. (1998) concluded that "the four cultural biases may be best interpreted as extreme reference points" (p. 646).

Cultural theory's basic principles have also been questioned. Boholm (1996) contends the theory's assumption that cultural biases are shaped by social relations, and more specifically by the grid and group factors of the framework. Furthermore, since risk perceptions are considered a product of values, it is uncertain whether findings indicate individual or collective perceptions (Marris et al., 1998). The possibility that individuals' cultural worldviews may evolve throughout their lives as they associate with different institutions (Dobbie & Brown, 2014;

Marris et al., 1998) also introduces some uncertainty to the usefulness of cultural theory for informing policy formulation. Nevertheless, the importance of culture in shaping risk perception is recognised in the literature (Wachinger et al., 2010), which makes cultural theory one of the leading frameworks in this field.

4.3 The social amplification of risk framework (SARF)

The third theoretical framework used in risk perception research, the social amplification of risk, emerged from communications theory (Harrington & Elliott, 2015). It was first developed in an attempt to integrate the psychometric paradigm, cultural theory and media research to "overcome the fragmented nature of risk perception" research (J. X. Kasperson, Kasperson, Pidgeon, & Slovic, 2003, p. 13). The SARF argues that risk and risk events are either amplified or attenuated as a result of their interaction with various psychological, institutional, social and cultural factors (Renn, Burns, Kasperson, Kasperson, & Slovic, 1992).It further posits that, since the majority of the public learns about risk through transmitted information rather than direct experience with the risk event, risk amplification and attenuation are mediated by communication (R. E. Kasperson & Kasperson, 1996). Therefore, the SARF focuses on how risk communication influences public perceptions. Figure 3.3 below illustrates the framework.

The framework has two stages. In the first stage, experience with risk and information about risk events gives rise to risk signals, such as images, which are then processed by amplification or attenuation "stations" (J. X. Kasperson et al., 2003). These stations (social, individual, and institutional, group and individual behaviour) are comprised of various variables that produce and shape information which is then disseminated through communication channels such as the media (R. E. Kasperson et al., 1988). In the second stage, the "ripple" effects of risk perception are considered. J. X. Kasperson et al. (2003) argue that ripple effects create far reaching secondary and tertiary impacts which can either encourage or hinder risk reduction efforts. Thus, the framework helps to understand why certain risks which are deemed acceptable by experts elicit substantial public concern while other risks that experts judge as dangerous, do not (Frewer, Miles, & Marsh, 2002).

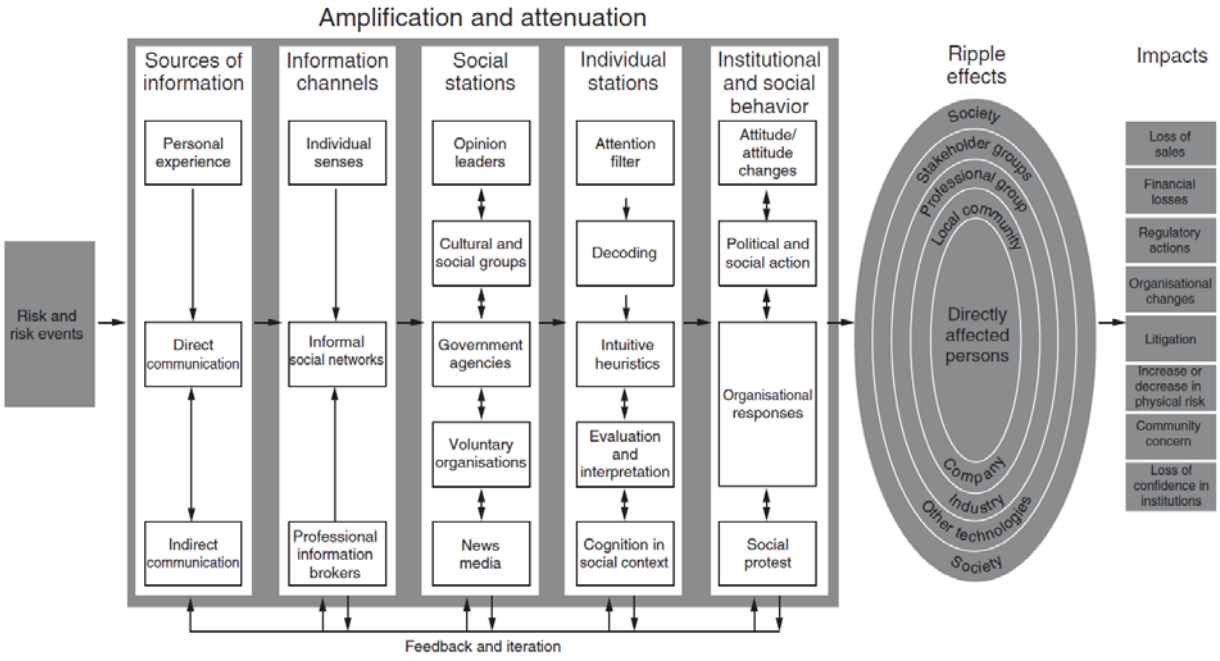

Figure 4.3 The social amplification of risk framework (Renn, 2011).

The importance of communication for the management of climate change risks is recognised (Poumadère, Mays, Le Mer, & Blong, 2005) and interest in the application of the SARF for research on climate change is growing (Leiserowitz, Maibach, Roser-Renouf, Smith, & Dawson, 2013; Renn, 2011; Shakeela & Becken, 2015). A study by Shakeela and Becken (2015) in Maldives is the first one to apply the SARF to understand how communication shapes risk perception in the tourism industry. Their research identified personal experience, social networks, international media and the government as risk amplifiers, and community values, marketing and industry factors, the national media and the government as risk attenuators.

Interestingly, Shakeela and Becken (2015) found that the Maldivian government acts as both an amplifier and an attenuator of risk perception. While on the international stage, the government has highlighted the risks of climate change to SIDS by using the case of Maldives, at the same time, on the national level, the government strongly attenuates risk perception to retain tourist and investor interests in the tourism industry. By utilising the SARF to explore the risk communication process, Shakeela and Becken (2015) revealed the "low-risk façade" created by the government in Maldives (p. 79).

Proponents of the SARF assert that it is a robust framework which offers a holistic approach to the study of risk perception (R. E. Kasperson et al., 1988). According to Shakeela and Becken (2015), the integrative nature of the SARF is particularly important for uncertain risks, such as those associated with climate change, since it reconciles the objective and subjective representations of risk from different perspectives. Additionally, (Leiserowitz et al., 2013) argue that it can provide insights into both individual risk perceptions as well as resultant large scale social responses. As such, it is considered a dynamic framework (Roger E Kasperson et al., 1988; Renn, 2011; Wachinger et al., 2010).

Nevertheless, the SARF has received a wide range of criticisms. While Dessai et al. (2004) view the SARF as "conceptually attractive" but hard to actually utilise (p. 19), Rickard, McComas, Clarke, Stedman, and Decker (2013) deplore a lack of detail in the framework. They further claim that it oversimplifies the role of the media in risk perception. Moreover, Dessai et al. (2004) argue that the framework does not help in identifying the causes or the processes which underlie risk amplification or attenuation.

Responding to these criticisms, Shakeela and Becken (2015) argue that the SARF is "one of the most comprehensive frameworks for risk research" (p. 67). Although it does not identify the causes of risk amplification or attenuation, it can highlight their underlying processes (Shakeela & Becken, 2015). The SARF was in fact not developed with the intention of determining causal relationships or predicting public behaviour to risk (Renn, 2011). It is a framework which allows the interpretation of data from different perspectives and provides a good starting point for risk communication research (Bakir, 2005).

4.4 The conceptual framework of this research

As discussed above, the three dominant frameworks for risk perception have several limitations and there is a need to refine the existing frameworks and to develop new ones, especially to study emerging hazards and risks (Harrington & Elliott, 2015). A conceptual framework depicts variables among which relationships meaningful to the particular research may exist. It is guided by the research objectives and in turn guides the research methods and data collection (Cargan, 2007). It represents the researcher's viewpoint about the specific research problem and defines

the focus for various stages of the study, such as the literature review, data collection and the discussion of findings (Hall, 2010).

This framework was developed to explore stakeholders' perceptions of climate change risks within the tourism industry in Mauritius. It was therefore designed by considering the study's exploratory nature and qualitative methods. It shows the relationships between the main factors influencing risk perception, as illustrated in Figure 4.4. The framework integrates components from the three theoretical approaches described above, and was synthesised through a literature review of empirical and theoretical research pertaining to risk perception.

4.4.1 Components of the framework

The framework shares the fundamental principles of the SARF, which assert that "the social and economic impacts of an adverse event are determined by a combination of the physical consequences of the event and the interaction of psychological, social, institutional, and cultural processes" (Renn, 2011, p. 156). In this framework, risk perception is similarly constructed: as a product of the physical characteristics of the hazard and the interactions between individual and contextual variables. It considers both the objective and subjective aspects of risk perception.

In this framework, the physical characteristics of hazards determine individuals' experiences with the hazards. Experience then shapes the level of knowledge and understanding individuals possess about the phenomenon, either directly if the hazard was personally experienced or indirectly through communication. A hazard's characteristics also guides scientific research and the technical assessments of risks associated with the hazard, which influence knowledge and understanding mainly through communication. Knowledge and understanding, mediated by the level of trust individuals have in governmental institutions' capacity to address the hazard, determine the perception of risk.

As illustrated in Figure 4.4, communication, knowledge and understanding of hazards and risks, and trust in institutions are influenced by four contextual variables. As Jackson (2008) explains, risk perceptions are situated within specific environments that create specific contexts for each individual or groups of individuals. These environments include mainly political, economic and sociocultural aspects (Harrington & Elliott, 2015). In this framework, governmental institutions'

response to climate change was also identified as an important contextual variable. Further elaboration on the influence of individual factors and governmental institutions' response on risk perception is provided below.

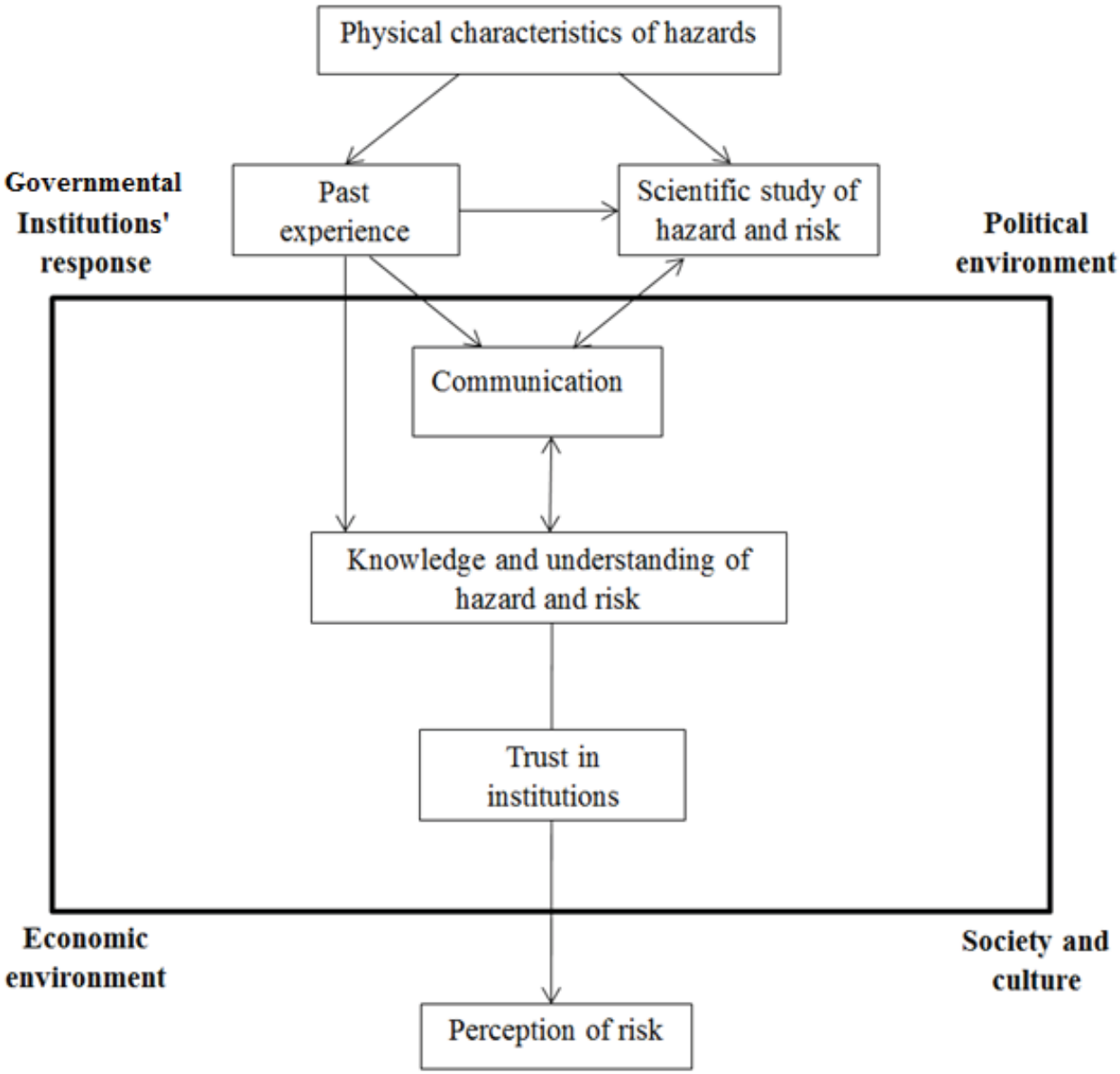

Figure 4.4 The developed conceptual framework showing the main factors influencing climate change risk perception.

Characteristics of hazards and scientific study of hazards and risks

As argued by the psychometric paradigm, the characteristics of hazards (adverse or extreme environmental conditions) are the starting point for risk perception. The technical analysis of a hazard's characteristics shapes expert knowledge and conventionally forms the basis for institutional understanding of hazards and risks (Brunner & Lynch, 2013). Although public risk perceptions tend to differ from expert knowledge, positive correlations have been obtained between them (Siegrist & Gutscher, 2006), suggesting that public risk perceptions are influenced by the technical assessment of risks. Knuth, Kehl, Hulse, and Schmidt (2014) explain that if a hazard occurs rarely, it is usually deemed low risk by experts. Consequently, the public also tends to associate low risks to the hazard since information about it is disseminated less frequently. In the framework, the scientific study of risk is conceptualised as influencing individual's knowledge mainly through communication.

Experience

The effect of direct experience with a hazard on risk perception is widely recognised in the literature (Harrington & Elliott, 2015; Knuth et al., 2014; Leiserowitz, 2006). Although the relationship between experience and risk perception is complex, it has been found to depend on the hazard's characteristics (Harrington & Elliott, 2015). For example, experience with earthquakes amplifies risk perception because the hazard is considered involuntary. In contrast, experience with voluntary risks such as skiing decreases the perceived risk (Knuth et al., 2014). Depending on the nature of the risk, particularly the extent to which it is controllable, the frequency of experience has also been identified as an amplifier or an attenuator of risk perception (Ho, Shaw, Lin, & Chiu, 2008). In this framework, experience is considered a crucial factor informing the technical study of risk as well as shaping knowledge, both directly and indirectly through communication.

Communication

Communication allows the flow of information between the scientific, institutional and public spheres. It is critical for increasing understanding, awareness and engagement with climate change (Moser & Ekstrom, 2010) and constantly influences risk perception. Information from

different sources continuously modifies, attenuates or amplifies the views of individuals with respect to potentially dangerous situations (Renn & Benighaus, 2013). Communication is particularly important for risks that are not easily discernible, such as climate change impacts which occur over long periods of time. Individuals rely on third party information to judge the seriousness of these risks (Renn & Benighaus, 2013).

Different sources of information influence risk perceptions in different ways. For example, the media may only present information which are attractive enough or which foster debate and conflict about climate change (Kellstedt, Zahran, & Vedlitz, 2008; Weingart, Engels, & Pansegrau, 2000). Consequently, individuals may also develop conflicting views about the risks associated with climate change (Kellstedt et al., 2008). In contrast, communication through credible and formal sources, such as scientists (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007), can help individuals overcome their perception biases (Renn & Benighaus, 2013).

Knowledge and understanding

In the literature, although different types of knowledge such as traditional knowledge and scientific knowledge can be identified, the terms knowledge and understanding are usually used together or interchangeably. For example, Weber and Stern (2011) and Leiserowitz, Smith, and Marlon (2010) provide a similar definition to understanding and knowledge of climate change, respectively. Broadly, they are both defined as possessing information about the climate system, and the causes and consequences of climate change.

Individuals with different levels of knowledge have been found to perceive climate change risks differently. In accordance with the knowledge-deficit model, which argues that increasing knowledge leads to behavioural change (Schultz, 2002), a lack of concern about climate change has often been attributed to a lack of knowledge (Kellstedt et al., 2008; Lorenzoni et al., 2007). However, research by Kahan et al. (2012) in the US revealed that levels of scientific knowledge were negatively correlated with levels of concern. Individuals possessing more scientific knowledge perceived climate change as being less risky (Kahan et al., 2012).

In contrast with Kahan et al. (2012), who concluded that scientific knowledge is not a predictor of climate change concern by using scientific literacy and numeracy as variables, Shi et al.

(2015) found that knowledge about the causes of climate change significantly increases concern. Hence, while general scientific knowledge is an inappropriate determinant of risk perception, specific knowledge about climate change is an important factor influencing individuals' perceptions.

Governmental institutions' response and trust

In this framework, four interdependent contextual variables mediate the influence of individual factors on risk perceptions. Of the four, institutional response, which refers to authorities' approaches to climate change, is of direct relevance to the aim of this research. Because of their responsibility and ability to maintain the power balance between different interest groups and ensure equitable resource allocation, the role of government institutions is critical for environmental management as well as the adaptive capacity of a country (Brown, Nkem, Sonwa, & Bele, 2010; Næss, Bang, Eriksen, & Vevatne, 2005). Research by E. Wong, Jiang, Klint, Dominey-Howes, et al. (2013) in three Pacific islands and by Shakeela and Becken (2015) in Maldives suggest that the importance government institutions give to climate change-related issues influences the extent to which the phenomenon is perceived as risky among tourism stakeholders. A lack of institutional response was found to attenuate risk perceptions.

Institutional response determines the level of trust that individuals place in the authorities that manage risks. Trust is particularly important for hazards, such as climate change impacts, which carry a high degree of uncertainty (Dobbie & Brown, 2014) and acts as "externalised faith" in authorities' capacity to manage threats about which individuals may not have enough information (Wachinger et al., 2013, p. 1053). While public trust in authorities is desirable, Wachinger et al. (2013) remark that high levels of trust may deter individual initiatives for disaster preparedness. According to Siegrist and Cvetkovich (2000), individuals tend to dismiss expert advice and to trust their personal judgement when they perceive their level of knowledge about the hazard to be high, and vice versa. In this framework, trust is conceptualised as being mainly shaped by knowledge, which is influenced by past experience and communication.

4.5 Conclusion

Risk perception is a multi-dimensional process which is constructed and influenced by various individual and socio-cultural factors. In the literature, three theoretical frameworks are commonly utilised to study risk perception: the psychometric paradigm, cultural theory and the social amplification of risk framework (SARF). Each of these frameworks offers a different perspective on risk perception. Through the development of a cognitive map, the psychometric paradigm allows the comparison of different hazards according to public perception of the hazards' characteristics. In contrast, cultural theory argues that the environmental beliefs of individuals can be inferred by categorising them according to their social and cultural values. The SARF was developed in an attempt to reconcile the psychometric paradigm and cultural theory, and as a result is comprised of elements from both theories. It focuses on how public risk perception is strengthened or weakened as information flows through individual, institutional and socio-cultural channels.

Each framework has both strengths and weaknesses. A common limitation of the three frameworks is the difficulty in operationalising them. The risk perception literature contains models which were developed with the aim of integrating the three theoretical frameworks. However, no model suited to the particular needs of this research was found. Therefore, a unique conceptual framework constituting of variables from the three dominant frameworks in risk perception research was developed.

In this conceptual framework, both the objective and subjective aspects of risk are considered. The framework recognises the relationships between the salient influencers of risk perception, namely, personal experience, the scientific study of risk, communication, knowledge and understanding of the hazard and risks, and social trust, as embedded within contextual factors. This framework was used to guide the methodology and the analysis of findings of this research.

Chapter 5 Research Methods

As outlined in Chapter 1, this research aims to gain a better understanding of how stakeholders within the tourism sector in Mauritius view climate change and climate change policies to inform future decision-making. It also seeks to determine stakeholder-perceived barriers to effective climate change management. To achieve this aim, a conceptual framework was developed in the previous chapter and appropriate research methods to carry out the study were identified through a literature review. This chapter outlines the research design, and describes the sampling procedure and data collection and analysis processes used. Finally, the ethical considerations and limitations of this research are discussed.

5.1 Research design

Among other factors, the choice of the research design depends on the nature of the research problem, the lens through which the researcher views the study, the expected outcome of the research and the tools for data collection and analysis (Creswell, 2014). This research used a mixed methods strategy in which both quantitative and qualitative data were collected. The data sets were analysed separately to produce a combined interpretation. This research design allows the comparison between the two different sets of data and to substantiate quantitative data with qualitative information to provide a better comprehension for the problem (Gibbs, 2008).

In this study, both quantitative and qualitative data were collected from the same purposively selected sample. Since no research has been conducted in the field of climate change risk perceptions in Mauritius so far, this study is exploratory, and therefore mainly qualitative, in nature. However, a mixed methods approach was selected for this study firstly, to obtain an overview of the patterns of risk perceptions in the tourism industry and to describe them broadly and secondly, to allow graphical representations for basic comparative analysis.

Two research methods were employed in this study: a questionnaire and semi-structured interviews. To allow comparison, merging of results and to increase validity, a key requirement of mixed methods is the use of similar variables for the collection of each data set (Creswell, 2014). Therefore, the same variables from the conceptual framework developed in Chapter 4 were used to design the questionnaire and the interview guidelines which were both uniform for

the different groups of participants. The questionnaires were administered in a face-to-face situation, after which the semi-structured interviews were conducted with the participants. This sequence was adopted to reduce the likelihood of the interviews influencing participant response to the questionnaire.

The questionnaire was used to determine:

1. The extent to which participants perceive climate change as dangerous,
2. The ways in which different factors influence their risk perceptions,
3. The efficiency of current climate change public policies as perceived by the interviewees.

The semi-structured interviews were used to:

1. Obtain further information on certain questionnaire elements,
2. Identify the factors that participants view as being barriers to the management of climate change impacts,
3. Determine stakeholders' public policy preferences.

5.2 Sampling procedure

There are two main type of sampling processes: probability or non-probability sampling. Probability sampling involves determining an appropriate sample through methods that minimise selection bias, resulting in a sample representing a larger population, and hence allowing the generalisation of research findings. It forms the basis of participant recruitment in quantitative studies. Since generalisation is not the aim of qualitative research, non-probability sampling is used to recruit participants who can contribute the most to the qualitative study based on specific selection criteria and the researcher's judgement (Merriam, 2009). This study employed purposive sampling, the most commonly used non-probability sampling method for qualitative research (Merriam, 2009). Specifically, a type of purposive sampling known as maximum variation was employed. This technique allows the capture of a wide range of perspectives about the research topic through the deliberate selection of participants who may hold contrasting opinions (Yin, 2015). The first step in sampling in this research was the identification of groups of key stakeholders according to their relevance to the research topic. Four groups were identified, namely academics, NGOs, actors from the tourism industry, and government officials.

Within each of these groups of key stakeholders, participants were then selected according to their official positions. Since purposive sampling depends on the researcher's judgement, the sample was prone to bias. However, sampling bias can be minimised through the use of clear criteria (Blankenship, 2010). In this research, sampling bias was minimised by using the participants' official positions as the main selection criterion.

Government officials were selected from different departments and divisions within the Ministry of Environment, Sustainable Development, and Disaster and Beach Management and the Ministry of Tourism and External Communications. Since the approach to climate change management varies across departments and ministries, the selected participants were expected to hold different views. Hotels were selected based on two criteria. Firstly, the hotels situated in coastal areas were identified. Hotels established on the coastal zone of Mauritius are potentially more vulnerable to climate change effects, such as beach erosion and storm surges, than others of comparable size located inland. Secondly, from this sample, large and/or chain-operated hotels were selected.

Research suggests that awareness about environmental issues such as climate change is generally higher in large establishments due to influence from corporate policies. In smaller, independently-operated hotels, it is mostly the knowledge and views of managers that define risk perceptions. Although engagement with policies and responses to climate change may be limited in these hotels (Su, Hall, & Ozanne, 2013), two managers from smaller hotels were included in the sample during fieldwork because of their interest in the research topic and their willingness to participate.

5.3 Questionnaire development

Survey instruments utilising intensity measures, or ordinal scales, are extensively employed in research on climate change risk perceptions. Intensity measures are considered an effective way of measuring subjective judgements and opinions through close-ended questions (Nardi, 2006). The questionnaire for this research (see Appendix 4) was developed by adapting questions validated in other climate change risk perception studies (Shi et al., 2015; Takahashi & Meisner, 2011). The questionnaire measured variables of the conceptual framework developed in Chapter 4, namely, knowledge, risk perception, past experience, source of information, trust, and the

efficiency of the institutional response. It was comprised of Likert scale intensity measures and other ordinal scales.

A Likert scale typically consists of a 1 to 5 or 1 to 7 rating scale ranging from "strongly agree" to "strongly disagree" in which the middle position represents "neutral" (Nardi, 2006). The other ordinal scales used, in contrast, were comprised of ordered response options in which 1 usually represents the lowest category and 5 or 7, the highest (Saris & Gallhofer, 2007). For example, an ordinal scale can range from "no trust at all" (1) to "complete trust" (5).

According to Saris and Gallhofer (2007), the "neutral" category is not always necessary and can be omitted. In the questionnaire, the "neutral" category was not employed in questions measuring objective variables and those that are indicative of knowledge about climate change. For these questions and for several others measuring subjective variables, the option "Don't know" or "Don't know/No opinion" was offered as an alternative for "neutral". Although Saris and Gallhofer (2007) argue that this option should not be offered because respondents tend to choose it out of convenience for not having to think about the question, it was important to include it in this questionnaire. It helped in determining respondents' level of knowledge as well as identifying climate sceptics.

Particular attention was paid to ensuring that ordinal response categories were mutually exclusive and as far as possible, represented all possible choices and that the direction of the scales was consistent throughout the questionnaire. Double-barrelled, leading and loaded questions were avoided. To allow the comparison of climate change perceptions, the same questionnaire design was used for all the different groups of stakeholders. The semi-structured interviews allowed the participants to elaborate further on their views.

5.3.1 Pretesting

Once a satisfactory first draft of the questionnaire instrument was developed by the researcher, it was pretested. Pretesting is important for assessing the effectiveness of a research tool. Through pretesting, double-meaning, leading and loaded questions can be identified and it can be determined if the language and wording are appropriate for the targeted sample. Pretesting can

also help ensure that all the questions necessary to achieve the aims of the research have been included (Berg, 2007).

According to Berg (2007), pretesting involves two main steps. Firstly, the research instrument is critically reviewed by other researchers or experts knowledgeable in the research topic. Secondly, the instrument is administered to people having similar characteristics as the final participants of the study. Both steps were undertaken to assess the questionnaire developed for this research.

Firstly, a researcher from Massey University who is experienced in conducting surveys on social perceptions and climate change examined the questionnaire and identified double-meaning and confusing questions and response categories which were not mutually exclusive. The questionnaire was then revised to improve the wording of the questions and the response options.

Secondly, the researcher's supervisor and co-supervisor verified the second draft of the questionnaire. All open-ended elements were deleted from the questionnaire to avoid duplication of questions during the interview and to minimise the amount of time participants spend in completing it to allow more time for the interview. Additionally, the wordings of certain questions were made more specific. For example, for the questions pertaining to trust and response, 'the government' was changed to 'government ministries' to dissociate the political aspect from institutions and 'district councils' were added to represent the local authorities.

Thirdly, the questionnaire was administered to two graduate students from the Institute of Agriculture and Environment at Massey University, one from the field of environmental management and the other, conducting research in agriculture. This allowed the researcher to assess if the questions contained technical terms that are unknown to people of different backgrounds and to obtain the estimated time taken to complete the questionnaire. This step revealed that instructions for certain questions were not clear enough. Clear instructions were therefore included for these questions, especially those requiring participants to rate several items across an ordinal scale.

Lastly, the questionnaire was emailed to two acquaintances of the researcher who were employed in the tourism industry in Mauritius. Although they did not hold a managerial position within

their respective companies, they provided some insight into the types of responses to be expected when the questionnaire would be used for data collection. They reported being able to complete the questionnaire quickly and without any difficulty.

5.4 Interview design

Until recently, research on climate change risk perceptions and public engagement with climate change policies mainly employed large-scale quantitative methods (e.g.Bostrom et al., 2012; Chowdhury et al., 2012; Kellstedt et al., 2008; Leiserowitz, 2006). However such methods do not allow the exploration of why specific risk perceptions are held and how they are influenced. Additionally, the ambiguities and uncertainties of climate change make qualitative methods, such as in-depth interviews, essential tools for understanding the beliefs and values that shape people's response (Lorenzoni et al., 2007). For this research, semi-structured interviews were selected because they allow participants the freedom to express their views about topics or questions pre-determined by the researcher (Berg, 2007).

The interviews undertaken during this research were designed to obtain contextual information which could not be captured by the questionnaire. During the interviews, participants were asked to elaborate on their experience with hazards, their perceptions of climate change policies for tourism in Mauritius, their policy preferences and the barriers to effective climate change management. Table 5.1 shows the interview schedule used and Appendix 5 contains the questions developed to guide the interviews.

Selected key stakeholders were contacted by email to request their participation in the research. They were introduced to the purpose of the research and the general focus of the questionnaire through an information sheet. The information sheet was also used to provide assurance of confidentiality and to inform them of their rights as participants. Appendix 2 contains a copy of the information sheet. Of the 25 participants who were initially approached through email, five responded positively and one responded negatively. The remaining, including the majority of hotel managers, did not respond to emails. Many participants were recruited through phone calls.

Table 5.1 Guidelines for semi-structured interviews.

Semi-structured interview guidelines
1. Introduction a. Interviewer introduction b. Purpose of research and interview c. Reason for interviewing individual d. Format of interview e. Assurance of confidentiality f. Summary of participant rights g. **Participant consent requested** h. **Questionnaire administered** i. Request for permission to record interview 2. Interviewee background a. Occupation and years of experience 3. Experience of climate change a. Personal experience with climate change impacts b. Personal response to climate change impacts c. Management of climate change in Mauritius (social and cultural values) d. Trust in institutions 4. Tourism a. Effects of climate change on tourism b. Climate change policies relevant to tourism industry c. Efficiency of the policies d. Participation of hoteliers in policy-making process e. Currently implemented mitigation and adaptation measures in the tourism industry f. Policy preferences 5. Barriers to climate change management a. Socio-economic factors b. Political environment of Mauritius 6. Conclusion a. Further information to add b. Demographics c. Recommended interviewees

5.4.1 Bias

Berg (2007) explains that individuals agree to participate in studies for various reasons, making qualitative studies subject to response bias. More specifically, social desirability bias may occur whereby, in wanting to portray themselves more favourably to the interviewer, some individuals may purposefully withhold information or distort facts (Krosnick & Presser, 2010). To reduce this source of bias, Blankenship (2010) advises that the conclusions from the findings must be made after comparing the results of the primary data with other sources of information such as the literature and other professional reports. This precaution was taken during the discussion of results.

5.5 Data collection

Data was collected over a period of one month between mid-March and mid-April 2016. A total of 19 key stakeholders completed the self-administered survey questionnaire. Sixteen participants were also interviewed. The three participants who were not interviewed were government officials from two different authorities. Table 5.2 below shows the number of participants from each group of stakeholders.

Table 5.2 Number of participants from each stakeholder group.

Stakeholder group	Number of participants (survey)
Industry managers	6 (31.6%)
Government officials	8 (42.1%)
Academics	2 (10.5%)
NGOs	3 (15.8%)
Total	**19 (100%)**

All interviews were conducted face-to-face at the participants' workplaces and ranged between 20 minutes and 1 hour 15 minutes in length. Depending on participants' preferences, interviews

were conducted in English, French or Mauritian Creole. Field notes about the general impressions of the interviews were also taken.

5.5.1 Private sector participants

Although initially only managers from chain-operated and large hotels were going to be approached, only three of the five interviewed managers were from large and/or chain hotels. Out of the three, one preferred participating in this study anonymously, while two agreed to be personally identified. The latter were from the St Regis Mauritius Resort, a 5 Star[4] hotel of the American company Starwood Hotels and Resorts Worldwide Inc., and Récif Attitude, a 3 Star Superior hotel which is locally owned and operated by Attitude Hospitality Ltd. Both hotels have beach fronts.

The remaining two managers were from smaller establishments. They showed particular interest in expressing their views about climate change. They were the Property Manager of La Margarita Hotel and the Manager of Le Grand Bleu Hotel. Both hotels are located in the north of Mauritius and do not have beachfronts. They are located at 300 m and 100 m from public beaches, respectively. Lastly, the CEO of the association of hoteliers and restaurateurs of Mauritius (Association des Hôteliers et Restaurateurs de l'île Maurice [AHRIM]) was included in the industry managers group since AHRIM represents the tourism private sector in Mauritius.

5.5.2 Other participants

Five government officials were interviewed, two of whom were from the local government. These participants were (environmental) Health Inspectors at the District Council of Flacq and the District Council of Black River, two districts having coastlines and several hotels. Of the remaining three public officials, two participated in the research anonymously and one was assigned an identifier due to ethical considerations.

The two interviewed academics were from different universities and specialised in different fields. One academic was a lecturer in the Department of Environmental Science and Social Sustainability from the School of Sustainable Development and Tourism of the University of

[4] A Star rating system has officially been implemented by the Government of Mauritius in 2015. Several hotels, especially small and medium-sized ones, were not classified yet.

Technology, Mauritius. The second academic was from the Faculty of Law and Management of the University of Mauritius. This interviewee was a Senior Lecturer and the Head of the Department of Management, and specialised in tourism management. Lastly, the three interviewed members of NGOs were comprised of the manager of Reef Conservation, one anonymous participant and one interviewee who was assigned an identifier due to ethical considerations.

5.6 Data analysis

Unlike quantitative research, qualitative data analysis may not follow rigorous procedures. However, it can be divided into four basic steps (Creswell & Plano Clark, 2011; Hesse-Biber & Leavy, 2010), as illustrated in Figure 5.1.

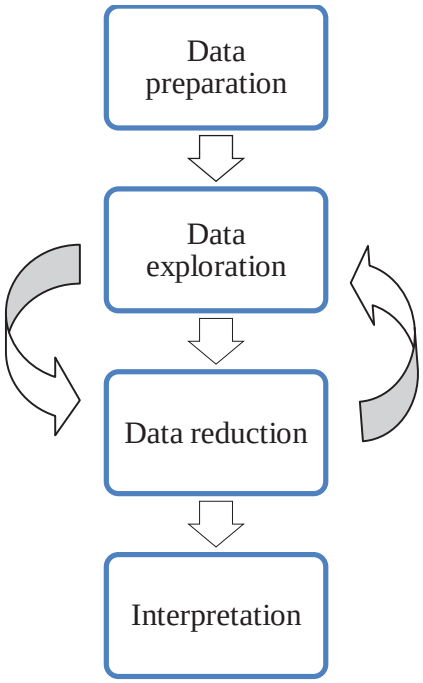

Figure 5.1 Steps in qualitative data analysis.

In this research, the initial step comprised of inputting the questionnaire data into Microsoft Excel and transcribing the interviews. Of the 16 interviews conducted, 11 were audio-recorded. These interviews were transcribed in their entirety by the researcher. Field notes were taken during the 5 non-audio recorded interviews and were transformed into written notes for analysis.

The second and third steps, data exploration and reduction, are usually carried out simultaneously and iteratively (Hesse-Biber & Leavy, 2010) with the aim of developing a preliminary understanding of the data (Creswell & Plano Clark, 2011). In these steps, the data was reviewed to identify the most significant aspects, trends and patterns as well as diverging opinions. The researcher then translated relevant segments of interview transcripts that were in French or Mauritian Creole into English.

The final step typically consists of coding the data to identify broad themes which can then be related to a theoretical framework (Creswell & Plano Clark, 2011). In this research, the data was not coded. Rather, predetermined themes from the conceptual framework developed in Chapter 4 guided data analysis. The questionnaire data was summarised into graphs and tables and excerpts from the interview transcripts were used to support, explain and discuss the results.

5.7 Research Ethics

Researchers, especially those studying the social dimensions of a problem in developing countries, have an ethical obligation to protect the rights and the privacy of their research participants. Researchers should ensure participant welfare and aim to empower them as well as build positive relationships with them (Banks & Scheyvens, 2014; Berg, 2007). Prior to fieldwork, the potential ethical concerns of this study were identified by using the Massey University Code of Ethical Conduct for Research, Teaching and Evaluations Involving Human Participants guidelines. Through the in-house ethics procedures of the Institute of Development Studies at Massey University, these concerns were discussed with the researcher's supervisors with the aim of minimising them. This research was deemed low risk. It is not expected to cause harm and discomfort to the participants or the researcher.

The main ethical considerations pertained to the privacy and confidentiality of participants. The small size and population of Mauritius make key stakeholders easily identifiable, especially the

limited number of government officials involved in climate change policy making. The purpose and process of the study as well as the participant rights were communicated to the interviewees through email prior to the interviews. Before starting data collection, participant rights to withdraw from the study at any time, decline to answer any question, request more information during participation or for the recorder to be switched off, were re-iterated to the interviewees, after which their written consent was obtained. If a participant was hesitant to provide written consent, an oral consent would have been sought. However, all the participants were comfortable providing their written consent.

To maintain the confidentiality of participants, no direct identifiers, such as department, position or location, were employed in this thesis without the consent of participants. During data collection, participants were asked how they wanted to be referred in this thesis (by their name and position, position only or by a descriptor if they wished to remain anonymous). Those who wished to remain completely anonymous were assigned identifiers depending on their positions (GOV for government officials, IND for industry managers, NGO for members of NGOs, and AC for academics).

In the event a participant chose to be identified in this thesis, but presented strong views that could jeopardise him/her or his/her position, a descriptor was attributed to that participant at the researcher's discretion. Participants were also informed that all information they share with the researcher would be used only in the dissemination of this study's findings and that the data collected would be stored securely until this research was completed, after which it would be destroyed.

5.8 Positionality

As the main research instrument, the researcher performs a key role in qualitative research, therefore making positionality a crucial consideration. Positionality pertains to "the multitude of roles and relationships that exist between the researcher and the participants within and in relation to the research setting, topic, and the broader contexts that shape it" (Ravitch & Carl, 2015, p. 11). It relates to the researcher's identity, which influences how fieldwork unfolds.

Aspects of the researcher's identity may be advantageous or create challenges during fieldwork (Mullings, 1999). In this research, the most important aspects of the researcher's identity that shaped fieldwork were nationality, professional background and education. Being a Mauritian provided the researcher with an insider status due to the shared cultural and linguistic heritage. Several government officials, the academics and certain private sector actors replied promptly and positively to the invitation to participate in the research within a very short period of time and showed particular willingness to assist the researcher during as well as after the interviews.

Furthermore, participants expressed their views in the language they were most comfortable with. The insider status of the researcher may have also allowed participants to express views which they would feel uncomfortable or reluctant to communicate to a researcher from a different culture, especially because the research topic involves tourism, an economic activity which relies substantially on foreign markets. However, having the insider status based on nationality only did not guarantee easy access to suitable participants. Having a professional background in the environmental field, the researcher was an outsider to the tourism industry. Consequently, contacting and scheduling interviews with certain industry managers was particularly challenging, but snowball sampling helped in overcoming this difficulty.

During an interview, the insider/outsider status of a researcher may change depending on the situation (Hesse-Biber & Leavy, 2010). In this research, the researcher's level of education might have led to an outsider status among certain participants. Participants were verbally asked their highest level of education. Several showed uneasiness in answering. The question possibly led the participants to compare their levels of education with the researcher who was consequently viewed as an outsider. A change in some participants' reaction to the researcher was noticeable. Since the questions were designed to ensure that education would arise at the end of the interviews, this situation did not affect the quality of the data collected. However, it may affect post-fieldwork relationships with the participants.

5.9 Limitations

This research has two main limitations. Firstly, because most Mauritians are at least bilingual, it is possible that interviewees interpreted the questions differently. Mauritian Creole, the most widely spoken language, is French based. Certain words that are written similarly in French and

English may have slightly nuanced meanings. It is possible that participants interpreted the questions according to the meanings of some words in French, thereby affecting their responses.

Secondly, the number of stakeholders, especially academics and members of NGOs, interviewed is fairly small. Furthermore, it is possible that the stakeholders who agreed to take part in the research were more concerned about climate change than those who declined to participate or did not respond to the invitation, leading to skewed results. Therefore, the results of this study cannot be generalised to the whole population. Further research is required to obtain a broader understanding of risk perceptions within the tourism sector of Mauritius. Nevertheless, this research provides meaningful insights into the risk perceptions of key actors who influence the policy-making process in Mauritius.

Chapter 6 Results

This chapter presents the results of this research. It is divided into five sections. Section 6.1 outlines the level of education and experience of participants. Sections 6.2 and 6.3 address the first research objective: exploring stakeholders' climate change risk perceptions and the factors that shape them. They demonstrate how past experience, communication, knowledge, the characteristics of hazards and the institutional response interact to create a high risk perception of climate change among the participants.

Section 6.4 explores stakeholder perceptions of the public policies for climate change management in Mauritius. Participants' policy preferences are then identified. Preferred policy instruments include education, stricter regulations and economic mechanisms such as carbon taxing. Lastly, Section 6.5 identifies what stakeholders perceived to be social, economic and political barriers to effective climate change management in Mauritius. Identified barriers include a lack of awareness and political will, and economic constraints, among others.

6.1 Education and professional experience

To reiterate, 19 stakeholders completed the survey questionnaire and 16 of them were interviewed. Since demographic data was collected at the end of the interviews, data about the length of experience and the highest level of education of the three non-interviewed participants could not be obtained. However, their gender and nationality were inferred from the communication between the researcher and the participants.

The sample was comprised of more male than female participants (14 men and 5 women). All participants were Mauritian, except one who was from Trinidad. The level of education and the length of experience in tourism or the environmental field varied among the interviewed participants, as shown in Tables 6.2 and 6.3. Fourteen of the 16 participants who were interviewed had an undergraduate degree. Nine possessed a post-graduate qualification. The two industry managers who did not possess university degrees were the most experienced participants of the sample, with more than 30 years of experience in the field of tourism. The majority of the other participants had ten or less than ten years of professional experience.

Table 6.1 Participants' level of education.

Stakeholder group	Highest level of education					
	Professional training	Undergraduate diploma	Bachelor's degree	Post-graduate diploma	Master's degree	PhD
Government officials			2	1	2	
Academics					1	1
NGOs			2			1
Industry managers	1	1	1		3	
Total	**1**	**1**	**5**	**1**	**6**	**2**

Table 6.2 Participants' length of professional experience.

Stakeholder group	Years of experience					
	Less than 1	1-5	6-10	11-20	21-30	More than 30
Government officials		1	3		1	
Academics			1	1[5]		
NGOs	2		1			
Industry managers			3		1	2
Total	**2**	**1**	**9**	**0**	**2**	**2**

[5] One academic stated having "more than 10 years" of professional experience without providing a specific number of years. The academic was therefore categorised as having 11-20 years of experience.

6.2 Risk perception

This section addresses the first research objective: determining stakeholders' climate change risk perceptions. Risk perception among the participants was evaluated by measuring two main elements: the level of concern for climate change impacts and the perceived characteristics of climate change. These characteristics include the onset of impacts, the seriousness of the impacts of unmitigated climate change and the degree to which climate change is controllable.

6.2.1 Level of concern

The participants were asked how concerned they feel about climate change affecting Mauritius, them personally and tourism in Mauritius. All participants reported that they feel "very concerned" about climate change affecting Mauritius. Likewise, all participants, except one, felt "very concerned" about climate change affecting them personally. One academic felt "fairly concerned" on the personal level. Therefore, participants perceived climate change as being highly risky for Mauritius and for themselves.

With respect to tourism in Mauritius, the majority of the participants (14), including all the industry managers, reported feeling "very concerned". Five participants felt "fairly concerned". For these five participants, risk perception is lower for tourism than for the island and for themselves. They include three government officials, one academic and one member of an NGO.

6.2.2 Onset of climate change impacts

The participants were asked when, according to them, climate change will start affecting Mauritius, their local area and tourism in Mauritius. All except two participants believed that the effects of climate change on Mauritius are "already being felt". Two industry managers believed that climate change will start affecting the island "within a few years". However, both reported having experienced changes in environmental conditions which they consider as indicative of climate change, including sea-level rise, beach erosion, coastal inundation and damage to marine life. One of them explained how temperature rise is specifically affecting his operations, leading to more carbon emissions by his establishment:

> When this hotel was built five years ago, a cooling tower was designed by considering an ambient temperature of 28°C. Now the ambient temperature is about 29.5°C. This additional 1.5°C makes a significant difference. I am unable to obtain my cooling cycle as required and this is affecting my operations. It affects the comfort of clients. Instead of using one cooling tower to achieve a cool temperature for my system here, I have to use two. It consumes more energy, more electricity and it becomes like a vicious cycle (Mr. A. Coonjun, Director of Engineering at The St Regis Mauritius Resort).

Views about climate change effects on participants' local areas varied slightly. The majority (15) considered that their local environment is already being impacted. A member of an NGO forecasted that climate change will affect his local area "within a few years"; two government officials believed that their local areas will be affected "during their lifetime" and another member of an NGO believed that the effects will not be felt within her lifetime, but future generations will be affected.

Higher variability was recorded in participants' views about the onset of climate change impacts on tourism in Mauritius, as illustrated in Table 6.3. Most participants (12) considered that tourism is already being impacted by climate change. However, seven stakeholders perceived climate change as representing more immediate risks to Mauritius and to their locality than to the tourism industry. In contrast, one industry manager, the Property Manager of La Margarita Hotel, believed that tourism will never be affected by climate change. The factors influencing his differing views are discussed in the next chapter.

Table 6.3 Participant views about the onset of climate change impacts on tourism in Mauritius.

Stakeholder group	When do you think climate change will start affecting tourism in Mauritius?					
	The effects are already being felt	Within a few years	Within your lifetime	Not within your lifetime, but it will affect future generations	Never	Total
NGOs	2		1			3
Industry Managers	4	1			1	6
Government Officials	4	4				8
Academics	2					2
Total	**12**	**5**	**1**	**0**	**1**	**19**
Total (%)	**63.2**	**26.3**	**5.3**	**0.0**	**5.3**	**100%**

6.2.3 Seriousness of impacts

The participants were asked how serious it will be for Mauritius, them personally and tourism in Mauritius if nothing is done to reduce climate change in the future. All except two participants thought that it will be very serious for Mauritius if nothing is done to mitigate climate change. For one industry manager, the Property Manager of La Margarita Hotel, and one government official, the situation for Mauritius will be somewhat serious. Generally, the Property Manager of La Margarita Hotel demonstrated a lower climate change risk perception than other participants.

All except three participants considered that it will be very serious for them on a personal level. Two government officials believed that it will be somewhat serious for them while another government official considered that climate change will not be so serious for him. However, this participant reported feeling very concerned about climate change affecting his local area, where effects such as uncomfortably hot temperatures were already being felt.

The same participant believed that unmitigated climate change will not be so serious for tourism in Mauritius while all other 18 stakeholders believed that the circumstances for tourism will become very serious. However, the participant stated feeling very concerned for tourism and believed that climate change will impact tourism within a few years. This inconsistent pattern, that is, high levels of concern but the belief that unmitigated climate change will not prove to be a serious issue, may indicate that the participant was subject to social desirability bias and had a lower risk perception than other participants. Social desirability bias refers to the purposeful manipulation of responses by participants to appear more favourable to the researcher (Krosnick & Presser, 2010).

6.2.4 Control over climate change

The participants were asked to what extent they believe that climate change is controllable through human intervention. None of the participants considered climate change to be completely out of human control. On a scale of 1 to 5, where 1 represented ‘not controllable at all’ and 5, ‘completely controllable’, only one participant selected a value tending to the lower end of the scale. To varying degrees, almost all participants view the phenomenon as being controllable through human intervention, as illustrated in Table 6.4.

Table 6.4 Participant ratings about the extent to which climate change is controllable through human invention (N=18, an academic did not respond to the question).

Stakeholder group	In your opinion, to what extent is climate change controllable through human intervention?					
	Not controllable at all				Completely controllable	
	1	2	3	4	5	Total
Academics			1			1
Government Officials			2	4	2	8
Industry Managers			4	2		6
NGOs		1	1	1		3
Total	**0**	**1**	**8**	**7**	**2**	**18**
Total (%)	**0**	**5.6**	**44.4**	**38.9**	**11.1**	**100%**

6.3 Factors shaping risk perceptions

This section examines participants' level of knowledge about climate change, their perceived past experiences with the phenomenon, the sources of information that they most frequently obtain information on climate change from, their level of trust in various information sources and the agencies that are considered to be the most responsible for taking actions against climate change impacts.

6.3.1 Knowledge

Participants' knowledge about climate change was measured in two ways. Firstly, participants' self-perception of knowledge, that is the level of confidence they had in their knowledge, was determined. Secondly, participants responded to factual statements about climate change on a Likert scale. The utilisation of a Likert Scale instead of true/false options helped to identify whether there were any climate sceptics in the sample.

All participants reported being either very well informed (9) or somewhat informed (10) about climate change, indicating that the self-perception of knowledge is high among all the participants. However, the second technique indicated that the majority of the participants were unfamiliar with some key aspects of the phenomenon. Six statements pertaining to the general

trend of climate change and its causes and consequences were used. Four of them, which described the more commonly known facts about climate change, were correct. As expected, most participants either agreed or strongly agreed with them.

The remaining two statements were incorrect and were specifically used to determine whether participants had an in-depth knowledge about climate change. Responses to these two statements varied the most, as illustrated in Figure 6.1. The responses indicate that there is more uncertainty about the causes than the consequences of climate change.

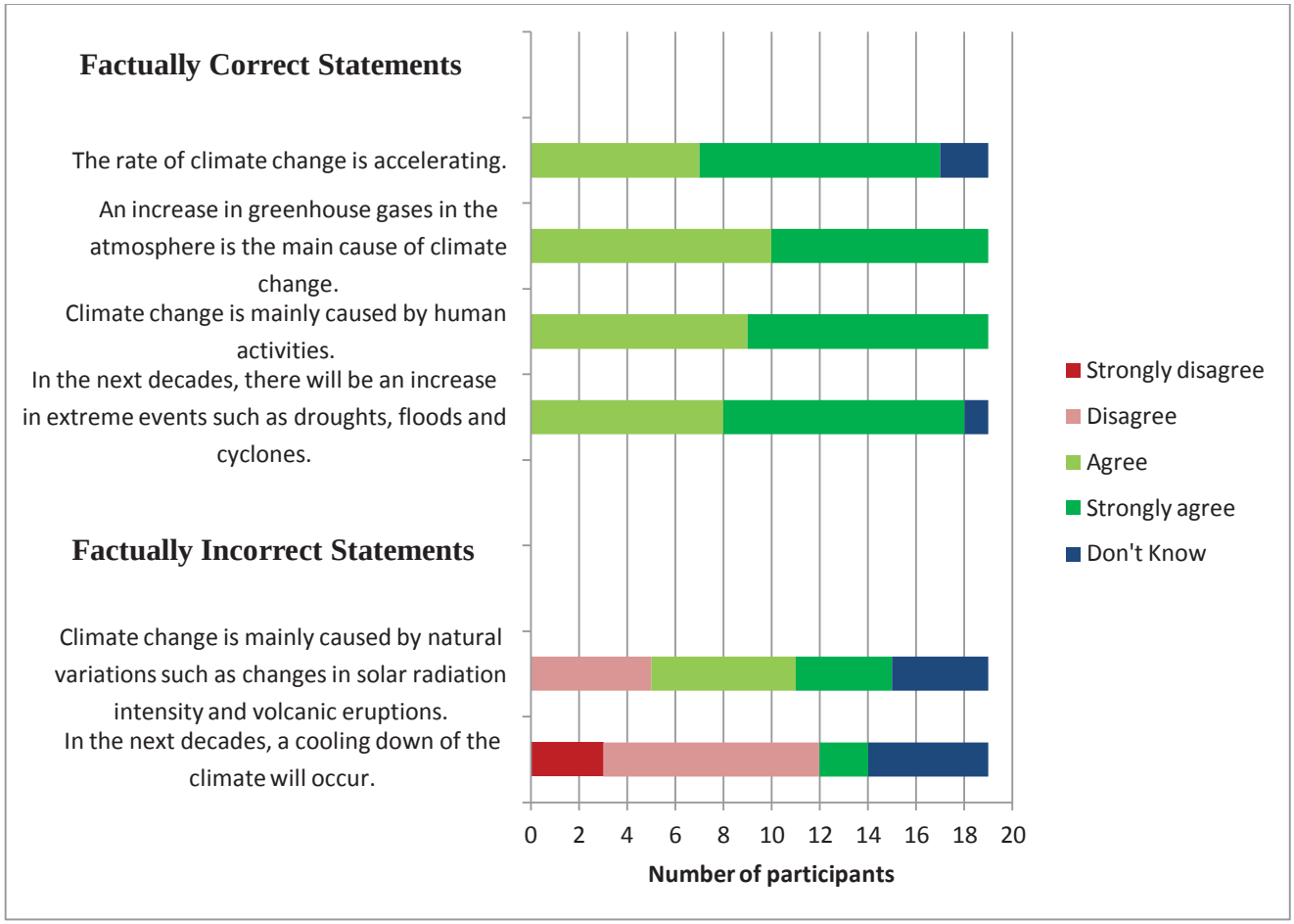

Figure 6.1 Response distributions of the statements measuring knowledge.

Tables 6.5 and 6.6 show how the responses to the two incorrect statements vary among stakeholder groups. Two industry managers and the three members of NGOs demonstrate more in-depth knowledge about the causes of climate change than the academics and government officials.

Table 6.5 Participants' responses to the incorrect statement pertaining to the causes of climate change.

Stakeholder group	Climate change is mainly caused by natural variations such as changes in solar radiation intensity and volcanic eruptions.					
	Strongly disagree	Disagree	Agree	Strongly agree	Don't Know	Total
NGOs		3				3
Industry Managers		2	1	2	1	6
Government Officials			3	2	3	8
Academics			2			2
Total	**0**	**5**	**6**	**4**	**4**	**19**
Total (%)	**0**	**26.3**	**31.6**	**21.1**	**21.1**	**100%**

Table 6.6 Participants' responses to the incorrect statement pertaining to the consequences of climate change

Stakeholder group	In the next decades, a cooling down of the climate will occur.					
	Strongly disagree	Disagree	Agree	Strongly agree	Don't Know	Total
NGOs	1	1			1	3
Industry Managers		4		1	1	6
Government Officials	2	3			3	8
Academics		1		1		2
Total	**3**	**9**	**0**	**2**	**5**	**19**
Total (%)	**15.8**	**47.4**	**0.0**	**10.5**	**26.3**	**100%**

6.3.1.1 Climate change scepticism

Two participants, an academic and a government official, selected the option 'don't know' for the statement "the rate of climate change is accelerating", suggesting that they may not believe that accelerated climate change is occurring and therefore, are climate sceptics. However, their responses to subsequent statements clarified that they are not climate sceptics. Both either agreed

or strongly agreed that an increase in GHG in the atmosphere is the main cause of climate change and that climate change is mainly caused by human activities. As such, their responses to the first statement can be considered indicative of incomplete knowledge, especially with respect to the geological timescales of natural and anthropogenic climate change.

The government official in fact selected 'don't know' for four of the six statements. During the interview, he explained that his knowledge about climate change is limited mainly because all government officials are not equally informed through inter-ministerial communication:

> Climate change is a problem, yes. What is it? What is its cause? What can we do to stop it? It [the information] is fragmented. [...] We do not master it. It is the Ministry of Environment that has a department (GOV#2).

Overall, the responses to the statements measuring knowledge indicate that all the interviewees believe that accelerated climate change is happening.

6.3.2 Experience

The participants were asked if they have personally experienced changes in their environment that may be indicative of climate change. All participants responded positively and claimed that they have experienced changes related with climate change. Table 6.4 illustrates when the most recent changes were experienced.

Table 6.7 Time when the most recent changes were experienced.

Occurrence of most recent changes	Number of participants
In the last 6 months	8 (42.1%)
6 months to 1 year ago	1 (5.3%)
1 year to 5 years ago	8 (42.1%)
More than 5 years ago	2 (10.5%)

The environmental change most frequently mentioned by participants when asked about their past experience with climate change-related hazards was flash floods. Although most participants did not personally experience or directly observe them, flash floods were among the first answers that they gave. The eight participants, who reported their most recent experience with changes as occurring 1 year to 5 years ago, as shown in Table 6.4, are in fact referring to deadly flash floods which occurred in 2013. Participants remarked that they are a new phenomenon for Mauritius:

> About the flash floods that occurred in Mauritius three years ago, people are saying it is due to drains. Indeed, it is a problem linked with drains but we are not used to receiving this kind of rain (GOV#2).

> It's been raining differently. The rain is more localised now. [...] We had the flash flood back in 2012 if I'm not mistaken and no one had heard about the flash flood in Mauritius. [...] Flash floods are becoming very common. Floods in general are becoming very common (Dr. R. Nunkoo, Senior Lecturer and Head of Department of Management at the University of Mauritius).

Environmental changes that participants listed as having personally experienced include:

- More frequent torrential rainfall
- More localised rainfall
- Periods of drought followed by sudden heavy rainfall
- Temperature rise
- More frequent outbreaks of vector-borne diseases

Environmental changes that participants listed as having observed, often during their professional activities, include:

- Extensive coral bleaching
- Marine biodiversity loss
- Sea level rise
- Accelerated beach erosion

Participants also identified the diminishing occurrence of historically common natural hazards, notably cyclones, as being indicative of climate change. Although destructive, cyclones have certain beneficial effects on Mauritius.

> For the past twenty years, no cyclone has visited Mauritius. We had Class II[6] and Class III, but only for some hours. No Class IV which has destroyed everything. [...] Twenty years, it is too obvious (Mr. J. Lobin, Chief Health Inspector at the Black River District Council and part-time lecturer at the University of Mauritius).
>
> Cyclones regulate the population of bats[7], the temperature and the climate. They are also important for our water resources. All of these things are disturbed today. [...] Things we learned about the geography and climatic conditions of Mauritius twenty to twenty-five years ago are disturbed now. We cannot rely on the dates and times to observe certain phenomenon. A lot of unpredictability, I think (Mr. J. Kwok, CEO of AHRIM).

6.3.3 Communication and trust

To determine the sources of information from which participants obtain information about climate change, participants were asked to rate thirteen sources on a five category scale ranging from never to all the time. For analysis, the five rating elements were grouped to create three categories: least frequently (the sum of 'never' and 'rarely'), occasionally and most frequently (the sum of 'frequently' and 'all the time'). As illustrated in Figure 6.2, the sources rated as the most frequently providing information are the internet, scientific journals, government ministries, professional reports and colleagues and peers.

The two sources from which the majority of participants (12) least frequently obtain information are friends and family and district councils. The other sources, except newspapers and local experts, provide information occasionally.

[6] In Mauritius, cyclone warnings are based on a system of class ranging from Class I to Class IV depending on the predicted amount of time left before wind speeds of 120 km/h reach the island (Mauritius Meteorological Services, n.d.-b).

[7] The Mauritian Fruit Bat is considered a pest by the Mauritian government. Fruit growers claim that they heavily damage their produce. The Mauritian Fruit Bat is classified as vulnerable by the IUCN Red List.

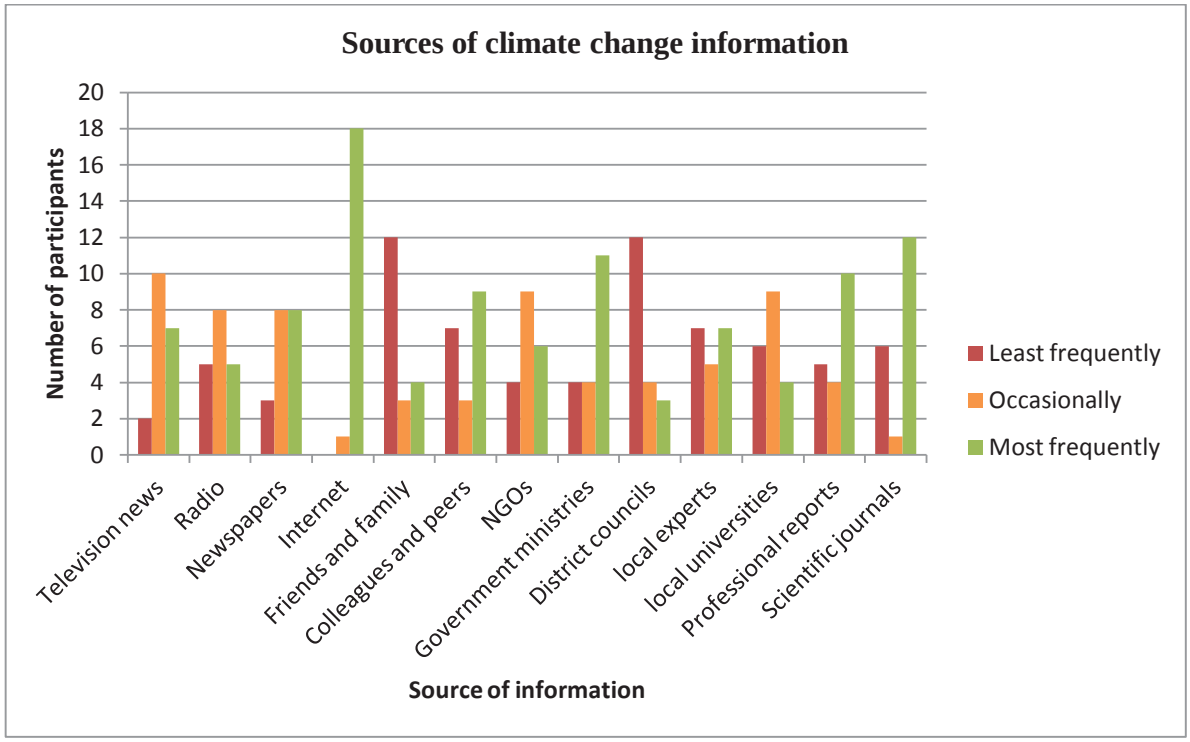

Figure 6.2 Frequency at which participants obtain information from various sources.

Figure 6.3 illustrates the differences between the sources of climate change information among the stakeholder groups. The internet, friends and family, and district councils are not included because their trends are similar to Figure 6.2. For members of NGOs, colleagues and peers, professional reports and scientific journals are equally the most frequent sources of information. For government officials, information about climate change is most frequently obtained from government ministries. For industry managers, media such as television news and newspapers are the most frequent sources. Academics rely mostly on scientific journals for climate change information.

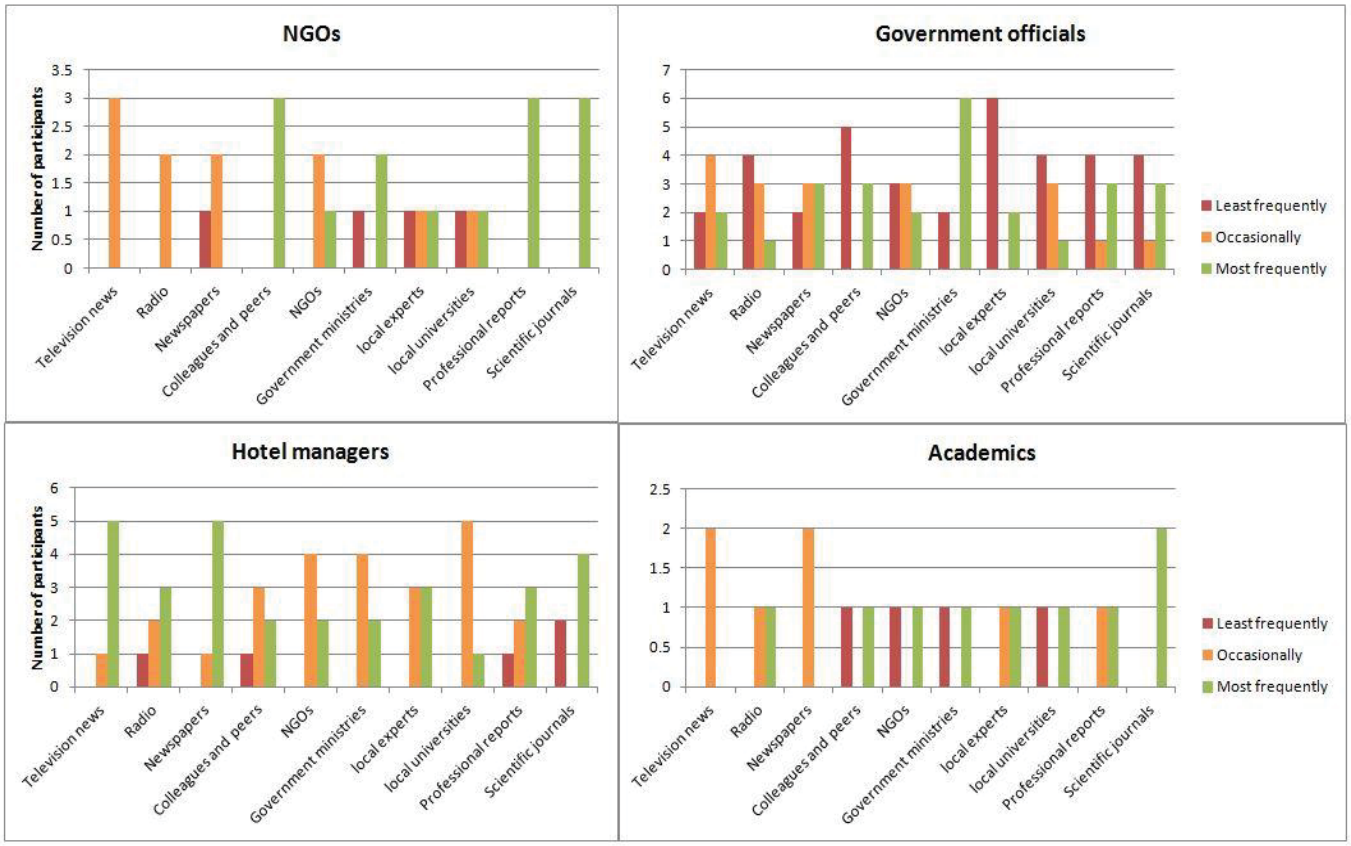

Figure 6.3 Comparison between the sources of information among the different stakeholder groups.

To determine how much participants trust different sources of information, they were asked to rate seven sources on a five category scale ranging from no trust at all to complete trust. The option 'don't know/no opinion' was also provided to cater for instances when a participant does not receive information about climate change from a particular source. For analysis, the five rating categories were grouped to represent three levels of trust: low (the sum of 'no trust at all' and 'very little trust'), intermediate ('some trust') and high (the sum of 'a lot of trust' and 'complete trust'). Figure 6.4 illustrates the level of trust in each source.

Scientists are the most highly trusted source. Government ministries, participants' employers and NGOs are also highly trusted sources. Participants exhibited an intermediate level of trust towards the media, district councils and friends and family.

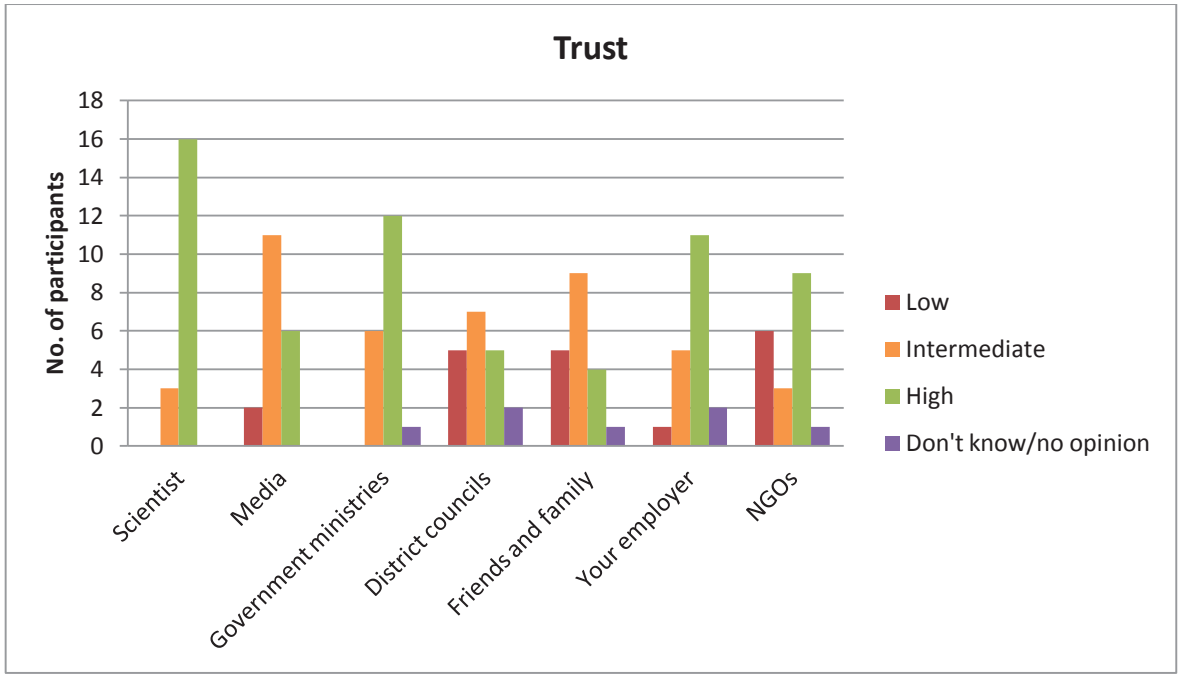

Figure 6.4 Levels of trust in different information sources.

Peculiarly, NGOs are simultaneously the least trusted and one of the most highly trusted sources. While 9 participants consider NGOs highly trustworthy, 6 participants also had a low level of trust in them. Table 6.4 illustrates the levels of trust in NGOs according to stakeholder groups.

Table 6.8 Trust in NGOs according to stakeholder groups.

Stakeholder group	Level of trust in NGOs				
	Low	Intermediate	High	Don't know/no opinion	Total
NGOs	1		2		3
Government officials	3		4	1	8
Hotel managers		3	3		6
Academics	2				2
Total	6	3	9	1	19
Total (%)	**31.6**	**15.8**	**47.4**	**5.3**	**100%**

6.3.4 Responsibility

All participants either agreed (9) or strongly agreed (10) that climate change is mainly caused by human activities. The majority of participants (10) either acknowledged not taking any measures or explained their organisations' responses when questioned about their personal response to climate change. Six participants reported implementing measures at the household level, including using solar water heaters, more eco-friendly air conditioners and light bulbs, saving electricity in general and limiting aerosol use. Two participants mentioned rainwater harvesting and three participants mentioned engaging in other environmentally friendly behaviours such as composting.

Out of the six participants who reported taking personal measures, an academic and an industry manager recognise that the problem cannot be addressed only through simple solutions implemented by a few people.

> At the micro-level at home, we do engage in composting now, waste management. We save electricity, but I think it should happen at a more macro level, society level (Dr. R. Nunkoo, Senior Lecturer and Head of Department of Management at the University of Mauritius)
>
> We try to contribute something at least. It is true that individual actions will not change much but we start to do something to educate the children (Mrs S. Tiroumalechetty, Human Resources Executive at Récif Attitude Hotel).

To identify which agencies participants consider the most responsible for ensuring the sustainability of tourism in Mauritius, participants were asked to rank environmental groups, hotel companies, government ministries and district councils on a five point scale where 1 represented no responsibility and 5, high responsibility. As illustrated in Figure 6.5, seven participants considered all four agencies to be highly responsible in taking actions against climate change.

Most stakeholders (16) attributed the highest level of responsibility to government ministries, followed by hotel companies. District councils were considered as moderately responsible. While only seven participants selected a rating of 5 for environmental groups such as NGOs, eight participants selected a rating of 4, suggesting that the roles of NGOs are also deemed important in climate change management for tourism.

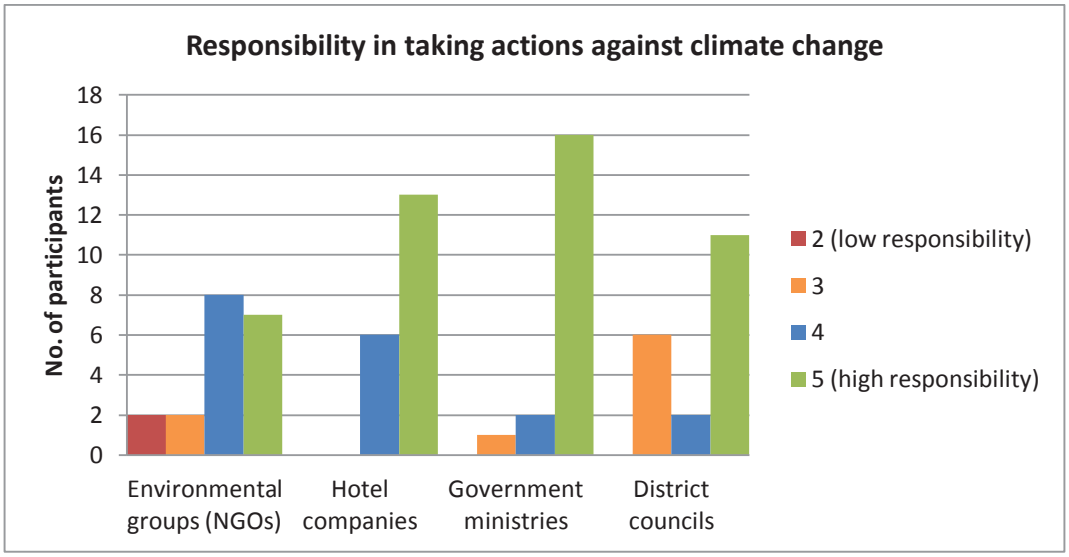

Figure 6.5 Participants ratings about the level of responsibility different agencies have towards climate change management for the sustainability of tourism in Mauritius.

Participants also identified local research institutions, hotel guests, airlines, the public and international agencies such as the UNFCCC as highly responsible for taking actions against climate change impacts for the sustainability of tourism in Mauritius.

6.3.5 Institutional capacity and response

Perceived institutional capacity was measured through the level of confidence participants have in authorities successfully managing the effects of climate change. Confidence was measured on a five category scale ranging from 'no confidence at all' to 'very high confidence'. Table 6.9 illustrates the level of confidence according to stakeholder groups. The majority (12) selected the middle category, stating that they have 'some confidence' in the authorities. They included five government officials, five industry managers, one member of an NGO and one academic.

Two government officials have more confidence in the authorities; one selected 'high confidence' and the other, 'very high confidence'. On the other hand, four participants have very little confidence in the authorities. A member of an NGO stated having no confidence at all.

Table 6.9 Levels of confidence in authorities successfully managing climate change in Mauritius according to stakeholder groups.

Stakeholder group	How much confidence do you have in the authorities successfully managing the effects of climate change in Mauritius?					
	No confidence at all	Very little confidence	Some confidence	High confidence	Very high confidence	Total
Academics		1	1			2
Government Officials		1	5	1	1	8
Industry Managers		1	5			6
NGOs	1	1	1			3
Total	**1**	**4**	**12**	**1**	**1**	**19**
Total (%)	**5.6**	**21.05**	**63.16**	**5.26**	**5.26**	**100%**

To determine participants' perceptions about the institutional response to climate change, they were asked to select one out of four statements that best describes their feelings about climate change management in Mauritius. Half of the participants who responded[8] (9) believe that actions are being taken, but they are inadequate, while the other half thinks that adequate actions are being taken but more is required.

To explain their survey responses, two government officials explained that the authorities have started various adequate actions such as the regular maintenance of storm-water drains, tree planting and the formulation of policies. However, two others feel that more capacity building is required among government staff with respect to climate change management. Another government official considers that the protocols set up for disaster and risk management, and more specifically their practical aspects, can be substantially improved.

Members of NGOs share the view that government officials require further capacity building, especially because environmental management is usually done through projects, and is therefore fragmented.

> There's also a need for the different ministries, for their technical people to be trained in, even how to monitor climate change issues, like in terms of how do you monitor the extent of bleaching. So there's capacity building that needs to happen within different ministries to be able to do things. [...] I know there has been quite a lot of work done and things are being put in place but this is all through projects, so now maintaining these things after project life, is something that we need to see how it's going to evolve (Mrs. K. Young, Manager of Reef Conservation).

The confidence of NGO member #1 decreased following allegations of corruption against the Minister of Environment in March 2016. A real estate developer accused the minister of soliciting a bribe to issue his EIA permit and disclosed a voice recording to support his claim. The Prime Minister of Mauritius subsequently asked the Minister of Environment to resign. In this research, several interviewees did not agree to be audio recorded due to this incident.

[8] One participant selected two statements. Since the statements were mutually exclusive, the participant's response is invalid. Therefore, N = 18.

Industry managers were unanimous: authorities are not implementing concrete long-term solutions despite having the monetary resources. Using the example of waste recycling, Industry Manager #1 explained that authorities appear uncertain about the measures they implement. Hotels are encouraged to sort wastes, but separate collection services are not provided. Sorted wastes are therefore mixed again before being sent to landfill. According to Industry Manager #1 as well as the other industry actors, authorities demonstrate limited forward-thinking.

> They have constructed a beautiful beach at Bain Boeuf and what they have done is very good. But these are piecemeal solutions. It is not for the medium or long term. They are solutions for the short term only (Mr. N. Molotoo, manager at Le Grand Bleu Hotel)

Figures 6.7 and 6.8 illustrate the rehabilitative works done at Bain Boeuf, a public beach located in the north of Mauritius.

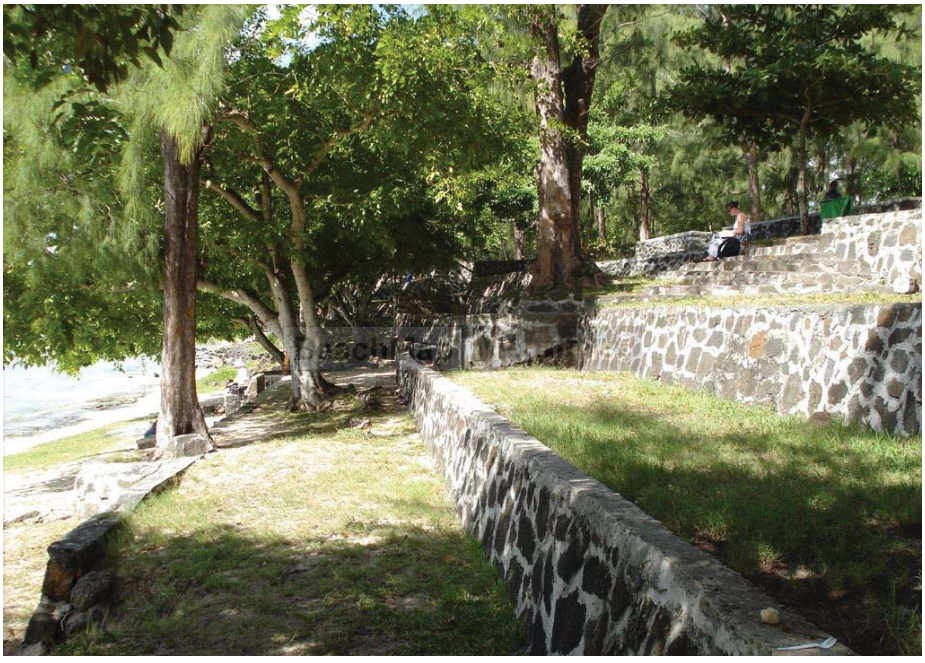

Figure 6.6 Photograph of Bain Boeuf beach after rehabilitation (BeachMap Mauritius, 2016).

Figure 6.7 Photograph of Bain Boeuf beach after rehabilitation (BeachMap Mauritius, 2016).

Two industry managers highlighted the lack of specific environmental targets.

> We do not have a concrete strategy. We do not set targets. It is as if we are doing [managing] climate change for the sake of doing it. […] These [current actions] are petty things. We still lack high level things. We do not have a forum. We do not have a board. We do not have a good action plan where we can put all the procedures and the best practices. And [there are no] whistle-blowers to check, verify and flag industrials (Mr. A. Coonjun, Director of Engineering at The St Regis Mauritius Resort).

> There are no laws that are strong enough. There are no directives as well. We could have national directives, but we do not. […] We understand the small things like cleaning up, but with respect to environmental protection and even further, climate change etc., I think we are very far from it. Although enormous budgets are dedicated to these things, they remain poorly understood and people do not really know what to do. The smallness of Mauritius becomes a good excuse for inaction (Mr. J. Kwok, CEO of AHRIM).

To a certain extent, the interviewed academics agreed with the industry managers. Both academics believe that, although governmental bodies are undertaking several important actions, a gap exists between their action plans and the reality on the field.

> I think there needs to be more consensus in terms of what needs to be done. In fact, a lot of micro-management of climate change is not going to work. There needs to be concerted action. Obviously at the government level, you have the SIDS conference and all. This is where it is discussed. But there needs to be more action on the ground. [...] I think there is not enough. Or at least, it is not visible to me (Dr. R. Nunkoo, Senior Lecturer and Head of Department of Management at the University of Mauritius).

6.4 Policy

This section addresses the second research objective: exploring stakeholder perceptions of the public policies in place to address climate change risks and examining their public policy preferences for climate change management. Prior to collecting data about their views on the public policies, participants were asked to list the impacts they consider the most serious for tourism to identify aspects requiring attention.

6.4.1 Effects of climate change on tourism

All of the interviewees were acutely aware of the dependence of tourism on environmental features. The impacts of climate change identified as most important include:

- Sea level rise causing beach erosion
- Flooding
- Coastal zone degradation
- Biodiversity loss
- Impacts on landscapes other than beaches
- Uncomfortably high temperatures
- Too many rainy days, and therefore fewer sunny days

For two NGO members, government policy will cause further damage to the tourism products of Mauritius.

> The government policy is to increase the number of tourists but increasing the number has an impact on the environment as well as on the number of hotels that needs to be constructed. [...] Mauritius will reach a point when it will no longer have the environment to attract the tourists (NGO#2).

> The quality of our beaches is continuously deteriorating and we do not get the same quality of tourism. Now they [the government ministries] are expanding [the markets]. They are going towards China, etc. When we talk with them, skippers tell us that Asian tourists are not like European tourists, who are more environmentally conscious. They just use the beach and then leave (NGO#1).

Only one industry manager expressed concern about the combined effects of these government policies and climate change for tourism.

> Authorities want to attract two million tourists per year in the coming years. How will we supply such a large number of tourists with food, water and electricity? Water desalination maybe (Property Manager of La Margarita Hotel).

La Margarita Hotel is the smallest hotel of the sample. As determined in Section 6.2, its property manager has a lower risk perception compared to other participants. Nevertheless, he demonstrated an awareness of the indirect impacts of climate change, possibly due to the hotel's small size, and therefore, higher vulnerability to these threats.

Two government officials mentioned the social and economic implications of a destabilised tourism industry.

> Tomorrow if there is a problem in the tourism industry, it will be a big social issue for Mauritius. The number of people who will lose their jobs, the number of people who have invested in the business. If tourists stop coming, then... (GOV#2).

> It is not only the tourism industry that will suffer, but also all the other activities related with the tourism industry: the food industry, transport because they have taxis linked to them, so many jobs linked to them. And you have other places, restaurants, where people [tourists] go, and the places where they go to buy local products. All these indirectly associated activities would be affected if tourists move away from our country (Mr. J. Lobin, Chief Health Inspector at the Black River District Council and part-time lecturer at the University of Mauritius).

6.4.2 Effectiveness of public policies

To determine the effectiveness of climate change policies relevant for tourism in Mauritius, the participants were first asked if they were aware of these policies. Most of the participants have low or no awareness of climate change policies for tourism in Mauritius. More than half of the participants (9) acknowledged being unaware of any climate change policies specifically for tourism. Therefore, they were unable to comment on their effectiveness. They included four hotel managers, the three members of NGOS, one academic and one government official.

Two government officials named different government bodies, such as the Disaster Risk Reduction Committee and the Ministry of Environment, that are responsible for managing climate change effects. According to one, in-depth research is not conducted before formulating and implementing policies and other actions. More specifically, modelling software is not used to predict the effects of development on coastal dynamics. Consequently, implemented actions prove to be less effective than expected. Nevertheless, the interviewee highlighted that significant effort is being put into the management of coastal environmental issues.

The second government official, who works within a district council, stated that policies for the construction and maintenance of drains are effective. Another government official listed several actions, such as tree planting on beaches and coastal rehabilitation, which are being implemented by various authorities, without commenting on their effectiveness.

Two industry managers stated that they are aware of the existence of a national climate change strategy. However, they were certain that the policies are not being implemented.

> There is no follow-up. There is no policing. There are no whistle-blowers. There is no monitoring. There is no awareness. There is no sensitisation about these policies. There is no campaign being done across the country to tell us what to do. [...] We cannot say they are effective since they are being unable to put it in place. The policies are here but they are not practically being implemented (Mr. A. Coonjun, Director of Engineering at The St Regis Mauritius Resort).

Only two participants, an academic and a government official, identified the National Climate Change Adaptation Policy Framework (NCCAPF) as the main policy document for climate change in Mauritius. According to the government official, the desired level of success is

difficult to achieve due to financial constraints. The academic did not know to what extent the policies are being implemented.

> We don't know because it's never been publicised. It's never brought to the attention of stakeholders. Universities are not aware of it [...] University should have been a major contributor. They are the most important generator of research output (Dr. R. Nunkoo, Senior Lecturer and Head of Department of Management at the University of Mauritius).

6.4.3 Preferred public policies

The participants were asked which types of policies they prefer for the management of climate change risks. The preferred policy mentioned by all the participants is education and raising awareness among the general population of Mauritius.

> When we have the means to make ourselves heard at COP21 and we are in the SIDS etc., we tend to believe that we are very well informed but I think that lay people are not necessarily well informed. They understand things like the environment, water ways, wastes, etc. But about climate change, what is it? What are we doing to reduce it? To slow it down and manage the changes? I do not think that people are fully aware (Mr. J. Kwok, CEO of AHRIM).

Six participants, including five industry managers and one academic, advocated for stronger mitigation measures by authorities. The industry managers consistently asked "What is being done by the authorities to reduce climate change?" and two argued that targets for reducing carbon emissions have to be set. The academic and one industry manager further suggested the implementation of a carbon taxation system.

The NGO representatives interviewed supported stricter policies for environmental conservation, including lagoon management, designating specific zones for snorkelling and diving, increasing coastal setbacks and the use of fixed mooring buoys.

Only one government official stated that Mauritius needs to adapt more than mitigate its GHG emissions. The participant stated that although both mitigation and adaptation are needed, Mauritius must focus on adaptation since it is among the most vulnerable countries. He stressed the need for coastal protection works. Another government official mentioned the importance of diversifying the tourism industry:

> We should not solely focus on our beaches but we should move inland as well. To have a nice place where tourists will be attracted, we have to make it as beautiful as the sea and sand by having green spaces. For example we have the gorges, and we have the folkloric dance and all that. […] They are very interesting and unique to Mauritius (Mr. J. Lobin, Chief Health Inspector at the Black River District Council and part-time lecturer at the University of Mauritius).

6.5 Barriers to climate change management

This section addresses the third research objective: identifying the stakeholder-perceived barriers to efficient climate change management. The participants were asked if there were social, economic or political factors which prevented effective climate change management for tourism. Six barriers were identified.

6.5.1 Social factors

Several participants identified lack of awareness and understanding as the main social barrier to climate change management. Several participants, especially industry managers, remarked upon the lack of communication between government bodies and their organisations. Consequently, industry managers were uncertain about the effectiveness of government initiatives.

> We know a bit. Well, there is a project, I know they have an ongoing project, then nothing. One year later, they do another project and then nothing again. So, we don't have a follow-up. Was it OK? What did it [the project] contribute? Nothing at all. I am not aware of the project outputs (Mrs S. Tiroumalechetty, Human Resources Executive at Récif Attitude Hotel).

While the two smaller establishments stated that they have never been contacted to provide any input into the policy making process, the three industry managers from the large and/or chain-operated hotels acknowledged providing their views for certain policies, mainly through AHRIM. Nevertheless, the CEO of AHRIM highlighted the lack of a strategy for communication.

> For several projects on the environment, and especially climate change, we fail because we do not integrate the communication aspect from day 1. There is no strategy for communication. […] A strategy for communication is not just saying 'today we did this and tomorrow we will do that'. Rather, it is 'we are doing this because of that'. We lack it (Mr. J. Kwok, CEO of AHRIM).

Additionally, an academic identified the material culture of Mauritian society as hindering climate change actions.

> We are still in a materialistic culture. It's about money, power, cars, it's about property, real estate. [...] I am not blaming anyone. It's just that it's us; it's our culture that will change as we develop ourselves. As we enter a probably high income economy, we will move from a materialistic to a post-materialistic society where we will start thinking about environment, welfare, corruption, what's happening to the country (Dr. R. Nunkoo, Senior Lecturer and Head of Department of Management at the University of Mauritius).

6.5.2 Lack of political will

A government official explained that, because of the different treaties Mauritius is part of, climate change has to be included in the political agenda regardless of which political party represents the government. However, a general feeling of 'only talk, no action' prevailed among the participants with respect to political will. Five industry managers, two NGO representatives and one government official highlighted the lack of political will to effectively address climate change while several others believed that climate change is not high on the political agenda.

> Climate change was being discussed when I was still a government official in 2002. Now if you go there, it is still the same. There has been no change. I believe that, until now, the government has not come forward with it. It has not encouraged the population (Mr. A. Coonjun, Director of Engineering at The St Regis Mauritius Resort).

> Like in other countries of the world, we are not going to reinvent things. It is all a question of political will. All this [mainstreaming of hybrid cars] is not done. If they think that the citizen will do it by himself, no way. There are a lot of contradictions. We need a champion. In the future, we need a strong leader who will put the environment, climate change management, etc. very high hierarchically (Mr. J. Kwok, CEO of AHRIM).

Furthermore, an academic asserted that politics interfere with sound policy formulation.

> Mauritius is a difficult country to manage politically because we are multi-racial and there's lots of political interference in all organisations. […] It's a question of which government department has the highest lobby on policy making because policy making is always about who has the largest influence (Dr. R. Nunkoo, Senior Lecturer and Head of Department of Management at the University of Mauritius).

6.5.3 Political and institutional integrity

As explained in section 6.3.5, participants have an intermediate level of confidence in the capacity of institutions to respond to climate change. In addition to the recent allegations of corruption against the Minister of Environment, two NGO members emphasised that authorities and political leaders do not always demonstrate integrity. Signed treaties are not always respected.

> You cannot conserve when you are letting people build hotels in places that you are supposed to conserve. It does not make sense. What are they trying to conserve? If conservation is on the agenda, you must know how to give EIA permits. You cannot give an EIA for places that are supposed to be conserved (NGO member #2).

> Several times I have seen that, although Mauritius is signatory to something, it does not follow them. For example, the endemic bats of Mauritius. We are in CITES, we signed a lot of things to protect it. But nothing was able to stop the official culling (NGO member #1).

6.5.4 Limited private sector participation

One academic and two government officials emphasised that the private sector does not participate sufficiently in the management of climate change impacts. According to a lecturer from the University of Technology Mauritius, the private sector is usually resistant to change. Furthermore, GOV#1 asserted that there is a gap between intention and action in the industry and that most industry actors place too much reliance on government authorities. According to GOV#1, industry actors believe that the authorities must do everything. Therefore, GOV#1 underlined the importance of investment by the private sector for win-win outcomes.

6.5.5 Economic barriers

The Property Manager of La Margarita Hotel identified the lack of finance as a barrier to his business' capacity to adapt to climate change. La Margarita's Property Manager stated that installing a solar water heater system at the hotel proved costly and that he has little motivation to adopt other eco-friendly measures. Unlike households, businesses are not eligible for subsidies on renewable energy systems. Additionally, GOV#1 stated that complaints about insufficient funds to implement policies are frequently registered, without elaborating on the complainers.

However, according to another government official, finance is available through local branches of international institutions but despite this, green projects are few.

> You have international organisations that are willing to invest money for climate change. For example, AFD is one [Agence Française de Developpement – French Development Agency]. So we have international agencies that are ready to inject money but they don't find proper projects (Mr. J. Lobin, Chief Health Inspector at the Black River District Council and part-time lecturer at the University of Mauritius).

6.6 Conclusion

Almost all the participants viewed climate change as being highly risky for themselves, tourism and Mauritius. Most of them believed that climate change impacts are already being felt and that serious consequences will result in the near future if climate change is not mitigated. However, two participants, an industry manager and a government official, had a lower risk perception, possibly because of their limited exposure to climate change impacts, as discussed in the following chapter. Most participants believed that the phenomenon can be controlled through human intervention to a certain extent.

There is evidence that stakeholders' risk perceptions are strongly influenced by communication and experience. All participants have experienced environmental changes that they attribute to climate change. Impacts such as higher temperatures and more frequent torrential rainfall have been experienced as part of their everyday life while impacts such as accelerated beach erosion and coral bleaching have been experienced through their professional activities. However, the most commonly mentioned extreme weather event, flash floods, was indirectly observed by the participants. The internet, scientific journals, government ministries and professional reports constitute the most frequent sources of climate change information for the sample, but different stakeholder groups showed preferences for different communication channels.

Unexpectedly, most of the stakeholders were unaware of the public policies guiding climate change management in Mauritius. Several participants wanted to address the source of the problem: GHG emissions. Only one government official emphasised that, while mitigation is desirable, given the negligible contribution of Mauritius to global GHG emissions, adaptation is more urgently required.

In addition to the perceived limited institutional capacity, participants identified a lack of public awareness, communication, political will and institutional integrity as barriers to effective climate change management. One main economic barrier was also identified. The property manager of the smallest hotel of the sample highlighted that the implementation of eco-friendly measures is costly and the lack of finance mechanisms is demotivating.

Chapter 7 Discussion

This chapter discusses the results outlined in the previous chapter. It is divided into two sections. The first section discusses stakeholders' climate change risk perceptions and the factors which influence them. With respect to factors at the individual level, past experience appears to have the strongest influence on risk perceptions. The second section discusses the institutional approach to climate change in Mauritius and highlights how, at the contextual level, the perception of an inadequate and insufficient institutional response, and the resultant lack of confidence in institutional capacity, amplifies risk perceptions.

7.1 Risk perceptions

Among the interviewed stakeholders, climate change is perceived as being more risky for Mauritius and for the participants at the personal level than for tourism. Nevertheless, climate change is believed to present significant threats to the tourism industry. These results are in contrast with research conducted in other SIDS such as Fiji, Samoa, Vanuatu (E. Wong, Jiang, Klint, Dominey-Howes, et al., 2013) and Maldives (Shakeela & Becken, 2015) where factors such as political instability, limited institutional capacity and economic interests attenuate the risk perceptions of stakeholders.

The results of this research are similar to those obtained by Belle and Bramwell (2005) in Barbados, where subtle differences were found between the views of industry managers and policy makers despite a high overall perception of climate change risk. Industry managers were more aware of the implications of climate change for tourism in Barbados than policy makers. In this study, while almost all participants agreed that unmitigated climate change will result in serious consequences for tourism, opinions diverged about the level of concern they felt for tourism and the onset of climate change impacts on the industry. Industry managers demonstrated a high level of concern about climate change impacts on tourism, which they believed are already visible. Conversely, a lower level of concern for tourism was reported by several government officials. As described in Chapter 6, half of the surveyed government officials believed that tourism is currently not being impacted by climate change. However, the CEO of AHRIM explained how climate change is already negatively affecting tourism in Mauritius.

> The slightest things that affect the decision making process of someone who is going for holidays in a distant destination play a very important role for 12, 24 or 36 hours. These things must absolutely be avoided. For example, in Mauritius, there were the floods where people were killed at Caudan. During three days, we did not have any positive communication to reassure the markets [...] these are holidays in a faraway country. They are expensive (Mr. J. Kwok, CEO of AHRIM).

Belle and Bramwell (2005) attributed the difference in opinion to managers being more familiar with the industry and therefore, having a better understanding of the risks. The lower risk perception among public officials may also be attributed to limited experience with coastal impacts. Industry managers are more regularly exposed to the changes occurring in the coastal areas, which they have observed over several years or decades.

> Twenty years ago, we used to play football on the beach. Now there is no beach. [...] If it continues at the rate at which I have observed it during the past twenty years, in the next twenty years, the hotel will become waterfront [the hotel is located about 100m from the beach] (Mr. N. Molotoo, Manager of Le Grand Bleu hotel).

The following sub-sections elaborate further on the participants' experience of changes they believe are linked to climate change and on the other factors shaping risk perceptions.

7.1.1 Experience

The high level of risk associated with climate change by participants can partly be explained by their personal experiences with perceived climate change related impacts. During the interviews, participants listed a wide range of environmental changes that they have personally experienced and observed which they attribute to climate change. Most of these environmental changes are climate change impacts identified in the literature (Nurse et al., 2014; Republic of Mauritius, 2010). Impacts which were personally experienced relate to weather conditions, such as high temperatures and altered rainfall patterns, which affect the island in general or abrupt and localised weather events such as torrential rainfall.

7.1.1.1 Temperature rise

Like several countries in the Southern hemisphere, Mauritius registered record summer temperatures in the first months of 2016. With atmospheric temperature reaching 35.6°C in

certain areas, January 2016 was the hottest month since 1960 (Ramgulam, 2016). Since 1950, temperatures over the region have increased between 0.74°C and 1.2°C at a rate of 0.16°C per decade (Republic of Mauritius, 2010, p. 7). Under all climate scenarios, temperature in Mauritius is predicted to further increase by 0.94°C - 1.4°C by 2050 (Republic of Mauritius, 2010, p. 77). According to NGO#1, the population's level of concern about the uncomfortable heat does not match the seriousness of the issue.

> I think everyone experienced it but they complained a little and then it died out until, I am sure, next year will create records again. It will become news and then forgotten again (NGO#1).

Among industry managers, the economic implications of temperature rise elicit a high level of concern. Rising temperatures are associated with higher energy consumption for cooling and hence, with larger carbon footprints. As outlined in the previous chapter, industry managers are mostly focussed on mitigating their GHG emissions, possibly as a marketing strategy.

7.1.1.2 Rainfall

Alterations in rainfall patterns in Mauritius became apparent about two decades ago when the island experienced its most severe drought between 1998 and 1999. During this drought, water reserves decreased by 56% (UNEP, 2010, p. 301). Consequently, strict restrictions were placed on water supply. In certain areas, daily water supply was restricted to 6 hours while in other places, only one to two hours per day (UNEP, 2010). These restrictions are still in place in various localities of the island. Figure 7.1 shows how Mauritius is becoming drier by comparing average rainfall over 30 year periods during the mid and late twentieth century.

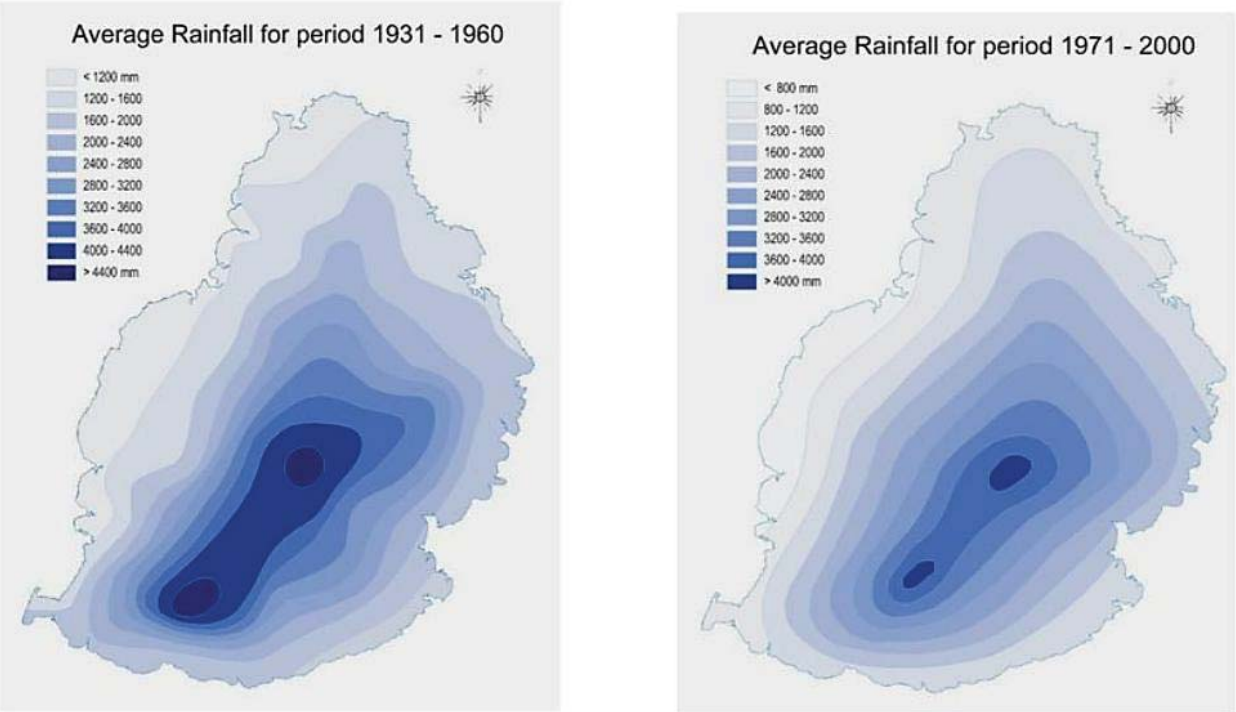

Figure 7.1 Comparison of average rainfall in Mauritius between 1931 and 1960 and between 1971 and 2000 (Republic of Mauritius, 2010).

After 2000, the frequency of localised torrential rainfall over short periods of time increased considerably. These conditions favour surface run off and consequently reduce the amount of water available for replenishing the aquifers. Moreover, they give rise to flash floods, which are becoming increasingly frequent (Republic of Mauritius, 2010). Despite not having directly experienced or observed flash floods, several participants promptly referred to them when describing their experience with climate change impacts.

According to GOV#1, torrential rainfall which occurred in Port Louis, the capital city of Mauritius, on the 30th March 2013 was an eye-opening occurrence. The resultant flash floods led to eleven deaths, heavy damage to property and vehicles and disrupted economic activities for several days. The incident was heavily reported in the media. Figure 7.1 provides an indication of the extent of damage caused by these flash floods.

Figure 7.2 Damage to traffic and vehicles during flash floods in the capital of Mauritius on the 30th March 2013 (Djbass, 2013).

Before that day, only cyclones had the potential to cause such extensive damage to the island but the last cyclone that made more than ten victims occurred more than fifty years ago (LeMauricien.com, 2013). These findings indicate that the sudden, unpredicted and catastrophic outcome of these flash floods has significantly heightened climate change risk perceptions in Mauritius. They are consistent with the Psychometric paradigm (Slovic, 1987), whose central tenet is that a hazard's characteristics, more specifically its catastrophic potential, substantially increase risk perceptions.

7.1.1.3 Changing coastal environments

Observed climate change impacts pertaining to gradual and incremental changes to the coastlines and to coastal ecosystems, although having low catastrophic potential, also engendered significant concern among participants. These include accelerated beach erosion and extensive coral bleaching leading to marine biodiversity loss. Most participants observed these changes over long periods of time as part of their professional activities. With respect to tourism, participants identified these gradual changes as particularly important since they are affecting the main tourist attractions of Mauritius.

While research by Shakeela and Becken (2015) in Maldives revealed that several tourism stakeholders believe that beach erosion at one location naturally leads to beach accretion at another location, this research identified no such belief among the tourism stakeholders in Mauritius. Participants from all stakeholder groups were aware that coastal erosion is diminishing the amount of sand from the beaches. Only one government official mentioned beach accretion occurring at two locations. Therefore, tourism stakeholders in Mauritius have a higher climate change risk perception with respect to coastal erosion.

One participant, Mr. Molotoo, the manager of Le Grand Bleu hotel, highlighted the alarming rate at which beach erosion is occurring. According to this participant's long term experience, beaches in the north of Mauritius have shrunk by approximately 5m since 2008. The country's Second National Communication under the UNFCCC confirms these observations, showing that the industry manager accurately identified the rate of beach erosion. In the north of Mauritius, popular beaches such as Mon Choisy, Grand Bay and Trou aux Biches, where Le Grand Bleu hotel is located, have retreated by 10m between 1995 and 2009, that is, over a period of 14 years. Of the 200 beaches in Mauritius, Duvat (2009) identified 95 as being seriously eroded. An estimated area of 18,500m^2 has been eroded from the most affected beaches between 2000 and 2010 (Republic of Mauritius, 2010, p. 81).

Coral bleaching has also reached an alarming scale in Mauritius. A survey carried out in 2010 in the Blue Bay Marine Park, one of the islands two marine parks, revealed that 40% of the corals are either heavily damaged or dead (Delphinium Ltd, 2010, p. 73). Extensive coral mortality has been recorded at other sites around the island as well. At Anse La Raie in the north of Mauritius, over a period of five years only, live coral cover decreased from 60% in 2004 to less than 5% in 2009 (Moothien Pillay, Bacha Gian, Bhoyroo, & Curpen, 2012, p. 156).

In addition to the reduced tourism appeal that coral reef degradation entails, several participants recognised the protective role of coral reefs for lagoons and beaches. In particular, government officials and members of NGOs emphasized safety issues which may arise from stronger waves entering the lagoons. In reference to the effects of climate change on tourism, an NGO representative stated:

> Coral reefs are very important for maintaining your beaches itself. So you have problems with your [reefs], you'll have deficits in beach sand availability eventually. For the protection of your coastal areas also. As the reefs die, they will be eroded and break down. And then they won't provide that barrier to waves on those calm lagoons (Mrs. K. Young, Manager of Reef Conservation).

7.1.1.4 Cyclones

Participants' observations about the decreasing number of cyclones visiting Mauritius are consistent with predictive models about the influence of climate change on tropical cyclones. Several models predict the formation of fewer but stronger tropical cyclones (Bamber, van den Broeke, Ettema, Lenaerts, & Rignot, 2012; Gualdi, Scoccimarro, & Navarra, 2009; Knutson et al., 2010). While research by Ho et al. (2008) emphasizes the influence of repeated past experience in heightening risk perceptions, the findings of this research suggest that a discontinuity in commonly experienced natural hazards also increases risk perception.

Fewer cyclones may be increasing risk perception by acting as an indicator of climate change's potential to dramatically alter the patterns of regular and predictable extreme weather events. Recently, in April 2016, a very intense tropical cyclone (equivalent to a Category 5 hurricane) named Fantala formed in the Southwest Indian Ocean. Cyclone Fantala formed almost at the beginning of the winter season and deviated considerably from typical cyclone trajectories. While cyclonic conditions were not felt in Mauritius, despite being expected, cyclone Fantala caused heavy infrastructural damage in Seychelles, which lie outside the cyclone belt (Vannier & Uranie, 2016). Cyclone Fantala's path may also be indicating a shift in cyclone tracks in the South-west Indian Ocean. The occurrence and behaviour of cyclones now carry a greater degree of uncertainty, which may be increasing risk perception among tourism stakeholders in Mauritius.

Hurricane Patricia, cyclone Winston and cyclone Fantala have been referred to as "abnormally menacing cyclones" by the media. Patricia was a Category 5 hurricane which formed late season in October 2015 in the North Pacific and cyclone Winston, also equivalent to a Category 5 hurricane, devastated Fiji in February 2016. The three events have been related to the current El Niño event and to climate change (Kimberlain, Blake, & Cangialosi, 2016; Metcalfe, 2016).

7.1.2 Communication

Communication plays a determinant role in risk perception. As an industry manager explained, increased access to information increases risk perceptions as individuals are indirectly experiencing environmental hazards that were not previously communicated, creating the impression of more frequent or severe hazards.

> It may be linked with climate change. It may also be linked with more information that we previously did not have. Local people say that regular tidal waves of 3 to 4 metres at Grand Gaube are not a recent occurrence. I think that today, when we learn about these things, we have the tendency to group them together and attribute them to climate change. It may not be true (Mr. J. Kwok, CEO of AHRIM).

Despite the perceived level of risk being high among the participants, one industry manager, the Property Manager of La Margarita Hotel, believed that tourism in Mauritius will never be affected by climate change. He also believed that climate change will start affecting Mauritius within a few years, despite having observed accelerated beach degradation. The participant stated feeling less concerned about climate change impacts since his establishment is not situated directly on the coast. Therefore, the Property of La Margarita hotel demonstrated a lower risk perception because he did not consider climate change risks to be highly relevant to his context. The case of this industry manager is consistent with the SARF which argues that the interpretation of information about risks is influenced by the nature of the risk as well as its relevance to the individual (Harrington & Elliott, 2015).

In this research, the internet was found to be the most frequent source of information about climate change for the participants. These results are similar to those obtained by Takahashi and Meisner (2011) who found that the internet is the most common source of climate change information among policy makers and political elites in Peru. Since this research explores the factors shaping climate change risk perceptions, an examination of the information-seeking behaviour of research participants was not undertaken. Consequently, the types of information which participants obtain from the internet as well as its effects on risk perceptions are not specifically known.

Nevertheless, it can be deduced that participants are more receptive to information on the internet than other sources, possibly because of the growing popularity of technology over conventional information sources such as printed media. An industry manager noted that in Mauritius, the internet, especially social media, is an underexploited platform for climate change communication. Therefore, climate change awareness can be increased through the use of social media and the internet in general.

> The internet is within everyone's reach. Nowadays, everyone is connected to social media. Social media in fact plays a very important role in our life, but communication on climate change in Mauritius [on social media] is almost inexistent. It is minimal, especially at the level of professionals and policy makers (Mr. A. Coonjun, Director of Engineering at The St Régis Mauritius Resort).

The second, third and fourth most frequent sources of climate change information include formal information sources, namely, scientific journals, government ministries and professional reports. These results were expected given firstly, the scientific orientation of academics, and secondly, the highly technical roles and primary focus on environmental issues of several government officials as well as the members of NGOs.

Although scientific journals are also frequent sources of information for industry managers, they obtain climate change information most frequently from the media, more specifically, from television news and newspapers. This may be explained by industry managers having fewer obligations to consult, or limited access to, formal sources. Therefore, the media may be influencing the risk perceptions of industry managers' more frequently than the other participants.

The media also influences the risk perceptions of the other interviewees as well. As indicated in the previous section, despite not having personally experienced or observed the deadly flash floods which occurred in 2013, several participants viewed it as an indication of the catastrophic potential of climate change. The nature of the hazard and the substantial media coverage it received significantly increased risk perceptions among the general population, including the research participants, placing climate change at the forefront of environmental concerns in Mauritius.

In contrast, it was found that participants obtain climate change information least frequently from friends and family and district councils. Limited communication with friends and family may be explained by the participants' perceptions that awareness about climate change is low among lay people. However, district councils perform the essential role of preventing and minimising damage from climate change-induced flash floods by monitoring and managing flood prone areas and storm-water drains. Nevertheless, they are not perceived as contributing to climate change management, and therefore not perceived as a source of climate change information by tourism stakeholders. This is mainly because district councils, although most have coastlines, are not engaged in beach management. The Beach Authority, under the Ministry of Environment, Sustainable Development, and Disaster and Beach Management, performs this function.

Except for NGOs, the results suggest that discussion about climate change within the different agencies, and particularly government agencies, is limited. Five of the eight surveyed government officials stated that their colleagues and peers were least frequent sources. When asked about information sharing between ministries, a government official stated:

> There is [information sharing]. For example, they [the Ministry of Environment, Sustainable Development, and Disaster and Beach Management] may do a workshop about a plan that they are setting up for climate change, etc. One officer will go [from the participant's ministry]. When he returns, the officer will prepare a report and submit it to the higher ups so that they can take decisions. The information is not necessarily disseminated among everyone (GOV#2).

Conversely, the three members of NGOs all identified colleagues and peers as highly frequent sources of information, indicating more ongoing discussion within these organisations.

7.1.2.1 Communication between stakeholder groups and trust

The level of trust in an information source determines the extent to which the information from that particular source is considered during decision making (Tribbia & Moser, 2008). Although views about their trustworthiness vary considerably, NGOs also appear to be the strongest link with respect to inter-agency communication. NGOs and several hotels collaborate and communicate regularly in Mauritius. For example, in collaboration with Attitude Resorts, the NGO Reef Conservation has set up the Nauticaz Marine Discovery Centre for sensitisation about marine biodiversity conservation.

> We've got a centre there, in their hotel, which is open to schools and the public. It's not just for their guests, it's open to everyone. [...] We did have some hotel groups that were willing to let us come and do sensitisation with them. Besides that, we also work with other hotel groups specifically. [...] And currently, we have been requested by a number of other hotel groups to actually come in and do some training and sensitisation with their boathouse and personnel (Mrs. K. Young, Manager of Reef Conservation).

While none of the industry managers reported a low level of trust in NGOs, government officials' opinions showed more variability. The low levels of trust between NGOs and government bodies perhaps reflects in part the limited communication between them, which occurs mainly when they undertake projects collaboratively.

> When we work together on certain projects, the communication [with government ministries] is very good. [...] It would be interesting to see it at other instances as well. It is not as simple as saying that there is no communication; it depends on the project. It depends on the topic. For the moment, we have not heard anything about climate change (NGO member #1).

Scientists were the most highly trusted source of information. However, communication between the stakeholders and local universities, and hence local scientists, appears to be very limited. More participants identified local universities as an occasional or least frequent source of information than a most frequent one. One academic supported these results during the interview:

> The problem is, I think, the connection between universities and the private sector or even the government is a little bit weak […] The university should have been contacted. We've got academics who work in collaboration with the ministry but I think it needs to be more formalised (Dr. R. Nunkoo, Senior Lecturer and Head of Department of Management at the University of Mauritius).

It appears that the expertise of local scientists is a minimally utilised resource. With climate change risk perceptions being high among the participants, and with the preferred policy option being increasing awareness, local scientists can perform a significant role in climate change management in Mauritius.

Communication between government ministries and industry managers, which occurs mainly through AHRIM, is more regular than with NGOs or local universities. However, smaller hotels appear to be excluded from this process. The two industry managers from the smaller hotels did

not mention AHRIM and reported that they have never been contacted to provide their views for the policy making process, despite having long term experiential knowledge. One of them furthermore complained that government agencies do not respond when they are contacted about environmental issues.

Although communication between the different groups of stakeholders and government ministries is not consistent, they are the second most highly trusted sources of information. Therefore, it may be deduced that communication with the public sector is viewed as particularly important. Hence, government-initiated awareness campaigns can be expected to be successful.

7.1.3 Knowledge and understanding

Scientific knowledge about climate change is an important factor in increasing risk perceptions, climate-friendly behaviours and acceptance of public policies (Botzen, Aerts, & van den Bergh, 2009; Shi et al., 2015). Sundblad, Biel, and Gärling (2009) and Takahashi and Meisner (2011) view self-perception of knowledge as an acceptable measure of actual knowledge. However, this research contradicts their arguments because the level of confidence some participants had in their knowledge did not match their actual level of knowledge.

Many participants had an incomplete knowledge about climate change with two-thirds of them agreeing that, or not knowing if, climate change is caused naturally by variations in solar radiation and volcanic eruptions. Similar misconceptions have been unveiled in several other studies where participants incorrectly associate climate change with solar radiation or ozone depletion. These results may be arising due to acquiescence bias, whereby participants tend to agree with the statements presented to them, even when contradictory (Whitmarsh, 2009).

Furthermore, one-third of the participants agreed that, or did not know if, the climate will cool down in the coming decades. Nevertheless, participants reported having high confidence in their knowledge. Bird, Gisladottir, and Dominey-Howes (2010) assert that an overestimation of one's knowledge may lead to an overestimation of personal safety. However, despite their high confidence, participants viewed climate change as highly risky and emphasized the need for awareness, suggesting that past experience, communication and trust in institutions to manage

the risks may be influencing risk perceptions more than scientific knowledge. Institutional capacity in Mauritius is discussed in the following section.

As outlined in Chapter 3, in the literature, the terms knowledge and understanding are usually used together or interchangeably. However, the emphasis that participants placed on mitigation highlights a difference between possessing knowledge about climate change and understanding the phenomenon. In particular, it appears that many of the stakeholders have difficulty in positioning Mauritius within the global context of climate change. Most of the interviewees were aware that tourism may be negatively affected due to environmental damage and understood the implications of climate change for the island, but the inability of participants to utilise their knowledge to understand how these implications may be addressed beyond mitigation and raising awareness for mitigation was apparent.

Climate change was in fact not viewed as a distinct environmental issue. Several participants considered climate change as being part of the broader environmental challenges, such as pollution and improper waste management that Mauritius faces, and mentioned recycling and composting when questioned about their personal responses. Participants perhaps advocated for climate change mitigation because they related it to pollution, which can be managed by addressing the source of the problem. This low level of understanding among participants underlines the need for adaptation-focused awareness campaigns.

7.2 Management of climate change impacts

Participants ascribed the highest responsibility for taking actions in response to climate change to government ministries. Several other studies have revealed that the government is often attributed the highest level of responsibility in addressing climate change (Lo, 2010; Lorenzoni & Pidgeon, 2006; E. Wong, Jiang, Klint, Dominey-Howes, et al., 2013) mainly because it is viewed as having enough power and resources to implement and enforce regulations and compel businesses to adopt more environmentally conscious behaviours (Stoddart, Tindall, & Greenfield, 2012). The second highest level of responsibility was ascribed to hotel companies. Because of tourism's dependence on coastal environmental quality, hotel companies are viewed as being particularly vulnerable to climate change impacts. They are also considered as having the financial resources to implement measures to reduce the seriousness of these impacts.

However, the private sector's limited participation has been identified as a barrier to the management of climate change impacts by some participants. In effect, hotel companies are significantly responsible for environmental degradation in the coastal areas of Mauritius.

Accelerated beach erosion and coral bleaching, as attributed to climate change by several participants, are pre-existing environmental issues caused mainly by unregulated coastal development. More than half of the 200 beaches in Mauritius have some form of tourism infrastructure (Duvat, 2009). Duvat (2009) argued that sand mining, buildings constructed too close to the shoreline, the illegal building of jetties and groins, poor implementation of regulations and minimal consideration of ecological aspects during tourism development have disrupted the natural beach erosion and accretion processes in Mauritius. Research participants expressed similar views:

> Beach erosion, loss of beaches and changes in the beach patterns. These are things that are affecting some hotels quite greatly, which sometimes has to do with climate change but sometimes has to do with decisions they made and structures that they have put in the water, groins and such, but which are being exasperated now as you get stronger storm surges. And you tend to be seeing them quite more, even if there's not a big storm, because there's storms other places, the waves are stronger and coming in (Mrs. Young, Manager of Reef Conservation).

> I think we are contributing a lot to climate change in terms of the barbarous unplanned development we are having: the construction of hotels. 80% of our hotels in the coastal area have beach frontage, which means that we are interfering with the biodiversity of the coastal area (Dr. R. Nunkoo, Senior Lecturer and Head of Department of Management at the University of Mauritius).

Interviewed industry managers showed substantial willingness to implement more environmentally friendly measures, especially if specific targets are set by authorities. Those from the large and/or chain hotels gave the impression of relying on authorities to obtain information on further actions that can be implemented beyond Corporate Social Responsibility (CSR) and the common energy saving policies of hotels. These observations suggest that, although it may be for marketing purposes, the private sector actors are willing to comply with additional regulations with respect to climate change. There may also be potential for public-private partnerships.

7.2.1 Governmental institutions' response

As explained in section 2.3.6, the Climate Change Division within the Ministry of Environment, Sustainable Development, and Disaster and Beach Management oversees the management of climate change impacts in Mauritius, which is guided by the National Climate Change Adaptation Policy Framework (NCCAPF). Only two participants, a government official and an academic mentioned the NCCAPF when questioned about climate change policies in Mauritius. This is possibly because the NCCAPF currently lacks a legally binding mechanism and therefore, is unknown to most interviewed stakeholders. However, during the interviews, all the government officials, one academic and one NGO representative recognised that authorities are putting substantial efforts into the management of climate change impacts. They listed several initiatives, such as the construction and regular maintenance of drains for the prevention of flash floods, beach rehabilitation, zoning of lagoons for the protection of corals and beaches, the development of educational toolkits, and mainstreaming of climate change into primary and secondary school curricula, which are being taken by authorities in response to climate change.

The majority of the government officials reported high or very high confidence in institutional capacity. This high level of confidence may be because of their higher awareness of the numerous actions being taken. In contrast, several interviewed industry managers considered the implemented measures, such as tree planting on beaches, as being insignificant. The majority of them, as well as some other participants, reported having "some confidence" in authorities' capacity for three main reasons: efforts for climate change mitigation are too scarce, communication about the implemented actions is limited, and authorities do not demonstrate long term planning.

These reasons reflect the lack of strategic communication between government agencies and the stakeholders. A particularly important step which may provide a clearer sense of direction to stakeholders is a Climate Change Bill that is currently being developed. In March 2015, the then Minister of Environment, Sustainable Development, Disaster and Beach Management announced that a Climate Change Bill is being prepared to legally support the policies and strengthen the institutional response to climate change (Republic of Mauritius, 2015). However, previous research by Gray and Lalljee (2013) revealed that "dozens of committees and advisory bodies,

mostly mandated by legislation" (p. 104) influence adaptation governance in Mauritius, suggesting that new legislation may further increase the complexity of coordinating climate change action across the ministries and the sectors. Nevertheless, among stakeholders, legislation which specifically addresses climate change can act as a strong indication of the urgent need for action as well as demonstrate the commitment of the Mauritian government towards addressing climate change.

7.2.2 Perceived barriers to engagement with climate change

Participants mentioned various social, economic, institutional and political factors that impede the efficient management of climate change impacts. The barriers identified include the lack of awareness, communication, political will, and economic mechanisms, as well as limited private sector participation. These barriers are inter-dependent and mainly arise from human actions and decisions. Therefore, they can potentially be overcome (Eisenack et al., 2014).

The main social barrier identified was lack of knowledge and awareness about climate change among the public. As mentioned in Chapter 6, the interviewees believed that the public is also responsible for taking action against climate change and must be educated about energy saving and pollution reduction. However, as discussed in the previous sections, research participants have misconceptions about the more specific details of climate change and lack a clear understanding of the required response in Mauritius. Lorenzoni et al. (2007) list several reasons for the lack of awareness about climate change, including lack of knowledge about information sources available, lack of desire to find information, confusion about conflicting information, lack of trust in information sources, and available information being too technical, etc. Among the participants, limited detailed knowledge and the perceived lack of institutional response and political will may be partly due to a lack of communication between authorities and the stakeholders.

Although constraints to climate change actions are highly context-dependent, limited institutional capacity and lack of political will are commonly identified barriers (Biesbroek, Klostermann, Termeer, & Kabat, 2013). Gray and Lalljee (2013) revealed that, authorities in Mauritius sometimes withhold important information for fear of public or media misinterpretation or for development reasons. Consequently, stakeholders are unaware of the

various efforts institutions are inputting into climate change adaptation. More importantly, they are unaware of the reasons underlying the adopted measures. A participant highlighted a similar point.

> About 5 to 6 years ago, we did a project where we were analysing the effects of greenhouse gases in Mauritius. We contacted the authorities to identify areas which may be submerged within 50 years due to sea-level rise. Areas in Grand Baie [a tourism hotspot in the north of Mauritius] and other places were identified. So, this information exists. People can work on it. […] Unless we show people how they can be directly affected, they will not react to it (NGO member #1).

As advocated by the CEO of AHRIM, the rationale for and the outcomes of the different measures adopted by authorities must be communicated to the stakeholders to ensure their engagement. Furthermore, the exclusion of small and medium-sized hotels from the communication links is creating a sense of alienation and helplessness among them. It is crucial to consider these smaller hotels in the planning process since their businesses may be the first ones to be affected by climate change impacts in the future. As the Property Manager of La Margarita hotel explained, smaller hotels cannot match larger hotels' investments into climate change adaptation.

According to two government officials and an academic, investment by the private sector into measures against climate change is limited and the lack of private sector participation is a barrier to climate change adaptation. However, research by Duvat (2009) revealed that the private sector has been addressing coastal erosion through experimentation. Techniques include buried gabions, submerged breakwaters, sand bags and stabilisation of the beach with indigenous plants. This is primarily because many tourism investors in Mauritius are local citizens and therefore, consider the long-term implications of their investments (Duvat, 2009). Thus, authorities and the private sector appear to operate independently with respect to beach erosion management.

7.3 Conclusion

This chapter discussed the influence of various factors on the perception of climate change risks among tourism stakeholders in Mauritius. With respect to the factors that shape risk perceptions at the individual level, as outlined in the conceptual framework developed in Chapter 4, experience of climate change impacts, communication and limited trust in governmental

institutions' capacity to successfully address climate change amplified participants' perceptions of risk. Direct experience of gradual and incremental climate change impacts, such as temperature rise and altered rainfall patterns which are affecting Mauritius in general, created significant concern among the participants. Their observations of environmental changes in coastal areas, such as accelerated beach erosion and coral bleaching, also contributed to their experience of climate change, although these changes are partly due to unsustainable tourism development. As explained in Chapter 4, the frequency of experience can amplify or attenuate risk perceptions. In this research, reduced frequency of experience with cyclones, which until recently were the most catastrophic hazards to affect Mauritius, increased the level of perceived risk, possibly because it provides an indication of the scale of climate change.

In particular, indirect experience of catastrophic flash floods through communication considerably heightened risk perceptions, thereby highlighting the importance of a hazard's characteristics in shaping risk perceptions. Climate change communication is a determinant of risk perceptions as it increases people's indirect exposure to hazards. The most frequent sources of climate change information for the participants include the internet and formal sources such as scientific journals, government ministries and professional reports. The media, more specifically television news and newspapers, are also frequent sources of climate change information for industry managers, possibly because they are not as scientifically or environmentally oriented as the other research participants. These sources of information may be used for raising awareness through targeted communication with different groups of stakeholders.

There is a need to raise awareness with the four stakeholder groups because many interviewees had an incomplete knowledge about climate change. The majority also did not understand the need for adaptation in Mauritius and advocated for climate change mitigation measures, partly due to a lack of communication between authorities and the other stakeholders. Therefore, they viewed governmental institutions' response to climate change, which focuses on adaptation, as inadequate or insufficient, resulting in limited trust in authorities' capacity to successfully manage climate change. However, although they highlighted various shortcomings in the current institutional approach, the majority of government officials were more confident in the authorities' capacity to manage climate change, perhaps reflecting higher awareness of the different adaptation measures being implemented.

The perceived barriers to the effective management of climate change impacts are inter-dependent and result mainly from human decisions. In particular, there is a lack of strategic communication with tourism stakeholders which is partly due to governmental institutions' fear that the public and the media may misinterpret information and impede development. There is also a need to increase communication with small and medium-sized hotels as their businesses may be the most vulnerable to climate change due to limited resources for adaptation. The lack of communication between authorities and the industry also resulted in government officials being unaware of the various adaptation measures that hotels are implementing independently.

Chapter 8 Conclusion

This research aimed to inform the policy process in Mauritius through a better understanding of how stakeholders within the tourism sector perceive climate change and the public policies addressing climate change. To achieve this aim, four objectives were set. These included firstly, exploring stakeholders' perceptions of climate change and identifying the factors shaping them, secondly, exploring their views about the public policies in place to address climate change risks and determining their public policy preferences for the management of these risks, thirdly, identifying the factors that stakeholders perceive as hindering an effective climate change response and lastly, making recommendations for future decision making. This research was guided by a conceptual framework which was developed based on the literature pertaining to the theoretical perspectives of risk perception. This chapter outlines the research conclusions, outlines the policy implications of the research findings and provides suggestions for future research to further the understanding of risk perceptions in Mauritius.

8.1 Research conclusions

This research has shown that the interviewed stakeholders within the tourism sector perceive climate change as representing significant risks for Mauritius, themselves and the tourism sector. Various factors influenced the way in which climate change risks were perceived among the research participants. In particular, indirect past experience of a flash flood occurrence, mainly through media communication, has contributed in portraying climate change as leading to unpredictable, sudden and fatal hazards. Consequently, climate change is perceived as having a high catastrophic potential.

The perceived lack of institutional response to climate change and the lack of confidence in the institutional capacity to successfully manage the risks have further heightened risk perceptions. With respect to tourism, climate change was viewed as accelerating beach erosion and coral bleaching, and therefore, as a threat for the tourism products of Mauritius. The institutional response to these risks is viewed as being inadequate or insufficient for various reasons, including unsustainable planning for coastal development, lack of long-term planning, uncertainty about which measures are being adopted due to a lack of communication, and insufficient attention to climate change mitigation. Through the development of a comprehensive

adaptation policy framework – the NCCAPF – and the various actions authorities are implementing, the institutional response reflects an acute awareness of the need for adaptation in Mauritius.

However, research participants demonstrated low or no awareness of the NCCAPF or other policies guiding climate change. As such, the perceived level of their effectiveness could not be determined. The main reason identified was the absence of legal mechanisms to support existing climate change policies. A Climate Change Bill which is currently under preparation is expected to provide clearer directives to stakeholders and to demonstrate the commitment of the government towards addressing climate change.

Participants identified several barriers to effective climate change action in Mauritius, including lack of awareness, lack of political will, limited institutional capacity, lack of communication, limited private sector participation, and financial constraints. To some extent, lack of communication between the authorities and the stakeholders explains why limited political will and institutional capacity are viewed as barriers despite the various measures being implemented for adaptation. Since they consider mitigation as an indicator of climate change action, several participants did not understand why authorities' are prioritising adaptation. Small hotels were identified as the most vulnerable to climate change impacts. They lack the financial means to adapt and their businesses can be the first ones to be affected if tourism demand for Mauritius reduces as a consequence of climate change. Furthermore, their exclusion from communication links is creating a sense of helplessness and further reducing their confidence in the institutional capacity. Several of the perceived barriers can be addressed through effective two-way communication.

8.2 Policy implications

These findings indicate a need to address important aspects of the institutional response to climate change in Mauritius. The following four main recommendations are made to foster engagement among the stakeholders within the tourism sector and to strengthen climate change adaptation efforts in Mauritius.

1. **Targeted communication focussing on adaptation**

Information focusing on the importance of adaptation must be communicated to ensure that all stakeholders understand why authorities are adopting their current approach to climate change. This information must be disseminated through sources that stakeholders perceive as credible (Lorenzoni et al., 2007). Since scientists are the most highly trusted source of information, awareness campaigns in collaboration with local universities could be developed. In particular, the inclusion of small and medium-sized hotels must be ensured during communication. Transparent and sustained communication with stakeholders will ensure acceptability of future policies (Lorenzoni et al., 2007) and minimise resistance against adaptation measures in favour of mitigation options. However, communication between the stakeholders should be two-way to ensure government officials are aware of industry initiatives.

2. **The establishment of marine parks in collaboration with NGOs**

Although 70% of the island's coastline is bordered by fringing reefs (Duvat, 2009, p. 152), only two marine parks have been established in Mauritius (Ministry of Agro-industry and Food Security, 2015). Although many participants did not attribute a high responsibility to NGOs for ensuring the sustainability of tourism in Mauritius, their expertise can be utilised in such projects. The NGO Reef Conservation is working in close collaboration with local communities for the creation of Voluntary Marine Conservation Areas (VMCAs) in the north of Mauritius. VMCAs are designated areas in the lagoon where communities and other stakeholders agree not to engage in activities which are ecologically damaging. Three VMCAs have been established (Reef Conservation, n.d.). These initiatives could be extended to include the participation of authorities and hotels.

3. **Climate change mitigation measures**

Given the support of industry managers for regulations to mitigate climate change, policies to foster energy saving in hotels and reduce the GHG emissions of the tourism industry could be developed. The aim of carbon neutrality is also a good marketing strategy (Gössling, 2009) and may attract affluent environmentally conscious tourists. However, mitigation measures require detailed assessments and monitoring of the industry's GHG emissions and the careful determination of achievable targets (Gössling & Schumacher, 2010), which should not be indiscriminate for all hotels.

4. **Regulations for resource conservation**

Stronger policies which directly involve the stakeholders in adaptation should be developed. For example, since hotels are large consumers of water and given the slow but consistent reduction in rainfall in Mauritius, regulations for resource conservation, such as rainwater harvesting, could be implemented. According to the NCCAPF, currently, hotels having more than 75 rooms are only requested to recycle and reuse water. These regulations will help create awareness among the stakeholders and will lead to win-win outcomes. They will produce economic benefits for hotels and reduce the pressure on water resources.

8.3 Future research

A wide range of future research can be developed from this study. The management of climate change impacts requires continuous research to explore and enhance mitigation and adaptation options and to identify and address barriers for an effective response to the issue. One way to do so is to apply the approach adopted in this research, that is, through investigating stakeholder perceptions. As mentioned previously, this study is limited by its sample size. Future research could aim to gain a broader understanding of stakeholders' risk perceptions in the tourism sector by significantly increasing the sample size.

Further research into the specific influences of each of the variables from the developed conceptual framework should also be carried out. In particular, stakeholders' information seeking behaviours and the ways in which specific communication channels shape risk perceptions should be examined to devise effective communication strategies and awareness campaigns. With respect to policy, the effectiveness of currently implemented measures and stakeholder support for specific mitigation and adaptation options as well as their feasibility should be investigated. The adaptive capacity of hotels, especially small and medium establishments, and the tourism carrying capacity of Mauritius also needs to be investigated, especially in light of the government's ambitious plans to attract 2 million visitors by 2020. Finally, this research could be replicated for other climate sensitive economic activities such as agriculture and fisheries to determine and compare stakeholder views across sectors for a more holistic understanding of perceptions of climate change in Mauritius.

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Appendices

Appendix 1. List of SIDS (United Nations, n.d.)

Caribbean SIDS		
1. Antigua and Barbuda	7. Dominican Republic	13. St. Lucia
2. Bahamas	8. Grenada	14. St. Vincent and the Grenadines
3. Barbados	9. Guyana	15. Suriname
4. Belize	10. Haiti	16. Trinidad and Tobago
5. Cuba	11. Jamaica	
6. Dominica	12. St. Kitts and Nevis	

Pacific SIDS		
1. Cook Islands	6. Nauru	11. Solomon Islands
2. Federated States of Micronesia	7. Niue	12. Timor Leste
3. Fiji	8. Palau	13. Tonga
4. Kiribati	9. Papua New Guinea	14. Tuvalu
5. Marshall Islands	10. Samoa	15. Vanuatu

African, Indian Ocean, Mediterranean and South Chinese Sea (AIMS) SIDS		
1. Cabo Verde	4. Maldives	7. Seychelles
2. Comoros	5. Mauritius	8. Singapore
3. Guinea-Bissau	6. São Tomé and Príncipe	

Appendix 2. Information Sheet

Project title: Perceptions of climate change and public policy preferences within the tourism industry in Mauritius.

INFORMATION SHEET

Climate change has become one of the biggest issues in the world. The aim of this research is to examine how stakeholders within the tourism sector in Mauritius view climate change and climate change policies, particularly as they may facilitate future decision-making and inform the public policy making process. As tourism is one of the main economic sectors in Mauritius, the views of influential stakeholders are important for climate change research at national and international levels. I am seeking to interview government officials, representatives of NGOs, scientists from local universities and hotel managers.

Participating in this research will take approximately 45 minutes. You will be asked to complete a short questionnaire, and then participate in an interview that I will conduct. Questions will be asked about your knowledge of climate change, any experience you may have had with events related to climate change, the source and availability of information, your perception of climate change risks and public policies in place to manage them, as well as any barriers that may limit their management.

Confidentiality

With your permission, I would like to record the interview. You will not be identified, or your name and position disclosed, in any publication or dissemination of the research findings without your approval. All information collected during the interview will be accessible only to me and my supervisors, and will be kept strictly confidential. The summarised data from this study will be stored in a password protected computer at the Institute of Agriculture and Environment, Massey University, Palmerston North in New Zealand, and will be destroyed after the research project is completed.

Participant's Rights

Participation in this study is voluntary. You are under no obligation to accept this invitation; however I would be very grateful for your assistance. If you decide to participate, you have the right to:

- decline to answer any particular question;
- withdraw from the study at any point;
- ask any questions about the study at any time during the interview;
- provide information on the understanding that your name will not be used unless you give permission to the researcher;
- be given access to a summary of the project findings when it is concluded;
- ask for the recorder to be turned off at any time during the interview (if you agreed for the interview to be recorded).

Project contacts

You are welcome to contact the researcher and/or supervisors if you have any questions about the project.

Researcher

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This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director, Research Ethics, telephone: 06 356 9099 x 86015, email *humanethics@massey.ac.nz*.

Thank you for your time and cooperation.

Appendix 3. Consent form

Project Title: Perceptions of climate change and public policy preferences within the tourism sector in Mauritius

PARTICIPANT CONSENT FORM – INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree / do not agree to the interview being sound recorded.

In the research, I would like to be referred to by using:

☐ My name and position (**Please specify**:_____)

☐ My position only (**Please specify**: _____)

☐ A descriptor (e.g. public official, member of NGO, scientist, or hotel administrator)

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: ..... **Date:** .....

Full Name - printed .....

☐ I would like to receive a summary and/or copy of the research.

Email address:

_____

Appendix 4. Questionnaire.

PLEASE TICK AS APPROPRIATE.

SECTION A – Knowledge and risk perception

1. How well informed do you feel you are about climate change?

Very well informed	☐
Somewhat informed	☐
A little	☐
Very little	☐
Not informed at all	☐

2. How concerned are you about climate change affecting **each one** of the following?

	Not at all concerned	Not very concerned	Fairly concerned	Very concerned	Don't know/ No opinion
a. Mauritius					
b. You, personally					
c. Tourism in Mauritius					

3. When do you think climate change will start affecting **each one** of the following?

	The effects are already being felt	Within a few years	Within your lifetime	Not within your lifetime, but it will affect future generations	Never	Don't know
a. Mauritius						
b. Your local area						
c. Tourism in Mauritius						

4. If nothing is done to reduce climate change in the future, how serious do you think it will be for **each one** of the following?

	Not serious at all	Not so serious	Somewhat serious	Very serious	Don't know
a. Mauritius					
b. You, personally					
c. Tourism in Mauritius					

5. In your opinion, to what extent is climate change controllable through human intervention? **(Please circle one number or tick as appropriate).**

Not controllable at all → Completely controllable

1 2 3 4 5

Don't Know/No opinion ☐

How strongly do you agree or disagree with each of the following statements?

	Strongly disagree	Disagree	Agree	Strongly agree	Don't know
6. The rate of climate change is accelerating.					
7. An increase in greenhouse gases in the atmosphere is the main cause of climate change.					
8. Climate change is mainly caused by human activities.					
9. Climate change is mainly caused by natural variations such as changes in solar radiation intensity and volcanic eruptions.					
10. In the next decades, there will be an increase in extreme events such as droughts, floods and cyclones.					
11. In the next decades, a cooling down of the climate will occur.					

SECTION B – Past experience

12. Have you personally experienced any changes in your environment that may be indicative of climate change?

Yes ☐ (**Please go to question 13)**

No ☐ (**Please go to question 14)**

Don't know ☐ (**Please go to question 14)**

13. When did you experience **the most recent** changes?

In the last 6 months ☐

6 months to 1 year ago ☐

1 year to 5 years ago ☐

More than 5 years ago ☐

SECTION C – Source of information

14. In general, how often do you obtain information about climate change from the following sources? **(Please tick once for each communication source).**

	Never	Rarely	Occasionally	Frequently	All the time
Television news					
Radio					
Newspapers					
Internet					
Friends and family					
Colleagues and peers					
NGOs					
Government ministries					
District councils					
Local experts					
Local universities					
Professional reports					
Scientific journals					

SECTION D – Trust

15. How much do you trust what these different sources say about climate change?

	No trust at all	Very little trust	Some trust	A lot of trust	Complete trust	Don't know/No opinion
Scientists						
Media						
Government ministries						
District councils						
Friends and family						
Your employer						
NGOs						

16. In general, how much confidence do you have in the authorities successfully managing the effects of climate change in Mauritius?

No confidence at all	Very little confidence	Some confidence	High confidence	Very high confidence	Don't know/No opinion
☐	☐	☐	☐	☐	☐

SECTION E – Responsibility and response

17. Please rank **each** of the following according to how much responsibility they should have in taking actions to protect the tourism industry against climate change in Mauritius. **(Please tick <u>once</u> for <u>each</u> group).**

No responsibility ⟶ High responsibilit

	1	2	3	4	5	Don't know
Environmental groups (e.g. NGOs)						
Hotel companies						
Government ministries						
District councils						
Others (Please specify): _____						

18. Which **one** of the following statements **best** describes how you feel about management of climate change effects in Mauritius?

- No actions are being taken ☐
- Actions are being taken but they are inadequate ☐
- Adequate actions are being taken but more is required ☐
- The actions being taken are adequate **and** sufficient to deal with the problem ☐
- Don't know/No opinion ☐

Appendix 5. Interview Questions.

Experience of climate change

(If participant replied **Yes** to Q. 12)

1. What changes did you experience?
2. How concerned are you about these changes?
3. Do you take personal measures (both precautions and mitigation measures) to respond to climate change?
    a. **If yes**, what measures do you take?
4. What is the best approach to manage climate change in Mauritius?
5. Can you please elaborate on your answer for Q. 16? Why do you have this level of confidence in authorities managing climate change in Mauritius?

Tourism

(If participant **did not** choose **Never/Don't know** for Q. 3)

6. What do you think are the most serious effects that climate change is having or will have on tourism in Mauritius?
7. Are you aware of any climate change policy relevant for the tourism industry?
    a. **If yes**, can you please briefly elaborate? (**If no**, go to question 9).
8. How effective do you think these policies are? Are they achieving the desired outcomes?
9. Do hoteliers in Mauritius participate in the policy making process in Mauritius?
    a. **If yes**, how does this process take place? (**If no**, go to question 10).
10. What do you think are the most important actions that must be taken for the tourism industry in Mauritius to adjust to climate change?
11. As far as you know, to what extent are these important actions being implemented?
12. With respect to climate change management for tourism, what kind of policies do you prefer? Why?

Barriers to climate change management

13. Are there social or economic factors that prevent effective climate change management for tourism in Mauritius?
    a. **If yes**, which factors?
14. Does the political environment of Mauritius favour climate change management for tourism? Please explain.

Demographics

15. Gender
16. Nationality
17. Highest level of education

Appendix 6. Sections of the NCCAPF showing the policies, strategies and actions for adaptation in the tourism sector.

Policy directives for the tourism sector (Ministry of Environment and Sustainable Development, 2012, p. 39).

2.3.4. Tourism and coastal management

In an effort to use appropriate approaches to adaptation in the tourism sector, the Government of Mauritius, in collaboration with other relevant parties, will:

- Ensure that appropriate physical planning guideline such as coastal setbacks are enforced for new tourism developments, and possibly consider the extension of the coastal setback to 45 meters (from 30 meters);
- Undertake measures to incorporate tourism development with natural resources management such as Integrated Coastal Zone Management (ICZM) to preserve ecosystem services;
- Facilitate the protection and rehabilitation of tourism resources, including natural resources such as beaches, and man-made resources (infrastructure);
- Continue working with stakeholders in the tourism sector to develop a strategic plan that incorporates climate change considerations and appropriate measures such as water conservation programmes as well as general safety and sustainability concerns (e.g., hotels with over 75 rooms are already requested to recycle and reuse water).

Strategies and actions for adaptation in the tourism sector (Ministry of Environment and Sustainable Development, 2012, p. 68)

	Strategies	Action List
T1	Provide national guidance for protecting existing critical ecosystems, existing coastal development, and future investment	**T1.1.** Establish decision guidance. The relevant authorities shall develop a framework that can be used at the national and local level as guidance in preparation of adaptation plans. The guideline should be in line with the Tourism Sector Strategy Plan 2009-2015 and the Hotel Development Strategy (whereby priority consideration is given to hotel projects of the highest standard providing high quality service and belonging to the four and five start categories) and should consider three key questions for helping to design and locate proposed or existing structures that may be threatened by sea-level rise, in line with the Planning Policy Guidelines: □ Is the existing or proposed structure either necessary for the health, safety, or welfare of an entire region, or is it located within a hazard area for which protection will be provided because of surrounding high-value development? □ Is it infeasible to relocate an existing structure or site a new structure outside the hazard area and still provide this health, safety, or welfare function? □ Will relocating an existing or proposed structure provide habitat protection or recreational opportunities that may be otherwise lost if that structure is built or is protected along the coast? Additional questions that should be considered in the preparation of the framework include: □ Is there a feasible "soft" protection solution (i.e., can a barrier beach or wetland be used instead of a seawall)? □ Will the protection approach, retrofit, or new design: o Be necessary to protect an existing structure threatened by erosion? o Allow continuation of important natural processes, such

Strategies and actions for adaptation in the tourism sector (Ministry of Environment and Sustainable Development, 2012, p. 69)

	Strategies	Action List
		as littoral drift, and avoid any impacts to neighbouring habitats or structures? o Result in the loss of state tidelands or beaches? o Provide a long-term solution to the threats caused by sea-level rise? o Be resilient over a range of sea-level rise possibilities? o Provide broad protection to existing developed areas? o Protect structures of high cultural or social value? o Provide for a natural shoreline (i.e., can seawalls be designed to include habitat)? o Be coordinated with proposed actions for other infrastructure in the same flood hazard area? o Cost less than the value of the structure to be protected? o Provide mitigation for adverse impacts that cannot be avoided? **T1.2.** Develop pilot studies in cooperation with developers that will examine the efficacy and utility of the framework highlighted above.
T2	Engage the Tourism sector in adaptation and sustainable development	**T2.1.** The Ministry of Tourism and Leisure, in collaboration with other relevant bodies, shall promote micro-finance schemes which sustain adaptation and sustainable development programmes. Tourists contributing finance (directly or indirectly) are then provided the opportunity to witness benefits through visits of financed activities, thus placing the ROM as "responsible" destination. An example is financing the dissemination of drip irrigation for agriculture, contributing to poverty alleviation and food security. **T2.2.** Coastal and wetland attractions, as well as non-coastal attractions shall be developed and offered to demonstrate approaches to using adaptation mechanisms against climate change. **T2.3.** In coordination with Action F4.2 of the fisheries sector, the tourism sector shall assist the economic valuation of coastal and marine ecosystems, in addition to existing efforts in involving the community in development projects that would help preserve the ecosystem.