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**Behavioural links and limits of disaster risk management and  
climate change adaptation:  
Demand and supply-side evidence from Caribbean coastal tourism**

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A thesis  
submitted in partial fulfilment  
of the requirements for the Degree of  
Doctor of Philosophy

at  
Lincoln University,  
Te Whare Wānaka o Aoraki

by  
Roché Mahon

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Abstract of a thesis submitted in partial fulfilment of the  
requirements for the Degree of Doctor of Philosophy

Behavioural links and limits of  
disaster risk management and climate change adaptation:  
Demand and supply-side evidence from Caribbean coastal tourism

by

Roché Mahon

Although the treatment of disaster risk management (DRM) and climate change adaptation (CCA) as distinct and disparate processes is increasingly being questioned, the behavioural links and limits of DRM and CCA have received limited research attention. This thesis offers a demand and supply-side analysis of this research problem in one of the world's most disaster prone, climate sensitive and tourism dependent regions - the Caribbean.

The research focuses on two major knowledge gaps. The first research issue (RI) addresses the lack of studies that examine the similarities and differences of the DRM and CCA decision-making process of tourism suppliers (coastal hoteliers and policy-makers). This research conducts this type of assessment in relation to a sample of three DRM measures, as well as, four CCA strategies, namely, the Protection, Accommodation, Retreat and Diversification (PARAD) strategies. The second research issue (RI 2) investigates how DRM and CCA perception gaps between demand and supply-side stakeholders may inhibit coherent action on managing disaster risk to advance CCA.

To investigate these issues, the research used a sequential application of Kates' (1971) Adjustment Process Control (APC) model, the Destination Choice Set approach originally advanced in tourism by Woodside and his colleagues (1977), and Ajzen's (1985) Theory of Planned Behaviour (TPB). The research programme adopted a multi-stage, mixed methods strategy made up of a series of four independent yet inter-related primary studies that are qualitative or quantitative in nature. Evidence drawn from over 500 respondents in ten Caribbean destinations supports the findings, conclusions and research implications.

Regarding RI 1, the research finds that there are three behavioural links and five behavioural limits of supplier DRM and CCA decision-making. Regarding RI 2, the research finds that a DRM perception gap still exists between demand and supply-side stakeholders since Drabek's first findings of a perception gap over 20 years ago. Interestingly, the dynamic driving this gap is much

different, with tourists having lower perceptions of the importance of DRM considerations than their hosts. Importantly, the research also finds that there is a CCA perception gap between suppliers and tourists. Regarding RI 1, the research concludes that present-day DRM processes are likely to limit future CCA prospects to incremental versus transformational forms of adaptation. Regarding RI 2, it concludes that social pressure to adopt particular DRM and CCA measures will play a central role in suppliers' present and future protective decision-making. In this context, miscalculations across groups are likely.

This research makes important contributions to theory and methodology, in addition to having implications for policy and practice. The first theoretical contribution of this work is related to the conceptualisation and use of the Adjustment Choice Set (ACS) approach, a new analytical approach to measure and describe the scope, prevalence and categorisation of DRM and CCA measures. The second theoretical contribution revolves around the development and testing of a new Generalised Model of Tourism Supplier Protective Decision-making. The new model describes the influence of climatic and non-climatic factors at various stages of DRM and CCA decision-making, and has the potential for explanatory power, especially in the evaluation of intention to engage in protective behaviour.

The research methodology demonstrated that the use of inter-linking, multi-disciplinary models is an effective approach to understanding the complex nature of DRM and CCA decision-making. This approach overcomes the inherent limits encountered in trying to use individual models in isolation and exploits the potential that the use of multiple decision theories together offered to explain a wider range of behaviour across an expanded range of contexts.

Several policy and practice implications for DRM and CCA interventions arise from the research results. For example, the demand and supply-side perception gap analysis is insightful in identifying DRM and CCA measures that may be of benefit to destinations in the short and long-term and are perceived well by tourists. In this way, the results of this research enable hoteliers and policy-makers to move away from 'blanket adjustment strategies' to more specific measures that are 'win-win-win' across hoteliers, policy-makers and tourists. In addition, knowledge of the determinants to engage in protective behaviour is particularly useful for policy-makers to provide favourable conditions in support of supplier adoption of DRM and CCA measures. These contributions advance not only our understanding of supply-side protective behaviour but also enhance efforts to forecast and align the supply and consumption of DRM and CCA measures.

Future research should prioritise the further testing of the ACS approach, as well as, the new Generalised Model of Tourism Supplier Protective Decision-making across different contexts.

**Keywords:** Disaster risk management, climate change adaptation, decision-making, Adjustment Process Control model, Choice Sets, Theory of Planned Behaviour, demand and supply, coastal tourism, Caribbean tourism.

## **Dedication**

This thesis is lovingly dedicated to the memory of my father, Dennis Arthur Mahon, in whose image and likeness, I was imperfectly made – but it was enough.



## Acknowledgements

I am indebted to my main supervisors, Hamish Rennie and Gary Steel, for their tremendous intellectual support throughout my Ph.D. process. Thank you Hamish and Gary for helping me to realise my beautiful dream.

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## List of Abbreviations

ATT	Attitude
APC	Adjustment Process Control
CC	Climate change
CCM	Climate change mitigation
CS	Choice Set
CCA	Climate change adaptation
CRP	Climate risk perception
DM	Disaster management
DRM	Disaster risk management
DRR	Disaster risk reduction
H	Hypothesis
PARAD	Protection, Accommodation, Retreat, Diversification
PBC	Perceived behavioural control
RI	Research Issue
RP	Research proposition
RQ	Research question
SIDS	Small Island Developing State
SN	Subjective norm
SPSS	Statistical package for the Social Sciences
TPB	Theory of Planned Behaviour
$\alpha$	Alpha
$\beta$	Beta
$p$	Probability estimate

## Related Papers and Presentations

### Papers:

Becken, S., Mahon, R., Rennie, H., & Shakeela, A. (2014). The tourism disaster vulnerability framework: an application to tourism in small island destinations. *Natural Hazards*, 71(1), 955-972. doi:10.1007/s11069-013-0946-x

Mahon, R., Becken, S., & Rennie, H. (2013). *Evaluating the Business Case for Investment in the Resilience of the Tourism Sector of Small Island Developing States. A Background Paper Contributing to the Global Assessment Report on Disaster Risk Reduction (GAR) 2013. LEaP Research Report No. 32.* Christchurch: Lincoln University. Retrieved at: [http://researcharchive.lincoln.ac.nz/dspace/bitstream/10182/5300/3/LEaP\\_rr\\_32.pdf](http://researcharchive.lincoln.ac.nz/dspace/bitstream/10182/5300/3/LEaP_rr_32.pdf)

Mahon, R., Becken, S., & Rennie, H. (2012). *Evaluating the Business Case for Investment in the Resilience of the Tourism Sector of Small Island Developing States. A Background Paper Contributing to the Global Assessment Report on Disaster Risk Reduction (GAR) 2013.* Geneva, Switzerland: UNISDR. Retrieved at: <http://www.preventionweb.net/english/hyogo/gar/2013/en/bgdocs/Mahon%20et.al.%202012.pdf>

### Presentations:

Mahon, R. Becken, S., and H. Rennie. (2013). Evaluating the Business Case for Investment in the Resilience of the Tourism Sector of Small Island Developing States. Presentation at the 8<sup>th</sup> Caribbean Conference on Comprehensive Disaster Management, *CDM for Resilient Development: A Good Investment*, Hilton Rose Hall Resort and Spa, Montego Bay, Jamaica, 2-6 December, 2013. Presentation made by Roché Mahon: [http://www.cdema.org/cdmconference/presentations/2013/Roche\\_Mahon.pdf](http://www.cdema.org/cdmconference/presentations/2013/Roche_Mahon.pdf)

Mahon, R. (2013). Mainstreaming Disaster Risk Reduction and Climate Change Adaptation into Caribbean Coastal Tourism. Presentation at the Disastrous Doctorates Workshop 2013, Joint Centre for Disaster Research, Massey University, Wellington, New Zealand, 13 March, 2013

Mahon, R. (2011). To Adapt or Not To Adapt? Exploring Coastal Tourism Suppliers' Perceptions of Adaptation Options. Paper presented virtually at the 6<sup>th</sup> Caribbean Conference on Comprehensive Disaster Management, *CDM: Reflection, Introspection, Moving Forward*, Hyatt Regency, Port-of-Spain, Trinidad & Tobago, 5 – 9 December, 2011

Mahon, R. (2011). Climate Risk and Choice Perception: Preliminary Insights on Caribbean Coastal Tourism. Paper presented at the Islands and Small States Tourism Conference, *Current Issues and Future Challenges*, University of the South Pacific, Suva, Fiji, 12-14 September, 2011

Mahon, R. (2011). Climate Risk and Choice Perception. Preliminary Insights on Caribbean Coastal Tourism. Paper presented at Lincoln University's Post Graduate Conference 2011, *Research that will Move You*, Lincoln University, Christchurch, New Zealand, 1-2 September, 2011

## Chapter 1

### Introduction

#### 1.1 Achieving sustainable tourism development in the face of disasters and climate change

Sustainable development issues have been gaining momentum on the world stage over recent decades. As two of the fundamental challenges to global sustainable development in modern times, disasters (UNISDR, 2009b, 2011, 2013) and climate change (CC) (IPCC, 2007, 2012, 2013; Munasinghe, 2001; Najam, Rahman, Huq, & Sokona, 2003; Stern, 2008), have been moving higher up on the international agenda. Increasing recognition that changes in the climate are evident, that impacts are already being observed, and that further changes are likely (IPCC, 2007, 2013), has given impetus to formalising adaptation responses (Howden et al., 2007), and increasingly in the context of disaster risk management (DRM) (IPCC, 2012; UNISDR, 2009a).

Adjustment to hazards and disasters is captured in the concept and practice of disaster risk management (DRM) which refers to “processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, resilience, and sustainable development” (IPCC, 2012, p. 5). This approach includes identifying, assessing and reducing factors contributing to climate-related disasters, as well as, natural phenomenon attributed to climate variability and extreme events (IPCC, 2012).

Climate change adaptation (CCA) is applicable to both human and natural systems and has been redefined in IPCC (2012) for human systems as “the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities” while in natural systems, adaptation is understood to be “the process of adjustment to actual climate and its effects” (IPCC, 2012, p. 36). Adaptation to climate change includes not only long-term changes in mean conditions, but also a change in the year-to-year variation in weather conditions, and the frequency and magnitude of extreme weather events (Hulme et al., 1999; McCarthy, 2001; Smit, Burton, Klein, & Wandel, 2000; Smit & Skinner, 2002). In a sense therefore, adaptation is a process of adjustment not only to the risks associated with changes in averages but also relates to “managing climate-related risk in the Hyogo Framework on disaster risk management” (Patwardhan, Downing, Leary, & Wilbanks, 2009, p. 219).

Perhaps nowhere else is the need for a better understanding of DRM and CCA processes more pronounced than in relation to the dynamic and inherently vulnerable global travel and tourism industry – a disaster prone and climate sensitive industry (Becken & Hay, 2012; Becken & Hughey,

2013; Coombes, Jones, & Sutherland, 2009; Faulkner & Vikulov, 2001; Gössling & Hall, 2006; Hall, Scott, & Gössling, 2013; Prideaux, 2004; Ritchie, 2008; Viner & Agnew, 1999).

Tourism is the world's largest service sector industry that made a total economic contribution of USD 6.6 trillion (9% of global GDP) to global GDP; 260 million in jobs (1 in 11 jobs worldwide); USD 760 billion in investment (5% of global investment) and USD 1.2 trillion in exports (5% of global exports) in 2012 alone (WTTC, 2013a). Global tourism is growing – forecast on average to grow by 4.4% per year over the next 10 years (WTTC, 2013a). WTTC (2013a) projects that by the year 2023, travel and tourism will account for 10% of global GDP and 1 in 10 jobs. Even a small reduction in the industry's vulnerability and exposure to hazard effects, disaster impacts and the effects of climate variability, extremes and change would therefore be worthwhile.

## **1.2 Research problem**

Historically, the DRM and CCA communities have evolved independently of each other (Aalst, 2006; Mitchell & van Aalst, 2008; O'Brien, O'Keefe, Rose, & Wisner, 2006; Pelling & Schipper, 2009; Schipper & Pelling, 2006; Thomalla, Downing, Spanger-Siegfried, Han, & Rockström, 2006), with research and practice, even in tourism, treating DRM and CCA as distinct and disparate fields and processes.

However, increasing recognition that events associated with year-to-year variability and extremes are the pertinent attributes of climate change for most sectors, has led to the thrust of addressing adaptation within the near-term context of natural hazards (Birkmann et al., 2013; Smit & Skinner, 2002). There is consensus that "DRM and CCA offer a range of complementary approaches for managing the risks of climate extremes and disasters" (IPCC, 2012, p. 14), with researchers agreeing on the benefits of examining past experience with climate extremes, as relevant proxies that can contribute to an understanding of effective DRM to manage CC risks (IPCC, 2012, p. 8).

Yet, the behavioural links and limits of DRM and CCA in tourism have received limited research attention. In particular, empirical research in tourism has not adequately addressed the importance of measurable and alterable psychological factors in determining DRM, let alone the ways in which these determinants are similar to or different from the determinants of CCA. Progression into a future when climate change impacts will become more prevalent (IPCC, 2012) and the already hazardous coastal operating environment will become more adverse (Scott, Simpson, & Sim, 2012; Simpson, Scott, & Trotz, 2011) necessitates the development of a more predictive social science based upon a deeper understanding of the complex process of protective decision-making in the DRM and CCA contexts. This is the research problem investigated in this thesis.

### 1.3 Research background

The archipelagic Caribbean (Figure 1.1) is the world's leading tourism dependent region (Duval, 2004; McElroy, 2003; Pattullo, 1996; World Tourism Organization, 2012).

**Third party material removed due to copyright issues.**

#### **Figure 1.1 Map of the archipelagic Caribbean**

Source: [http://go.hrw.com/atlas/norm\\_hm/caribbean.htm](http://go.hrw.com/atlas/norm_hm/caribbean.htm) (Retrieved October 04, 2013)

According to the World Travel and Tourism Council (2013b), in 2012, travel and tourism contributed 14% to the Caribbean's economy, represented 15.6% of total regional exports, generated 2 million jobs and accounted for 11% of total regional capital investment. Seven of the ten most tourism dependent countries in the world are found in the Caribbean. It is also one of the most hazard-prone (Briguglio, 1995, 2003; Mycoo, 2011; Organization of American States, 2005; UNEP, 1994; UNISDR, 2013) and climate sensitive regions (CARICOM, 2011; IPCC, 2012; Nurse & Moore, 2005; Nurse et al., 2001; Pulwarty, Nurse, & Trotz, 2010; UNECLAC, 2010) on earth. Central to the vulnerability of Caribbean Small Island Developing States (SIDS) is the issue of their relative prosperity, which is often built on international coastal and marine tourism. By virtue of the region's geographic and climatic setting and the siting of tourism facilities on or near beaches, these tourism operations are highly exposed and vulnerable to hazard effects, disaster impacts and the effects of climate variability, extremes and change (Attz, 2002; Boxhill, 2011;

Brathwaite & Dharmaratne, 1998; Cashman, Cumberbatch, & Moore, 2012; Clayton, 2009; Gable, 1997; Garraway, 2008; Moore, Harewood, & Grosvenor, 2010; UNEP, 2008). Moreover, objective assessments of climate-related risks in the Caribbean confirm the likelihood of an increasingly adverse operating environment under future scenarios of climate change (Table 1.1).

**Table 1.1 Phenomenon, direction of trend and confidence level of climatic changes for Caribbean SIDS**

Phenomenon and direction of trend	Confidence Level
Increase in temperatures across the region by 1 to 4°C over 2071-2100; Increases in warm days and nights and decreases in cold days and nights	medium confidence
Trends in average total wet-day precipitation were weakly negative; Trends in heavy and very heavy precipitation are close to zero; Decrease in rainfall by 25-50% except in the northern Caribbean	medium confidence
Increase in tropical cyclone maximum wind speed	likely
Increased extreme coastal high water levels due to the contribution of mean sea level rise	very likely

Source: IPCC (2012) and Nurse (2010)

For many SIDS, expansion of international tourism has seen a concomitant increase in coastal tourism (Honey & Krantz, 2007). A scenario of continued growth in international tourism (WTTC, 2013a) based on coastal tourism means that tourists<sup>1</sup>, hoteliers and policy-makers in the Caribbean continue to engage in the construction of risk by exposing large numbers of visitors, employees and physical plant and infrastructure to intense hazard events that can lead to potentially catastrophic disaster impacts involving high mortality and asset loss (Alleyne, 2008; Collymore, 2006; Mahon, Becken, & Rennie, 2012; Tsai & Chen, 2011; UNISDR, 2009c). The present research allows for an examination of the thinking that underpins the process of continued invasion (Burton, 2006; Burton & Kates, 1964) of the hazardous coast by hoteliers who supply a risky form of leisure, demanded and consumed by tourists.

#### 1.4 Research issues

This thesis addresses two Research Issues that are critical to understanding and improving the protective decision-making of stakeholders operating at the frontline of climate and disaster risk.

<sup>1</sup> Defined for this research as overnight visitors to the Caribbean who are over the age of 18.

### **1.4.1 Research Issue 1: The supplier disaster risk management and climate change adaptation decision-making processes are not well understood**

Research Issue 1 centres around the observation that the DRM and CCA decision-making processes of suppliers<sup>2</sup> are not well understood. Those who supply tourism facilities, especially accommodation facilities, play a significant role in the exposure and vulnerability of tourists and tourism assets to the impacts of climate-related disasters and climate change. However, our understanding of how and why tourism policy-makers and coastal hoteliers choose to engage in DRM or CCA is coarse. Importantly, understanding the process, as well as the nature, structure and function of the main determinants of this process is key to predicting DRM and CCA behavioural intention, which may have broad implications for policy and practice.

To date, there has not been a systematic assessment of experience in DRM or CCA practice in the SIDS context in general (Kelman & Khan, 2013), and the Caribbean tourism context in particular (Becken, Mahon, Rennie, & Shakeela, 2014; Mahon et al., 2012). More specifically, although studies acknowledge the vulnerability of SIDS tourism to disaster impact (Milne, 1992), few tourism studies have clearly questioned and then examined the link and limits between present DRM processes and future CCA behaviour.

On one level, the research offers qualitative portraits of stakeholder experience that illuminate the critical factors that influence intention to adjust to present-day climate risk and adapt to future climate change. On another level, the thesis examines the degree to which supply-side responses may be influenced by differences in how hoteliers and policy-makers perceive disaster and climate-related risk, their attitude towards the advantages and disadvantages of engaging in DRM and CCA, social pressure to engage in DRM and CCA, perceptions of their own capacity to engage in DRM and CCA, as well as, perceptions of the feasibility of specific response measures. In this thesis, these factors are related to hoteliers' and tourism policy-makers' intention to adapt to climate change using the Protection, Accommodation, Retreat and Diversification (PARD) strategies which represent four quasi-hypothetical models of protective behaviour discussed as viable adaptation strategies in the coastal, adaptation and tourism planning and management literatures (Becken & Hay, 2007; IPCC, 1990; Linham & Nicholls, 2010). However, trade-offs associated with these strategies have never been empirically examined in the context of suppliers of tourism facilities and services. It is possible that variations in supply-side responses, particularly PARD behavioural intention, may be explained by differences in perceptions. It is in this context that my research qualitatively explores and quantitatively measures tourism supply-side stakeholders' perceptions of the attributes or features of the PARD strategies. This thesis extends beyond previous studies to provide an assessment of perceptions of the attributes associated with the PARD strategies, the likelihood that hoteliers and policy-makers intend to implement a particular PARD strategy; as well as, the determinants that contribute most significantly to their intention to implement a particular CCA strategy.

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<sup>2</sup> Defined in this thesis as coastal hoteliers and the tourism policy-makers that facilitate their business.



#### **1.4.2 Research Issue 2: Perception gaps across hoteliers, policy-makers and tourists may inhibit coherent disaster risk management and climate change adaptation**

Research Issue 2 focuses on improving our understanding of how perception gaps between demand and supply-side stakeholders may inhibit coherent action on managing disaster risk to advance climate change adaptation. Over a decade ago, Drabek demonstrated the existence of a DRM perception gap between demand and supply-side stakeholders (Drabek, 2000). This thesis examines whether this gap still exists. Moreover, the thesis further postulates that there is also a CCA perception gap between demand and supply-side stakeholders, specifically regarding the PARD strategies. This gap may also extend to the interaction between hoteliers and policy-makers. Belle and Bramwell (2005), for example, found a CCA perception gap between tourism managers and policy-makers. The present research hypothesises that there is both a DRM and CCA perception gap that have implications for planning and concerted action between hoteliers and policy-makers.

#### **1.5 Research aim, questions, propositions and hypotheses**

The overall and primary goal of this research programme is two-fold. Firstly, it seeks to contribute to theoretical knowledge on the nature, structure and function of a range of socio-psychological determinants in the risk management decision-making process in the social sciences. Secondly, it seeks to increase understanding of appropriate supplier DRM and CCA decision-making outcomes in a larger normative context. More specifically, and in the context of DRM and CCA decision-making processes and outcomes of hoteliers and policy-makers in Caribbean coastal tourism, this research aims to contribute to an enhanced understanding of the role played by: 1) attitude towards DRM and CCA, 2) social pressure to engage in DRM and CCA, 3) perceived behavioural control to engage in DRM and CCA, 4) perceptions of present and future climate risk, and 5) perceptions of the features of protective adjustment measures. The research questions, propositions and hypotheses investigated in this Ph.D. thesis are summarised in Table 1.2.

**Table 1.2 List of research issues, questions, propositions and hypotheses investigated by this research programme**

Research Issue	Research questions	Research propositions	Hypotheses
<p>RI 1: The DRM and CCA decision-making processes of supply-side stakeholders are not well understood. However, understanding these processes and the nature, structure and function of their main determinants may be key to predicting DRM and CCA behavioural intention.</p>	<p>RQ 1.1: What is the nature, structure and function of risk, attitudinal, normative and control perceptions in DRM and CCA decision-making?</p>	<p>RP 1.1.1: A range of climatic and non-climatic decision variables are associated with the DRM and CCA decision-making processes.</p> <p>RP 1.1.2: The nature, structure and function of the determinants of DRM and CCA have implications for protective behaviour outcomes.</p>	<p>H 1.1.1: There is a significant difference between Present and Future CRP for hoteliers and policy-makers.</p> <p>H 1.1.2: There is a significant difference in the levels of Present and Future CRP between hoteliers and policy-makers.</p> <p>H 1.1.3: There are significant differences in the attitudes, subjective norm, perceived behavioural control and intentions of hoteliers and policy-makers to use the PARD strategies to adapt to climate change.</p> <p>H 1.1.4: There is a significant linear relationship between hoteliers' and policy-makers' attitudes, subjective norm, perceived behavioural control and climate risk perception and their intentions to adapt using the PARD strategies.</p> <p>H 1.1.5: There are significant differences in hoteliers' and policy-makers' perceptions of social pressure to use the PARD strategies to adapt to climate change.</p> <p>H 1.1.6: There is a significant linear relationship between hoteliers' past adjustment behaviour and 1) present and 2) future climate risk perception.</p>
	<p>RQ 1.2: What is the size, composition and range of suppliers' DRM and CCA awareness sets?</p>	<p>RP 1.2: The size, composition, and range of measures within hoteliers' and tourism policy-makers' DRM and CCA awareness sets have implications for protective behaviour outcomes.</p>	

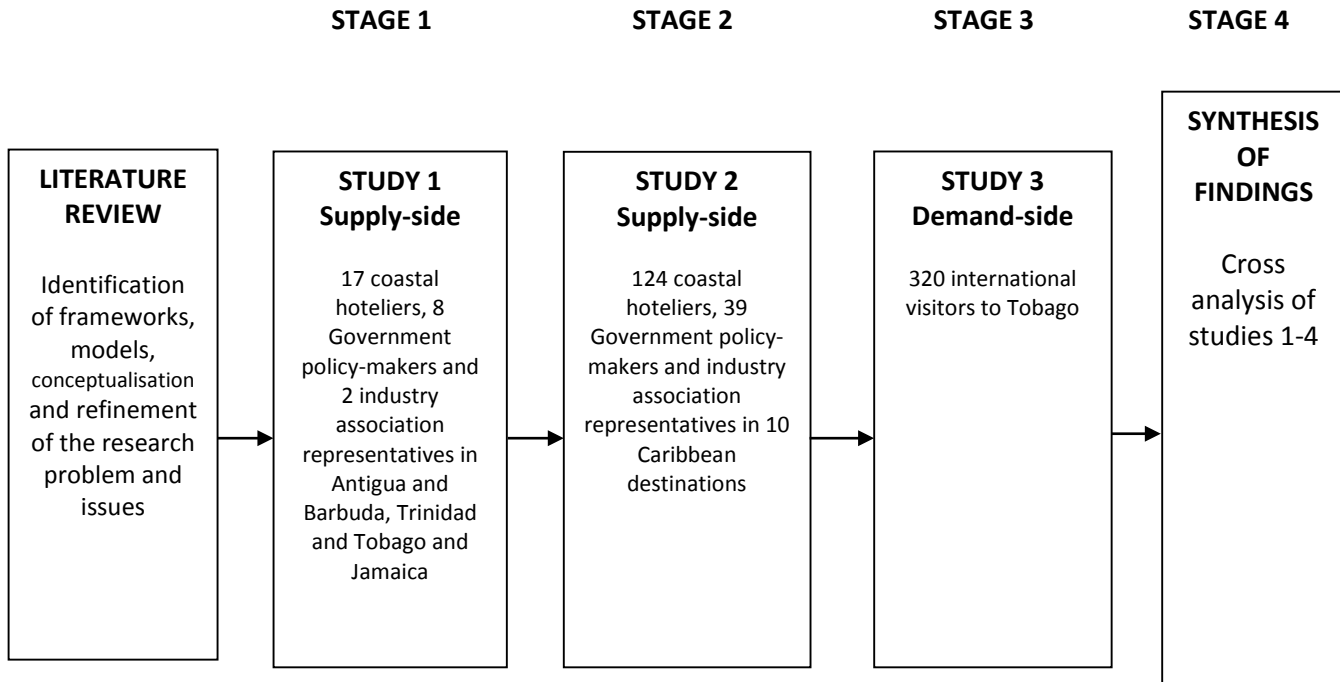
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	RQ 1.3: How are adjustments evaluated?	RP 1.3.1: Adjustment measures are evaluated on a wide range of criteria.	
		RP 1.3.2: The most likely CCA strategies are those that modify existing hotelier practices and tourism policies.	
RI 2: DRM and CCA perception gaps across hoteliers, policymakers and tourists may inhibit coherent response action	RQ 2.1: To what extent are there DRM perception gaps across hoteliers, policy-makers and tourists?		H 2.1: There is a significant difference in the levels of DRM perceptions across hoteliers, policy-makers and tourists.
	RQ 2.2: To what extent are there CCA perception gaps across hoteliers, policy-makers and tourists?		H 2.2: There are significant differences in the way hoteliers, policy-makers and tourists perceive the PARD strategies.
	RQ 2.3: How are perceptions of adjustment attributes associated with decision-making?		H 2.3: PARD perceptions are significantly associated with hoteliers' and tourism policy-makers' likelihood to use a specific PARD strategy or tourists' likelihood to visit a destination that has used a specific PARD strategy.
	RQ 2.2: To what extent are there beach perception gaps across hoteliers, policy-makers and tourists?		H 2.4: There are significant differences in the way hoteliers, policy-makers and tourists perceive the importance of the appearance and proximity of the beach.
	RQ 2.5: How are beach perceptions associated with decision-making?		H 2.5: There is a significant difference between the levels of beach and DRM perceptions across hoteliers, policy-makers, and tourists.
			H 2.6: Beach perception is significantly associated with hoteliers' and tourism policy-makers' likelihood to use a specific PARD strategy or tourists' likelihood to visit a destination that has used a specific PARD strategy.

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## 1.6 Methodology

The research reported in this thesis used a multi-stage, mixed methods strategy anchored within a multi-disciplinary theoretical framework (Figure 1.2) to provide insights on the extent to which demand and supply-side stakeholders' present-day climate-related risk management processes are associated with future CCA prospects. Within a pragmatic paradigm, a research design was employed that uses interview and survey data to facilitate exploratory, descriptive and explanatory research. The research methodology is discussed fully in Chapter 3.



**Figure 1.2 Studies conducted as part of the multi-stage, mixed methods strategy in this research programme**

## 1.7 Research scope

The major boundaries of this research are as follows:

- The setting of the research is confined to ten SIDS destinations in the English speaking Caribbean;
- Emphasis in the analysis is placed on the hotel sub-sector due to its prominent place in Caribbean coastal tourism (Duval, 2004; Harrison, Jayawardena, & Clayton, 2003; Haywood & Jayawardena, 2004);
- The research deals with climate change adaptation, but not climate change mitigation (CCM);

- The study deals specifically with: 1) weather and climate-related hazards and disasters, and 2) processes of adjustment in response to weather and climate-related risk, not the full range of potential hazards, disasters or potential responses;
- The thesis is on the DRM and CCA processes of human systems and not the adjustment of natural systems; and
- This research does not examine contributors or antecedents to climate risk perception.

## **1.8 Outline of the thesis**

This thesis has 7 chapters. This first chapter provided a brief overview of the Ph.D. research programme; presented the key research issues, aim, and research questions, and methodology, and discussed the research scope. In order to identify research issues to focus data collection and analysis about the research problem, the available literature is reviewed in Chapter 2. This chapter also identifies, critiques, refines, links and proposes a multi-disciplinary theoretical framework that guides the research programme. Chapter 3 presents the research methodology. Chapter 4 reports on the qualitative and quantitative results that address Research Issue 1. Chapter 5 presents the quantitative results that address Research Issue 2. Chapter 6 discusses the outcomes generated in response to the Research Issues within the context of a new generalised model of supplier decision-making. In Chapter 7, conclusions are made about the research problem, the implications of the research findings for theory, practice and policy are summarised; the limitations of the research are highlighted and an outlook for future work is provided.

## Chapter 2

### Research Issues

#### 2.1 Introduction

The previous chapter introduced the research problem about the need for a fuller understanding of the behavioural links and limits of DRM and CCA decision-making of demand and supply-side stakeholders. This chapter reviews the literature concerning DRM, CCA and decision-making to lay the foundation for the inter-linked theoretical framework that guides the investigation of the research issues for this research programme. The chapter is divided into seven Sections. This section introduces the chapter. Sections 2.2-2.3 give a general background of the disciplines and research fields relevant to this research. Section 2.4 identifies and discusses the research issues or key knowledge gaps. Section 2.5 provides an overview of relevant paradigms, frameworks and models and critiques these before going on to construct and discuss a new inter-linked theoretical framework in Section 2.6. Section 2.7 summarises the chapter.

#### 2.2 Disaster risk management and climate change adaptation - A brief overview

Disaster risk management has its roots in the study of human adjustment to natural hazards. Montz & Tobin (2010) assert that geographic research on physical hazards has a long history (over 60 years), with Gilbert White's seminal work, *Human Adjustment to Floods* (White, 1945) setting in motion a new era of hazards research. The field has evolved since that time. According to Smith (2013), the field of DRM has witnessed the emergence of four paradigms: 1) engineering (pre-1950), 2) behavioural (1950-70), 3) development (1970-90), and 4) complexity (1990-present). Each of these schools of thought propose a different way of conceptualising the human-environment interaction, with the most recent – the complexity paradigm - embedding hazards and disasters within global issues like climate change and sustainability (Smith, 2013, p. 20). Research in DRM has been highly interdisciplinary, international, cooperative and comparative (Porter, 1978; White, 1974). Beginning with floods, the scope of studies on physical processes was extended to coastal storms, coastal erosion, earthquake, drought, snow, wind and volcanic hazard (Kates, 1971, p. 438; White, 1974). The evolution of this field in the 1990s (Janssen & Ostrom, 2006) saw a shift from a narrow hazards focus that was overly concerned with case-studies as unique events and lacked a strong theoretical foundation (Montz & Tobin, 2010; White, Kates, & Burton, 2001) to an outlook that was "multi-faceted" in accounting for interactions between the physical and human environments. It was from this time onwards that human geographers started to unpack the relationship between people and environmental change, especially climate change, under a range of thematic approaches including risk (Cardona, 2003; Gaillard & Mercer, 2013; Kreimer & Arnold, 2000; Kreimer, Arnold, & Carlin, 2003; Smith, 2013; Viscusi, 2006; Wisner, Gaillard, & Kelman, 2012), vulnerability (Blaikie, 1994; Comfort et al., 1999; Cutter, 1996; Cutter, Boruff, & Shirley, 2003; Wisner, Blaikie, Cannon, & Davis, 2004) and resilience (Birkmann et al., 2013; Cannon & Müller-Mahn, 2010; Chang & Shinozuka, 2004;

Cimellaro, Reinhorn, & Bruneau, 2010; Djalante, Thomalla, Sinapoy, & Carnegie, 2012; Gaillard, 2010; Rose, 2004, 2007, 2011).

The formalisation of the adaptation community can be traced to the work of anthropologists who have been interested in adaptation to environmental variability and human-induced climate change since the early 1990s (Janssen & Ostrom, 2006). Pelling (2011, pp. 25-39) traces the ‘antecedents’ of adaptation, noting that concepts and patterns of thinking that are visible in the contemporary debate have roots in cybernetics (1970s and 80s), coevolution (1990s and 2000s), adaptive management (late 1970s – 2000s) and coping mechanisms (1970s onward). Pang, McKercher, and Prideaux (2013) note that adaptation scholarship has increased dramatically over the decades with the number of journal articles increasing sharply from 90 in 1989 to 573 in 1995 and over 9,700 in 2010. Smit and Wandel (2006) classify the bodies of adaptation scholarship into four broad categories: 1) studies that estimate the degree to which modelled impacts can be offset by adaptation, 2) studies that assess the relative merit of adaptation options or measures, 3) comparative vulnerability studies that assess regions, countries, and communities, and 4) research centred around adaptation implementation processes.

### 2.3 Managing the risks of disasters to advance climate change adaptation - A call for convergence

The theory and practice of DRM and CCA both involve implementing adjustments that seek to moderate harm by reducing risk (IPCC, 2012). All CCA and DRM activities are not the same, but these two distinct fields do share related goals and similarities (Table 2.1).

**Table 2.1 Differences and similarities between DRM and CCA**

Differences	Similarities
<ul style="list-style-type: none"> <li>• Emerged from different academic communities.ie. human ecology (DRM) versus anthropology (CCA)</li> <li>• Represent somewhat different ways of framing analyses of social-ecological change and the challenges of sustainability</li> <li>• Different terminology, definitions, conceptual frameworks, interpretations of concepts (such as ‘mitigation’, ‘coping’, ‘adaptive capacity’, and ‘vulnerability’), methods, strategies, and institutional arrangements</li> <li>• DRM has a long, mature tradition (over 60 years) of experience while CCA is relatively in its infancy (24 years)</li> <li>• DRM focuses on the full continuum of hazardous physical events while CCA focuses on climate variability, extremes and change</li> <li>• DRM has a near/short-term focus while CCA has a long-term focus</li> </ul>	<ul style="list-style-type: none"> <li>• Both DRM and CCA seek to reduce factors and modify environmental and human contexts that contribute to climate-related risk</li> <li>• Both share a development basis and similar challenges and barriers to implementation (e.g., mainstreaming)</li> <li>• Both share the ability to learn and strengthen adaptive capacity as critical components</li> <li>• Both share and emphasise the application of a holistic, integrated, trans-disciplinary approach to risk management</li> <li>• Both include and address climate variability</li> <li>• Both are processes rather than endpoints</li> </ul>

Differences	Similarities
<ul style="list-style-type: none"> <li>• DRM typically deals with fast-onset events requiring immediate action (with exceptions like slow-onset hazards such as drought or desertification)</li> </ul>	<ul style="list-style-type: none"> <li>• Both promote adequate preparedness</li> <li>• DRM and CCA both take place in a multi-hazard locational context</li> <li>• Modelling of disaster risk and climate change share aspects of uncertainty (e.g., there is uncertainty in the modelling of rare extreme climate events, as well as, the modelling of long-range hazards with long return periods such as tsunamis)</li> <li>• Vulnerability is a key determinant of climate and disaster risk</li> </ul>

Source: Synthesised from IPCC (2012); Mitchell and van Aalst (2008); Thomalla et al. (2006); Hay and Mimura (2010); Pelling and Schipper (2009); Schipper and Pelling (2006); and Miller et al. (2010)

Historically, the DRM and CCA communities have evolved independently of each other (Aalst, 2006; Mitchell & van Aalst, 2008; O'Brien et al., 2006; Pelling & Schipper, 2009; Schipper & Pelling, 2006; Thomalla et al., 2006) with research and practice, even in tourism (Gero, Méheux, & Dominey-Howes, 2011), treating DRM and CCA as distinct and disparate fields and processes. Although it was as early as the 1990s that some researchers advocated for the mitigation of natural hazards to be linked to concerns about climatic warming (Riebsame, 1991), it is only recently that the call for convergence has been heeded (Mitchell & van Aalst, 2008). The separation of DRM and CCA is now changing with contemporary research interest focusing on the need for a systematic link between these two processes to advance sustainable development (IPCC, 2012). This has been reflected in the growing number of multi-disciplinary studies in the international literature which have pointed to the need to address DRM and CCA research and practice more coherently (Birkmann & von Teichman, 2010; Mercer, 2010; UNDP, 2002; UNISDR, 2004, 2008, 2009a; United Nations Environment Programme, 2009; Venton & LaTrobe, 2008).

### **2.3.1 Application to tourism**

Research on DRM and CCA in tourism has also been disparate and disjointed (Gero et al., 2011). As the following discussion will show, the study of tourism and DRM has been largely independent of the study of tourism, CC and CCA.

#### **Tourism and disaster risk management**

While early work by Murphy and Bayley (Murphy & Bayley, 1989), Burby and Wagner (Burby & Wagner, 1996); and Drabek (Drabek, 1994a, 1994b, 1995a, 1995b, 1996a; Drabek, 1996b, 1999;



Drabek, 2000) were important in establishing the foundation, a sustained research interest and effort in formalising a tourism approach to DRM gained self-reinforcing momentum in the late 1990s with the work of Faulkner (Faulkner, 1999; Faulkner, 2001; Faulkner & Campus, 2000; Faulkner & Vikulov, 2001). His work set into motion an agenda to which others have steadily contributed (Miller & Ritchie, 2003; Prideaux, 2004). To date, a steady stream of tourism research on DRM has evolved and matured to include studies that offer perspectives on the impact of a diverse range of physical hazards on vulnerable tourism systems, including severe weather systems (Burby & Wagner, 1996; Drabek, 1996a); earthquakes (Huan, Beaman, & Shelby, 2004; Huang & Min, 2002; Tsai & Chen, 2010, 2011); tsunamis (Birkland, Herabat, Little, & Wallace, 2006; Calgaro & Lloyd, 2008; Carlsen, 2006; de Sausmarez, 2005; Garcia et al., 2006; Johnston et al., 2007; Reddy, 2005; Sharpley, 2005); volcanic eruptions (Bird, Gisladottir, & Dominey-Howes, 2010; Cioccio & Michael, 2007); coastal erosion (Phillips & Jones, 2006; Schleupner, 2008); and bushfires (Cioccio & Michael, 2007; Hystad & Keller, 2006; Hystad & Keller, 2008).

The tourism disaster risk management literature has evolved alongside the tourism crisis management literature (Anderson, 2006; Carlsen & Liburd, 2008; Cassedy, 1991, 1992; Cooper, 2006; de Sausmarez, 2004; de Sausmarez, 2007; Evans & Elphick, 2005; Glaesser, 2006; Laws, Prideaux, & Chon, 2007; Pennington-Gray, Thapa, Kaplanidou, Cahyanto, & McLaughlin, 2011; Rousaki & Alcott, 2006; Santana, 1999; Young & Montgomery, 1997). Although, there are tourism crisis management studies that focus specifically on physical disasters (Huang, Tseng, & Petrick, 2008; Ritchie, 2004; Ritchie, 2009), an important caveat is that a disaster triggered by the interaction of a physical hazard with human systems is just one of the broad gamut of exogenous events addressed by the tourism crisis management literature (Pforr & Hosie, 2008; Scott & Laws, 2006).

### **Tourism, climate change and climate change adaptation**

The attention devoted by the tourism literature to climate change and by the climate change literature to tourism has been recent and limited (Bigano, Goria, Hamilton, & Tol, 2005; Nicholls, 2004). The first comprehensive examination of the relationship between tourism and climate change was conducted by Hall and Higham (2005), while the first study to systematically attempt to analyse adaptation in the tourism and recreation sector was carried out by Scott, de Freitas, and Matzarakis (2009). In a 2010 editorial on tourism, climate change and climate policy, Scott & Becken (2010, p. 286) acknowledged that CCA research remains far less developed in tourism than in other economic sectors. Pang et al. (2013) estimate that papers in this area consistently represent less than 1% of the published research on climate change, while Scott et al. (2009) conclude that CCA research in the tourism-recreation sector is 5–7 years behind that of other productive sectors, most notably, agriculture. Becken (2013) offers the most recent analysis in noting that scholarly work and academic debate in climate change and tourism has developed considerably since the late 1980s. Pang et al. (2013) report that more than 100 papers a year are now published compared to less than 10 in 1990, with the main themes in the literature centring around: 1) impacts and adaptation, 2) mitigation, and 3) policy (Becken, 2013).

## **Behavioural links and limits of DRM and CCA in tourism?**

The research problem centres around the observation that, until recently, research and practice in tourism treated DRM and CCA as disparate fields and processes. A research compendium tracking 25 years of research (1985-2011) about climate change and global tourism (Zeppel, 2011) found over 1200 studies categorised under various themes. However, no theme addressed the integration of DRM and CCA. Importantly, Scott, Jones, and McBoyle (2006) bibliography of over 200 tourism resources spanning four decades (1936-2006) also reflects this gap. In the face of a contemporary thrust for convergence, tourism researchers and practitioners need to understand the behavioural links and limits of DRM and CCA decision-making of demand and supply-side stakeholders. Hoteliers, policy-makers and tourists represent important stakeholder groups on the supply and demand-side of the tourism value chain, however, the similarities and differences of the DRM and CCA decision-making processes of these groups remains an area of limited research. Given the consensus in the wider literature that past and present experiences in responding to climatic variability and extremes can contribute to building adaptive capacity for future climate change (Brooks, Adger, & Kelly, 2005; Ford et al., 2010; IPCC, 2012; Kelly & Adger, 2000; Smit et al., 2000; Smithers & Smit, 1997) and that present behaviour may affect future outcomes, an understanding of the processes of decision-making, and particularly of the ways in which potential CCA fits into actual near-term DRM decision-making (Smit & Skinner, 2002) is needed.

### **2.4 Research issues**

The two research issues investigated in this thesis relate to gaining a better understanding of: 1) the supplier DRM and CCA decision-making processes, and 2) how DRM and CCA perception gaps across hoteliers, tourism policy-makers and tourists may inhibit coherent response action. These research issues and their associated research propositions and hypotheses will now be discussed.

#### **2.4.1 Research Issue 1: The supplier disaster risk management and climate change adaptation decision-making processes are not well understood**

The DRM and CCA decision-making processes of supply-side stakeholders are not well understood. However, understanding the process and the nature, structure and function of its main determinants may be key to predicting DRM and CCA behavioural intention. The practice of DRM and CCA both involve implementing adjustments that seek to moderate harm by reducing risk (IPCC, 2012). The psychological determinants of adjustment adoption has been an area of research interest for the past 25 years in the broad natural hazard and disaster literature (Ge, Peacock, & Lindell, 2011; Paton, Kelly, Burgelt, & Doherty, 2006; Perry & Lindell, 2008; Prater & Lindell, 2000; Tang, Lindell, Prater, Wei, & Hussey, 2011); to a lesser extent in the CCA literature (Grothmann & Patt, 2005), and more recently in the tourism literature (Ritchie, Bentley, Koruth, & Wang, 2011; Wang & Ritchie, 2010; Wang & Ritchie, 2012).

In the DRM related adjustment adoption literature, several socio-cognitive variables have been shown to be determinants of protective behavioural intention and subsequent action. Lindell and Perry (2000) and Paton (2003) categorise the main variables into four classes: 1) risk perceptions, 2) perceived adjustment attributes, 3) demographic characteristics, and 4) other variables. Many empirical studies in the literature support the validity and relevance of the four classes of variables in various contexts (Lindell & Perry, 2000).

In the realm of CCA, several authors agree that little work appears to have been done on the link between strength of beliefs, perceptions and adaptation to climate change (Blennow & Persson, 2009; Moser, 2005; Patt & Schröter, 2008; Schröter, Polsky, & Patt, 2005). Hoffmann et al. (2009) assert that the ways in which affected companies adapt will, to a large extent, determine the nature and scale of impacts and possibly companies' survival in the long-run. However, studies on the determinants of firm and industry adaptation to climate impacts are only just beginning to emerge, and they are sparse (Linnenluecke, Griffiths, & Winn, 2013). Although some research into the determinants of corporate adaptation to climate change, such as company characteristics or managerial perceptions about climate change has been done (Bleda & Shackley, 2008; Fankhauser, Smith, & Tol, 1999), these determinants have not been investigated comprehensively.

In the tourism DRM literature, Ritchie et al. (2011) find that few supply-side studies examine the psychological determinants of disaster planning, and even fewer have undertaken a predictive or explanatory research approach. In addition, neither Zeppel (2011) nor Scott et al. (2006) list any studies that examine supplier risk perception, attitude, subjective norm or perceived behavioural control in the context of CCA and tourism. Moreover, there is an absence of studies that examine the psycho-social antecedents to CCA behaviour in tourism, and thereafter relate these results to the present-day DRM context, indicating that the tourism literature is yet to explore this research problem more deeply. While some work has been done with the accommodation sector in Australia (Wang & Ritchie, 2012), and the USA (Drabek, 1994b), there is very limited research on hoteliers and policy-makers in the SIDS context (Becken, 2005; Belle & Bramwell, 2005; Uyarra et al., 2005), with none of the existing SIDS studies being predictive in nature.

Of the tourism studies that do exist, studies providing evidence of the link between DRM and CCA in tourism supply-side behaviour, particularly in SIDS, are sparse and their results are mixed. For example, Becken (2005) found that many tourism businesses in the Pacific SIDS of Fiji already adjust by preparing for current climate-related events, and therefore are adapting to future climate change. Another study conducted by Mahon et al. (2012) in seven SIDS in the Caribbean, South Pacific and African, Indian, Mediterranean and South China Seas (AIMS) regions found that there was a focus on short-term business timeframes within which longer-term disaster risks and other environmental threats, such as climate change, are not considered. It is possible that this variation in behavioural outcomes may be better explained by measurable and alterable psychological determinants. Therefore, the first broad research proposition for the present study is:

*RP 1.1.1: A range of climatic and non-climatic decision variables are associated with the DRM and CCA decision-making processes.*

The decision variables investigated in this research programme will now be discussed.

## **Decision variables**

### ***Climate risk perception***

The role of risk perception as a key determinant in the adjustment process was first introduced by Gilbert White and his colleagues Robert Kates and Ian Burton in the early 1960s (Burton & Kates, 1964; Kates, 1963). Since that time, many cross-cultural studies of physical hazard and disaster risk perception have been carried out (Burton & Kates, 1964; Porter, 1978; White, 1974). Many definitions of risk perception exist in the literature (Paton, Smith, Daly, & Johnston, 2008; Paton, Smith, & Johnston, 2000; Slovic, 2000) and the language used in studies is not always consistent. Various authors, for example, use the term 'risk perception' or alternatively 'hazard awareness', 'hazard perception', and 'environmental perception' to broadly refer to a decision-maker's subjective evaluations of the threat of hazards. In addition, risk perception has been measured in a number of different ways for many different hazard types (Lindell & Perry, 2000). The lack of a common baseline of measurement (Paton et al., 2000) has led to a variety of conceptualisations being found in the literature. Such evaluations may be simple, one dimensional measures that only take into consideration awareness or knowledge for one hazard, or they may be multi-faceted in terms of going beyond cognition and including considerations of affect across a greater range of hazards. For the present research, climate risk perception is broadly defined as perceptions of knowledge and worry about the risk posed by coastal erosion, hurricanes and sea level rise on hotels and destinations.

As the effects of climate change occur, for instance in the form of more intense severe weather systems and an increase in sea level rise, the nature and level of vulnerability and exposure to hazardous events will change. For coastal tourism, it is probable that the environment will be inherently more risky (IPCC, 2012; Scott, Simpson, et al., 2012). Consequently, it would seem logical that decision-makers' perceptions of climate-related risk at some period in the future, in this case 15 years, would be increased. However, this temporal component of risk perception has not been widely investigated in tourism. In fact, our understanding of the temporal component of CRP as a determinant of DRM and CCA behaviour in tourism is crude. However, this is an important area of research because as IPCC (2012) and others such as Thomalla et al. (2006) and Birkmann and von Teichman (2010) note, for temporally distant events, risk perception may be reduced. This leads to the need to investigate the following hypothesis:

*H 1.1.1: There is a significant difference between Present and Future CRP for hoteliers and policy-makers.*

Understanding perceptions of disaster risk is regarded as an important precursor to understanding disaster planning. The consensus in the literature indicates that higher risk perceptions lead to more advanced disaster planning, mitigation and preparedness (Botzen,

Aerts, & van den Bergh, 2009; Miceli, Sotgiu, & Settanni, 2008; Peacock, Brody, & Highfield, 2005; Smit & Skinner, 2002). This leads to the need to investigate the following hypothesis:

*H 1.1.2: There is a significant difference in the levels of Present and Future CRP between hoteliers and policy-makers.*

However, this is not universal, with some studies finding non-significant correlations between risk perception and adjustment (Lindell & Perry, 2000). Paton et al. (2000), for example, reported a disconnect between decision-makers' risk perceptions and their level of preparation. Others such as Johnston, Bebbington, Lai, Houghton, and Paton (1999), Lindell and Whitney (2000), and Duval and Mulilis (1999) note a generally tenuous relationship between risk perceptions and protective behaviour. This has been explained by the diversity in decision-makers' interpretations of risk, or alternatively by the influence of additional mediating factors on the risk perception-protective behaviour relationship.

While risk perception is well researched in the DRM literature (Joffe, Rossetto, & Adams, 2013), it has been largely neglected in previous climate change research (Grothmann & Patt, 2005). Of the studies that exist, Patt and Schröter (2008) showed that, among other things, decision-maker perceptions of the need for adaptation based on the perceived seriousness of climate-related risks were important determinants of action. In two empirical studies conducted in Germany and Zimbabwe, Grothmann and Patt (2005) found that risk perception was one of the two most important factors contributing to the individual adaptation process. Thus, similar to engaging in DRM, there is evidence that engaging in CCA is directly related to the perception of risk (Smit & Skinner, 2002).

In the field of tourism, pioneering work carried out by Thomas Drabek in the 1990s (Drabek, 1994a, 1994b, 1995a, 1995b, 1996a) in the USA on the disaster evacuation perceptions and behaviour of tourism managers demonstrated the relevance of the risk perception-protective behaviour relationship. Among a number of managerial characteristics, the risk perception of tourism managers showed the highest correlation with the extent of disaster planning (Drabek, 1994b). In the Pacific SIDS context, Meheux and Parker (2006) concurred that the perception of natural hazards held by tourism managers may have had an influence on the adoption of mitigation and preparedness measures. In that study, as in Bird et al. (2010), it was concluded that low hazard knowledge and risk perceptions were associated with low adoption of protective adjustments (Bird et al., 2010; Meheux & Parker, 2006). Thus, tourism studies also suggest that risk perception is a key element guiding behavioural responses by influencing the decision-making process (Burton & Kates, 1964). A key hypothesis examined in this thesis is:

*H 1.1.4 a: There is a significant linear relationship between hoteliers' and policy-makers' climate risk perception and intention to adapt using the PARD strategies.*

## **Attitude**

In this research, attitude follows the broad conceptual definition proposed by Ajzen (2005) in referring to a decision-maker's perception of the advantages and disadvantages of using a specific DRM or CCA strategy or measure. The general consensus in the literature is that the tourism industry displays a passive and often reactive approach to DRM (Faulkner, 2001; Garcia et al., 2006; Pforr & Hosie, 2008), reflected in generally low levels of preparedness (Bird et al., 2010; Burby & Wagner, 1996; Hystad & Keller, 2008; Johnston et al., 2007; Prideaux, Laws, & Faulkner, 2003), poorly designed structures, and faulty architectural designs (Garcia et al., 2006). Low levels of action in DRM has been mirrored by similarly low levels of action in CCA (Ruhanen & Shakeela, 2012). One reason that has been suggested in the literature for this is that a decision-maker may not be able to determine how much to invest in protective actions (Kunreuther, Meyer, & Michel-Kerjan, 2009), making the advantages and disadvantages of investing in DRM or CCA hard to know (Mahon et al., 2012). With regard to CCA and some aspects of DRM (in particular long-range hazard events), there is inherent uncertainty and "ambiguity about just *what* these investments should be and *when* they should be undertaken" (Kunreuther et al., 2009, p. 7). In light of this, decision-makers may opt to either under-invest or to make no decision at all (Kunreuther et al., 2009). Work by McIvor and Paton (2007b) showed that positive attitudes will facilitate preparedness, and negative attitudes will constrain adjustment adoption. Therefore, a hypothesis investigated in this thesis is:

*H 1.1.4 b: There is a significant linear relationship between hoteliers' and policy-makers' attitudes and intention to adapt using the PARD strategies.*

## **Subjective norm**

For this research, subjective norm refers to a decision-maker's perception of social pressure (Ajzen, 2005) to use a specific DRM or CCA strategy or measure. Adjustment takes place in a social context comprising, among other things, behaviour that is seen as socially acceptable, in that, it fits with a society's expectations of normal behaviour (social norms) (Lindell & Perry, 2000; McIvor & Paton, 2007a). Positive attitudes to hazard mitigation are more likely to exist in a social environment that advocates adopting protective behaviours. The significant people or things (e.g., organisations) in a society that influence an individual are known as 'referents'. Important referents may play a key role in shaping an individual's 'subjective norm' (Ajzen, 2005). In discussing how reliance on social norms affects protective behaviour, Kunreuther et al. (2009) uses the example of raising a house on piles to illustrate. They argue that the owner of a house on piles in a flood prone area, would look like an oddity among the other houses at ground level. Should the homeowner choose to move, they would be concerned that the re-sale value of their home would be lower because the home was different. However, if a large number of neighbours had decided to raise their houses on piles, adjustment for the homeowner in question would be easier. Research in tourism has shown this assumption to hold. Buzinde, Manuel-Navarrete, Kerstetter, and Redclift (2010) reported that officials in Playacar, Mexico assumed that tourists will inevitably react negatively to the transformed landscape of an eroded coast. In that case, certain adjustments were made routinely in response to perceived market preferences, as much as to the changing physical environment.

In the context of DRM and CCA, Smit and Skinner (2002) emphasised the key role of important referents in CCA, asserting that “any realistic assessment of adaptation options needs to systematically consider the roles of the various stakeholders” (Smit & Skinner, 2002, p. 94). Nilsson, von Borgstede, and Biel (2004) found that norms were an important mediating variable influencing willingness to accept climate change policy measures within organisations. McIvor and Paton (2007a, pp. 80-81) sum up this trend by hypothesising that “the choices people make are influenced by their beliefs about how significant others will view their decisions to engage, or not engage, in hazard preparation activities”. The research, therefore, hypothesises that:

*H 1.1.4 c: There is a significant linear relationship between hoteliers and policy-makers’ subjective norm and intention to adapt using the PARD strategies.*

#### ***Perceived behavioural control***

In this thesis, perceived behavioural control refers to perceived self-efficacy or ability to use a specific DRM or CCA strategy or measure (Ajzen, 1980, 2005). Self-efficacy has been validated as a precursor of adjustment adoption (Lindell & Perry, 2000; Paton, 2003). Perceptions of self-efficacy are important to examine, especially when the threat is perceived as ‘involuntary’ (Slovic, 2000), as is the case with a change in climate. Since low versus high perceptions of self-efficacy are likely to produce very different protective behaviour, another hypothesis investigated in this thesis is:

*H 1.1.4 d: There is a significant linear relationship between hoteliers and policy-makers’ perceived behavioural control and intention to adapt using the PARD strategies.*

In summary, previous research findings raise questions about the relationship of risk perceptions, attitudes, subjective norm and perceived behavioural control to intention to engage in protective behaviour. Moreover, it could be asked whether the antecedents to protective behaviour (whether in the context of DRM or CCA) that interact to produce protective decision outcomes are structurally similar, the same, or perhaps different altogether. Consequently, the following research proposition and hypothesis will be investigated in this research:

*RP 1.1.2: The nature, structure and function of the determinants of DRM and CCA have implications for protective behaviour outcomes.*

*H 1.1.3: There are significant differences in the levels of attitudes, subjective norm, perceived behavioural control and intentions of hoteliers and policy-makers to use the PARD strategies to adapt to climate change.*

#### **Decision stages**

While it is important to examine the determinants underpinning the decision-making process, it is also critical to investigate the decision-making process itself. Paton (2003) proposed that a better understanding of adjustment can be gained by moving from a focus on the antecedents

of behaviour to a focus on the cognitive processes that underpin behaviour. This nuance emphasises that *how* a tourism supplier selects a particular DRM or CCA strategy is a crucial part of the study of supply-side adjustment. Thus, the decision stages of decision-making come into focus. Three sequential decision-making stages are particularly of research interest in the literature: 1) adjustment search, 2) adjustment evaluation, and 3) adjustment choice (Kates, 1971).

### ***Adjustment search***

Empirical research related to adjustment search is most commonly found in the DRM-related adjustment adoption literature. Work done by Burton and Kates (1964) found a relationship between the extent of a decision-maker's awareness and knowledge of protective measures and the extent of protective behaviour. This suggests that greater search results in greater awareness/knowledge and an increase in engaging in protective behaviour. Perry and Lindell (1990) thereafter observed that the adoption of adjustments may be inhibited by a lack of awareness of the available range of adjustments. This position is supported by Lindell and Perry (2000, p. 477) who concluded that a decision-maker's lack of information about suitable adjustments influence the 'prevalence of beliefs'. The consensus therefore seems to be that a lack of information about adjustments is associated with not only lower protective behaviour, but also impacts on the quality of the decision-making process that does take place. Thus, the following research proposition is investigated in this thesis:

*RP 1.2: The size, composition, and range of measures within tourism policy-makers' and hoteliers' DRM and CCA awareness sets have implications for protective behaviour outcomes.*

### ***Adjustment evaluation***

Adjustment evaluation is a common theme found in the DRM-based adjustment research literature (Kunreuther et al., 2009; Lindell & Perry, 2000), as well as, the coastal planning (Linham & Nicholls, 2010) and adaptation (IPCC, 1990) literatures. All adjustments are not equal, with research demonstrating that there are differences in the popularity of adjustments (Lindell & Perry, 2000). Smit and Skinner (2002) note that it is necessary to evaluate which adaptations are attractive and therefore likely to be adopted. Formal approaches to adjustment evaluation include Cost-Benefit Analysis (CBA), Cost-Effectiveness Analysis (CEA), and Multi-criteria Analysis (MCA) (Linham & Nicholls, 2010). Whether the evaluation is formal or not, once identified, adjustments are likely to be evaluated on the basis of a range of criteria. Particularly important are the attributes or features of adjustment measures which may lead to or prevent their adoption. Lindell and Perry (2000) list differences in situational appropriateness, technological requirements, effectiveness, utility for other purposes and cost as possible explanations for differences in the popularity of adjustments. Profitability, complexity, compatibility, economic efficiency, implementability, and flexibility are also relevant attributes (Smit & Skinner, 2002). Adjustments can also be differentiated with regard to their function and response efficacy (Paton, 2003). The perceived effectiveness of adjustments is closely related to what Kunreuther



et al. (2009) referred to as the inherent ambiguity of feedback about what constitutes optimal mitigation. Thus, a broad research proposition can be made here:

*RP 1.3.1: Adjustment measures are evaluated on a wide range of criteria.*

### **Adjustment choice**

After adjustment search and evaluation, a choice is hypothesised to be made by the decision-maker. Smit and Skinner (2002) hypothesised that most adaptation measures are not adopted solely to address climate change, but rather, they are modifications to existing practices and policies. There has been little empirical testing of this hypothesis in the tourism context and, consequently, this research investigates the proposition that:

*RP 1.3.2: The most likely CCA strategies are those that modify existing supply-side practices and tourism policies.*

## **2.4.2 Research Issue 2: Perception gaps across hoteliers, policy-makers and tourists may inhibit coherent disaster risk management and climate change adaptation**

It is quite possible that perception gaps between demand and supply-side stakeholders may inhibit coherent action on managing disaster risk to advance climate change adaptation, making this an important area for further investigation. Research by Drabek in 2000 in the realm of tourism and DRM showed a large gap between the perceptions of tourism managers and tourists regarding disaster planning. Tourists, for example, had a significantly different view of managers' roles and responsibilities related to evacuations when compared to managers themselves (Drabek, 2000, p. 53). Drabek found perception gaps between these two groups in six main areas: 1) managers' commitment to disaster evacuation planning, 2) managers' willingness to evacuate unless directly ordered by local government through a mandatory evacuation notice, 3) whether managers' responsibility ends with getting customers off property (versus being obligated to provide additional assistance – such as evacuation route assistance), 4) whether local governments should provide more disaster evacuation training for private-sector tourism managers, 5) whether tourist business associations should demonstrate more interest in disaster evacuation planning, and 6) whether there should be a local government media awareness campaign to ensure that prospective tourists know that the community has recovered from a disaster. Drake's findings on disaster evacuation measures are in line with the wider literature where researchers have repeatedly found differences in the popularity of adjustments (Lindell & Perry, 2000). To examine whether a similar DRM perception gap exists in the Caribbean coastal tourism context, this research hypothesises that:

*H 2.1: There is a significant difference in the levels of DRM perceptions across hoteliers, policy-makers and tourists.*

With regards to CCA, some recent tourism studies have focused on the differences between demand-side perceptions of destinations and supply-side projections of destination image as a

proxy for the interplay between demand and supply-side response to climate change (Buzinde, Manuel-Navarrete, Kerstetter, et al., 2010; Buzinde, Manuel-Navarrete, Yoo, & Morais, 2010; Grosspietsch, 2006). Each study concluded that suppliers tend to project images that were significantly extreme and different from reality. For example, tour operators projected inadequate or even negative images of the country of Rwanda (Grosspietsch, 2006), while hotelier-produced brochures projected images of stable and pristine beaches, despite negative coastline changes in Playacar, Mexico (Buzinde, Manuel-Navarrete, Kerstetter, et al., 2010). The studies by Buzinde raise the important issue of the authenticity of supplier representations of landscapes that have been altered by hoteliers' efforts such as beach replenishment to address the negative effects of coastal erosion in a near-term risk management context and the implications of this for climate change adaptation.

Aside from the gap between suppliers and tourists, another interesting dynamic that is worthy of further research is the possible perception gap between hoteliers and policy-makers. Studies have shown, for example, that there are internal inconsistencies within the supplier sector (Lowe & Lorenzoni, 2007). Patt and Schröter (2008) note that policies to promote adaptation to climate-related risks often rely on the willing cooperation of the intended industry beneficiaries. Yet, if these beneficiaries disagree with policy-makers about the need for adaptation, or the effectiveness of the measures they are being asked to undertake, then implementation of policies is likely to fail. Alternatively, policy misfits may result (Bunce, Brown, & Rosendo, 2010). In the SIDS context, at least one study indicates that divergent views between tourism managers and policy-makers on directions for CCA may be problematic. Belle and Bramwell's (2005) study revealed that tourism managers were less inclined when compared to policy-makers to regard policy responses as very appropriate, perhaps being more cautious about policy interventions. Given previous work done by Drabek (2000), and more recent work discussed above, it is possible that a CCA gap exists between demand and supply-side stakeholders and among suppliers themselves. One way to empirically measure this would be in relation to differences in perceptions of CCA strategies. Thus, this research hypothesises that:

*H 2.2: There are significant differences in the way hoteliers, policy-makers and tourists perceive the PARD strategies.*

If significant differences are found, it would be important to know how these perceptions are associated with protective behaviour. The correlation of adjustment attributes with adjustment adoption has been investigated in the adjustment adoption literature with past research finding limited but suggestive evidence of correlations between adjustment attributes and protective behaviour (Lindell & Perry, 2000). Further testing of the association between adjustment attributes and tourism supplier adjustment adoption in coastal tourism is warranted to gain insight into the likelihood of adjustment strategy adoption. With regards to tourists, Uyerra et al. (2005) found that environmental attributes are important decision-making criteria for tourists when choosing a holiday destination. More than 80% of tourists in Bonaire and Barbados for example, would be unwilling to return for the same holiday price in the event, respectively, of coral bleaching as a result of elevated sea surface temperatures, and reduced beach area as a result of sea level rise (Uyerra et al., 2005). To the extent that the reduced beach area might be

a consequence of an adjustment response (such as implementing hard coastal defences), this indicates that the implications of adjustment attributes will matter in tourist decision-making. Therefore, this research hypothesises that:

*H 2.3: PARD attribute perceptions are significantly associated with tourism policy-makers' and hoteliers' likelihood to use a specific PARD strategy and tourists' likelihood to visit a destination that has used a specific PARD strategy.*

## 2.5 Overview of decision-making paradigms, frameworks and models

As the focus of the research issues in this thesis are on decision-making and how people behave in choice situations, the most relevant body of theory is broadly that of behavioural decision theory (Jones, 1999). According to Decrop (2006), decision-making theory and research has been underpinned by several paradigms, often concurrently pursued. Table 2.2 presents a summative view of these paradigms or moments. However, it should be borne in mind that although the presentation of the table appears sequential, the demarcations between the moments/paradigms are actually 'fuzzy' in reality.

**Table 2.2 Summary of behavioural decision-making paradigms and models**

Moment/ paradigm	Main tenets	Representative concept/theory/model	Representative literature
Moment 1/ Rationality	Maximisation; humans are rational decision-makers that seek to maximise utility under budget constraints	Expected value (EV)	Von Neumann and Morgenstern (1944) on microeconomics; Edwards (1954) on psychology
Moment 2/ Limited or 'bounded rationality'	Individuals are intrinsically rational but constraints of limited time, cognitive capabilities and information results in actions that are not always completely rational	Satisficing principle; incrementalism	Simon (1955); Simon (1957); Lindblom (1959); Braybrooke and Lindblom (1963)
Moment 3/ Probabilistic decision- making	There is risk and uncertainty attached to every action. Choices are evaluated on the basis of expected value <i>and</i> the level of risk	Prospect theory; regret theory; 'standard gamble'	Kahneman and Tversky (1979); Bell (1982)
Moment 4/ Contingent or adaptive decision- making	People use a variety of strategies to solve decision problems. Decision choices are: 1. A compromise between the desire to make a correct decision and effort 2. Governed by human perception 3. Not individual but involve groups	Cost-benefit framework; Perceptual framework; Political model of decision-making	Payne (1982); Payne, Bettman, and Johnson (1993); Tversky and Kahneman (1981); Pettigrew (1973)

Moment/ paradigm	Main tenets	Representative concept/theory/model	Representative literature
Moment 5/ Post modernism	Relativism; reality is not unique, causality is often unclear and intentionality is a weak predictor of behaviour	Garbage can model	Cohen, March, and Olsen (1972)

Source: Adapted from Decrop (2006, pp. 2-4), Eiser et al. (2012) and Sirakaya and Woodside (2005)

Overall, as Table 2.2 shows, there has been a progression from assumptions of underlying rationality to an acceptance of the problems imposed by inadequacies in information and resources, and a diversity of values held by individual decision-makers. However, in sum, the existence of such a range of moments/paradigms is indicative of: 1) the failure to find a unifying approach, and 2) recognition that there are fundamental problems with each paradigm and thus the need to find better and/or alternative theoretical explanations.

### 2.5.1 A critical review of contemporary protective behaviour models

To explain the psychology underpinning protective behaviour, a number of models in the tourism and wider literatures have been proposed. A selection of contemporary examples are summarised in Table 2.3.

**Table 2.3 Summary of a selection of contemporary DRM and CCA decision-making models in the tourism and wider literatures**

Framework/model	Disciplinary perspective	Main tenets	Main variables
Paton's (2003) Social-Cognitive Model	Natural hazards and health research	Describes a developmental process encompassing three phases underpinned by specific socio-cognitive variables: 1) factors that motivate people to prepare, 2) factors that link initial motivation with the formation of intentions, and 3) factors that culminate in a decision to prepare	<ul style="list-style-type: none"> <li>• Motivators or precursor variables (critical awareness of hazards, risk perception, hazard anxiety)</li> <li>• Intention formation variables (self-efficacy, outcome expectancy, response efficacy, problem focused coping)</li> <li>• Variables linking intention and preparedness (perceived responsibility, timing of hazard activity, response efficacy, sense of community, normative factors e.g., trust and empowerment)</li> </ul>

Framework/model	Disciplinary perspective	Main tenets	Main variables
Lindell's (1992, 2000, 2012) Protective Action Decision Model	Emergent norms, response to environmental hazard vulnerability, emergency warning response, environmental risk perception, risk communication	Multi-stage model demonstrating the processing of information derived from social and environmental cues with messages that social sources transmit through communication channels. Hazard adjustment is a process in which characteristics of the hazard, the individual and the adjustment are key predictors	<ul style="list-style-type: none"> <li>• Environmental cues</li> <li>• Social cues</li> <li>• Information sources</li> <li>• Channel access and preference</li> <li>• Warning messages</li> <li>• Receiver characteristics</li> <li>• Exposure</li> <li>• Attention</li> <li>• Comprehension</li> <li>• Threat perceptions</li> <li>• Protective action perceptions</li> <li>• Stakeholder perceptions</li> <li>• Situational facilitators</li> <li>• Situational impediments</li> </ul>
Grothmann and Patt's (2005) Socio-cognitive Model of private proactive adaptation to climate change (MPPACC)	Psychology and behavioural economics	A process model based on Protection Motivation Theory for assessing individual adaptive capacity	<ul style="list-style-type: none"> <li>• Reliance on public adaptation</li> <li>• Risk experience appraisal</li> <li>• Cognitive biases/heuristics</li> <li>• Climate change risk appraisal (perceived probability, perceived severity)</li> <li>• Adaptation appraisal (perceived adaptation efficacy, perceived self-efficacy, perceived adaptation costs)</li> <li>• Avoidant maladaptation (fatalism, denial, wishful thinking)</li> <li>• Adaptation intention</li> <li>• Contextual factors (social discourse on climate change risks and adaptation, adaptation incentives, objective adaptation capacity)</li> </ul>
Wang and Ritchie's (2010) Onion Model for Strategic Crisis Planning (OMSCP)	Strategic management, organisational behaviour, organisational crisis management, social psychology	Integrates individual psychological, organisational and contextual factors into a model that theorises that these factors influence hotel crisis planning. Based in part on Ajzen's Theory of Planned Behaviour	<ul style="list-style-type: none"> <li>• Individual psychological factors (executives' attitudes, subjective norms, perceived control and past experience)</li> <li>• Organisational factors (organisation size, type, culture and structure)</li> <li>• Environmental contextual factors (geographic location, national culture, regulations)</li> </ul>

Source: Adapted from Paton (2003), Lindell & Perry (1992; 2012), Lindell & Whitney (2000), Grothmann and Patt (2005), Wang and Ritchie (2010)

These models make a temporal distinction in terms of their application to near-term (e.g., Paton’s Socio-Cognitive Model or Lindell’s Protective Action Decision Model) or future risk (e.g., Grothmann and Patt’s Model of Private Proactive Adaptation to Climate Change) and therefore are predominantly referenced in the DRM or the CCA literature respectively. Some models have enjoyed moderate testing with mixed results. A good example is Lindell’s PADM model which has been revised four times in light of new evidence over ten years of testing (1992, 1994, 2000, 2012). Others have only been tested once, for example, Wang and Ritchie (2010) Onion Model for Strategic Crisis Planning (OMSCP), or twice, for example, Grothmann and Patt (2005) Socio-cognitive Model of Private Proactive Adaptation to Climate Change (MPPACC), with mixed results in the two contexts. Some models are complex and there is limited guidance on how to operationalise them. An example is Grothmann and Patt (2005) MPPACC. Moreover, these models, while perhaps comprehensive in their own contexts, do not include all the variables that are of interest to this research programme. For example, although the MPPACC integrates multiple factors into one conceptual model to explain variance in protective behaviour, it does not take into consideration subjective norms; and in doing so, treats the decision-maker as the main/sole agent in decision-making. While a detailed critique of these models is beyond the scope of this thesis, an indicative assessment of their strengths and weaknesses for use in this research is presented in Table 2.4.

**Table 2.4 Summary critique of the usefulness of a selection of contemporary DRM and CCA decision-making models in the tourism and wider literatures for the present research**

Framework/Model	Strengths	Critique
Paton’s (2003) Social-Cognitive Model	<ul style="list-style-type: none"> <li>Places antecedents of protective behaviour within the context of a staged process of decision-making</li> <li>Explanatory power</li> </ul>	<ul style="list-style-type: none"> <li>Does not account for search and evaluation of adjustments</li> <li>Some variables are not parsimonious e.g., the measurement of critical awareness of hazards, risk perception, hazard anxiety as precursor variables seems redundant</li> <li>Moderate testing done in limited contexts (for example, household surveys)</li> <li>Contains variables that are extraneous to the scope of the present research study</li> </ul>
Lindell’s (1992, 1994, 2000, 2012) Protective Action Decision Model	<ul style="list-style-type: none"> <li>Demonstrates inter-relationships among hazards, social units (e.g., households), the social context and adjustment</li> <li>Moderate testing showing the model’s validity in risk communication, evacuation</li> </ul>	<ul style="list-style-type: none"> <li>Does not account for search and evaluation of adjustments</li> <li>Model is relevant to household adoption of protective actions</li> <li>Model is complex and contains many variables that are extraneous to the scope of the present study (for example, channel and preference)</li> </ul>

Framework/Model	Strengths	Critique
	modelling and long-term hazard adjustment	
	<ul style="list-style-type: none"> <li>• Explanatory power</li> </ul>	
Grothmann and Patt's (2005) Socio-cognitive Model of private proactive adaptation to climate change (MPPACC)	<ul style="list-style-type: none"> <li>• Comprehensive</li> <li>• Includes risk perception</li> <li>• Explanatory power</li> </ul>	<ul style="list-style-type: none"> <li>• Model is complex</li> <li>• Concentrates on the individual</li> <li>• Limited operational guidance</li> <li>• Limited testing in Zimbabwe and Germany</li> <li>• Unreliable performance in Zimbabwe context</li> </ul>
Wang and Rictchie's (2010) Onion Model for Strategic Crisis Planning (OMSCP)	<ul style="list-style-type: none"> <li>• Developed specifically for tourism</li> <li>• Descriptive and explanatory power</li> </ul>	<ul style="list-style-type: none"> <li>• Tested once in Australian context</li> </ul>

For the purposes of this thesis, the major limitations of these frameworks that precluded them from use in the present research can be summarised as follows: 1) they generally have not been widely tested, 2) they offer limited guidance on operationalisation, 3) in many cases, they do not include all decision variables or decision stages that are of interest to the present research, 4) they are not situated in a framework that allows for consideration of the influence of present behaviour on future behaviour, and 5) the frameworks do not allow consideration of the interaction between tourists and suppliers. From the review of available decision-making models in the literature, we can conclude that in much the same way that few studies were available that clearly made the link between present DRM processes and future CCA prospects, there was a corresponding lack of a comprehensive theoretical framework in the literature for the study of the present research problem. There was therefore a need to devise an inter-linked multi-disciplinary theoretical framework.

## 2.6 The theoretical framework used in this research programme

### 2.6.1 Parent theory: The Adjustment Process Control: Managerial Adjustment Decision Model

Drawing on human ecology, the human response to physical hazards paradigm as discussed in Kates (1971) has been modelled in a general systems model (Figure 2.1). The research sought to: 1) assess the extent of human occupancy in hazard zones, 2) identify the full range of possible human adjustments to the hazard(s), 3) study how individuals perceive and estimate the occurrence of the hazard(s), 4) describe the process of adoption of damage reducing adjustments in their social context, and 5) estimate the optimal set of adjustments in terms of anticipated social consequences. As such, Kates' (1971) General Systems Model is an example of a descriptive decision-making schema belonging to the 'bounded rationality' decision-making paradigm (Burton, Kates, & White, 1993) (see Table 2.3).

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**Figure 2.1 Human adjustment to physical hazards: A General Systems Model (Kates, 1971)**



Only a sub-component of this general model is of direct interest to this research. The Adjustment Process Control: Managerial Adjustment Decision Model (hereafter referred to as the APC Model) (Figure 2.2) illustrates the internal psychological processes by which adjustment choices are made and decisions taken.

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**Figure 2.2 Basic model of the Adjustment Process Control: Managerial Adjustment Decision Model (Kates, 1971)**

Conceptually, there are three main sequential stages/components of the decision-making process leading to the adoption (or rejection) of a DRM or CCA measure. First, there is a hazard perception threshold. That is, stakeholders must be sufficiently aware of the hazard and worried by it before they can act. The threshold level depends on several factors, the most important of which appears to include, among other things, perceptions of the hazard; past hazard experiences; future expectations of hazard possibilities; and the personality of the individual (Ericksen, 1986). The second component of decision-making involves a search for adjustments to the hazard. This search begins when the hazard perception threshold is exceeded and almost never includes the full theoretical range of adjustments possible. In part, it is dependent upon recent experiences and future expectations, as well as, the types of adjustments typically available and socially sanctioned (Ericksen, 1986). The third component of the adjustment process is the decision criteria used for evaluating the considered adjustments. The most important constraints on the adoption of perceived alternative adjustments include technical feasibility; economic benefit; social acceptability; and environmental compatibility (Ericksen, 1986).

Although not explicit, it becomes apparent that underpinning the APC model is information-processing theory which conceptualises the decision-making process as having five main stages: 1) problem recognition, 2) information search, 3) alternative evaluation and selection, 4) selection and decision, and 5) post-decision evaluation (Hawkins, Best, & Coney, 1995). A

key assumption of information-processing theory is that of utilitarian decision-makers who progress through stages driven by psychological or internal mechanisms (such as attitudes, motivation, beliefs and intentions), as well as, non-psychological or external variables (such as time and environmental factors) (Sirakaya & Woodside, 2005).

### **Strengths**

In line with the IPCC (2012) definition of adaptation, Kates' larger (1971) General Systems Model allows for adjustments to be made to the human use system or to the natural system. The model is flexible so that where DRM and CCA measures have been adopted, the consequences of these adjustments feed back into the larger social-ecological system to influence the hazard and/or the human system which its impacts (Ericksen, 1986; Kates, 1971). As a contextualist process model, the Model is capable of characterising coastal tourism as a complex system, within which changes are driven by the joint effects of psychological, economic, environmental, political and social forces. With some modification, it can emphasise the inter-connections among the various levels within the tourism system (i.e. resort, destination and region) and can describe changes at the level of the individual tourism business, as well as, at the aggregate level of the national and regional tourism industry.

Kates' (1971) General Systems Model - the larger general systems model in which the APC model sits - is especially appropriate due to the multiple hazards encountered in the coastal zone, the variability of hoteliers' and tourism policy-makers' perceptions of these hazards, and the differences in suppliers' choices in similar environments (Burton & Kates, 1964) across various coastal sites.

The subsidiary APC model satisfies the main purpose of behavioural models which is to illustrate the decision stages decision-makers transition through in choosing a DRM or CCA adjustment and to identify the internal and external factors influencing the transition process (Sirakaya & Woodside, 2005). In line with Perry and Lindell (2008, p. 175) which posits a role for information seeking, the APC model makes provision for an adjustment search stage.

Work done by Lindell and Perry (1993) and Eiser et al. (2012) emphasised that perceptions of adjustment measures matter. Thus, another strength of the APC model is that it provides a context for understanding the processes by which adjustments are identified, evaluated and adopted (Smit & Skinner, 2002).

### **Limitations**

The sub-system of the APC model is a cognitive process model and suffers from all associated limitations detailed in Weinstein (1993). In addition, for this research, the APC Model is limited in four major ways that make it difficult to test empirically: 1) it has a narrow conceptualisation of the nature and function of risk perception in the protective behaviour decision-making process, 2) it is ambiguous with regard to the adjustment search and evaluation stages, 3) it is unable to predict intention to implement final choice of adjustment, and 4) there is an absence of the role of the tourist and other intermediaries as a key component of supply-side decision-making. Each of these limitations will now be discussed:

### *Narrow conceptualisation of the nature and function of climate risk perception in the protective decision-making process*

Kates' (1971) General Systems Model belongs to the physicalist paradigm where emphasis is placed solely on the hazard and approaches to controlling it. However, this framing is simplistic in three ways. First, risk perception entails more than just perceptions of the hazard. Disaster risk has a triad structure of hazard, vulnerability and exposure which is the dominant framing found in key work such as IPCC (2012). Thus, to overcome the limited original framing of hazard perception in Kates (1971), hazard is supplemented with the two key components of vulnerability and exposure. Second, there is support in the literature that risk perceptions are a function of an amalgam of cognition and affect (Kobbeltvedt & Wolff, 2009; Slovic, Finucane, Peters, & MacGregor, 2004; Slovic & Peters, 2006; Villegas et al., 2013). However, Kates (1971) conceptualisation only addresses the cognitive component. Third, Kates (1971) does not account for the temporal component of risk perception that is relevant when examining protective decision-making in the present DRM and prospective CCA contexts.

This thesis incorporates the above nuanced understanding of risk perception in general and defines climate risk perception in particular as perceived knowledge and worry of the risk posed by present and future changes in climate-related hazard events intersecting with the vulnerable and exposed elements of beach hotels and resorts. CRP is defined in a manner that builds on considerations from other studies but for the purpose of this research also focuses on the temporal dimension of risk perceptions. The inclusion of respondents' perceived knowledge and worry about hazards, vulnerability and exposure across a temporal scale will be used to measure climate risk perception in the tourism context.

Regarding the function of CRP in the protective decision-making process, this research seeks to examine Kates (1971) proposition of the role of risk perception as the mechanism that triggers/ generates the adjustment process leading to the subsequent channelling of decision-making through the adjustment search, evaluation and choice stages. In addition, there is an important opportunity to test CRP's role as an antecedent to behavioural intention.

### *Ambiguous adjustment search and evaluation stages*

Kates (1971) proposes that there is an adjustment search and evaluation phase but provides little detail about how the search is conducted or about how adjustments are evaluated, leaving the adjustment search and evaluation process as ambiguous and not well defined. However, the application of work done by other decision-making researchers that explicitly incorporates the tenets of information processing theory (and its extensions) can help to shed insight. LeBlanc (1989), for example, advocated for the inclusion of Choice Sets when he suggested that there are six stages in the decision-making process: 1) problem recognition, 2) search, 3) formation of an early consideration set of alternatives, 4) evaluation of these alternatives and formation of a late consideration set, 5) evaluation and choice from the late consideration set, and 6) post-decision evaluation. A structured approach that follows Le Blanc's conceptualisation for describing and evaluating not only the size of the perceived range of DRM and CCA adjustments, but also, the structure of the perceived range of adjustment, is absent from the APC model.

### *Inability to predict intention to implement final choice of adjustment*

While the APC model can describe the process of choosing a DRM or CCA measure and identify the contributing factors associated with this process, it cannot provide insight on the correlation between these factors, nor can it offer any guidance on the probability that the decision-maker intends to implement the measure(s) identified as a final choice.

### *Absence of the role of the tourist and other intermediaries as a key component of supply-side decision-making*

Although consumer demand plays a very important role in coastal tourism development decisions (Honey & Krantz, 2007), most adaptation models neglect the role of the tourist (Jopp, DeLacy, & Mair, 2010). Moreover, tourism is a business activity that involves a range of intermediaries such as international tour operators who are especially important in the Caribbean coastal tourism context (Kimes & Lord, 1994).

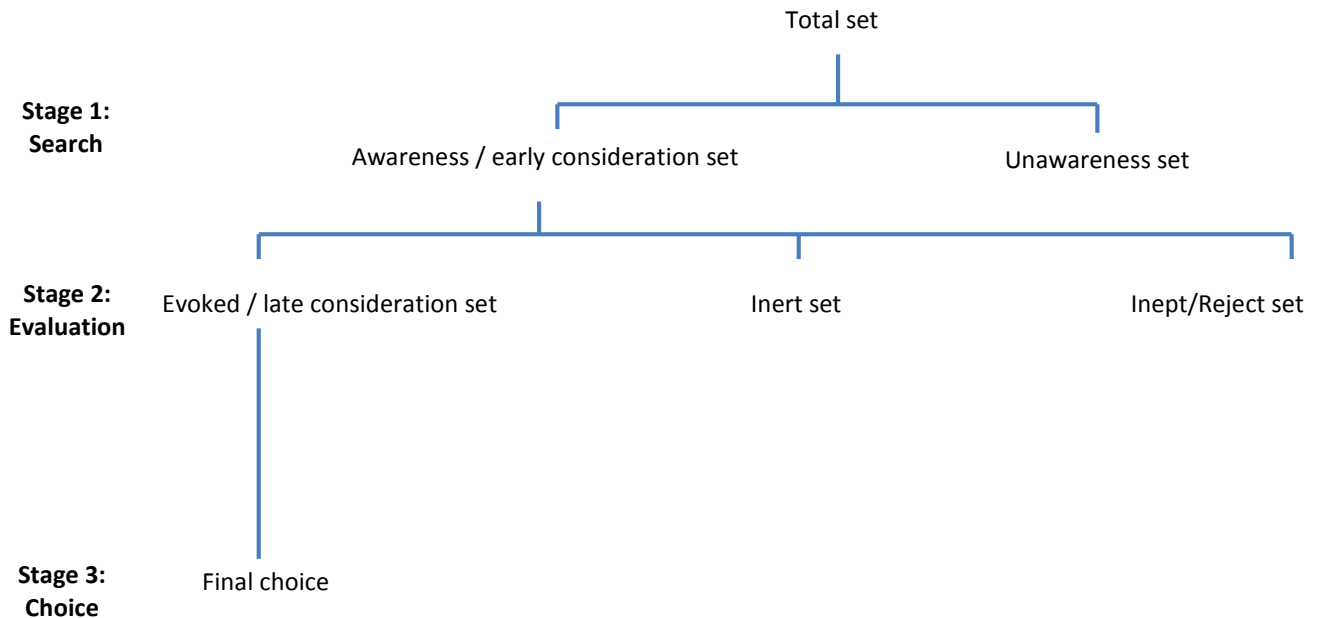
According to Sirakaya and Woodside (2005, p. 829), “the treatment of an individual decision-maker, as if they were in a vacuum, is common to decision-making models”. These models accept that other individuals affect the decision-maker but do not address active interaction with others along the decision-making process. The APC model does not account for the business context, since in its generic form, there is no explicit role for intermediaries, the tourist or demand and supply-side interaction. Thus, an enhanced approach is needed in which the role of intermediaries and the tourist as a key component of demand and supply interaction are made explicit.

In summary, while useful, the APC model is limited in four major ways. To overcome these limitations, it is necessary to extend and supplement the APC model to: 1) add depth to the concept of hazard perception by emphasising the three dimensions of disaster risk, 2) use a structured approach that clarifies how choices are made in the adjustment search and evaluation phases, 3) include an appropriate social psychology framework that facilitates measurement of critical behavioural factors and an examination of their role in influencing behavioural intention, and 4) explicitly integrate demand-side influence and the influence of other intermediaries on the supplier DRM and CCA decision-making process. Two sub-theories namely, the Choice Set approach and the Theory of Planned Behaviour will be linked to Kates’ (1971) APC model to achieve this. The Choice Set approach is now discussed.

#### **2.6.2 Sub-theory 1: The Choice Set approach**

Central to decision-making is the notion of Choice Sets (Figure 2.3) which conceptualises the decision-making process as a sequential narrowing down of sets of alternatives through a funnelling process (Crompton, 1992). The Choice Set concept was introduced by Howard (1963) in the consumer behaviour literature and later advanced by others, including two groups of tourism researchers: 1) Woodside and his colleagues (Woodside & Lyonski, 1989; Woodside & Sherrell, 1977) and 2) Crompton and his colleagues (Crompton, 1992; Crompton & Ankomah, 1993; Um & Crompton, 1990). Much of this work in tourism focuses on: 1) describing a tourist’s destination decision-making process, 2) examining the size and structure of destination choice sets (Um & Crompton, 1990), and 3) examining the types of variables impacting on tourist destination decision-making (Botha, Crompton, & Kim, 1999). In doing so, the Choice Set approach is able to provide a description of how tourists narrow down

the number of destinations considered and reach a final decision. The Choice Set funnelling process which has been adapted from Crompton (1992) and Crompton and Ankomah (1993) to make clear the search, evaluation and choice stages is shown in Figure 2.3.



**Figure 2.3 The Choice Set funnelling process**

Assuming a general motivation to act due to problem recognition triggered by a breach in the climate risk perception threshold, the decision-making process then transitions into the search phase. A decision-maker would possibly explore and choose a DRM or CCA measure from the theoretical range of choice (otherwise known as the ‘total set’) which is potentially infinite and therefore not entirely known by the average individual or manager (White, 1961). Usually, only a portion of the theoretical range of choice is perceived. White (1961, p. 27) refers to this as “the practical range of choice” while the Choice Set approach defines this as the ‘awareness’ or ‘early consideration’ set.

All adjustments can be categorised as belonging either in an individual’s awareness/early consideration or unawareness set (Crompton, 1992). The awareness/early consideration set is comprised of all adjustments that the decision-maker may be aware of at any given time and is formed through passive information from the outside environment. The evoked/late consideration set is developed from the awareness/early consideration set and consists of various adjustments that the decision-maker actively considers in their choice process (Spiggle & Sewall, 1987). This set is formed from active information searching from external sources, including media, technical experts and others (Sirakaya & Woodside, 2005). An inert set is made up of the adjustments towards which the decision-maker is ambivalent. There is neither a positive nor negative evaluation of these measures, and the lack of affect towards them causes them to be excluded from the late consideration set. In contrast, the inept set comprises of the measures that the decision-maker has rejected from consideration because they are perceived negatively (Sirakaya & Woodside, 2005). The negative perception may be the result of either an unpleasant personal experience or negative

feedback from external sources (Crompton & Ankomah, 1993). Alternatively, decision-makers may reject measures which do not meet their needs or preferences (Mansfeld, 1992).

According to the Choice Set approach, before deciding on a preferred DRM or CCA measure, suppliers' adjustment choice is made by funnelling the measures chosen from the total set through a three-stage sequential set process: 1) an awareness/early consideration set, 2) an evoked/late consideration set, and 3) a final choice. Since most options from the awareness/early consideration set are discarded to form the smaller evoked/late consideration set; and a final choice is selected from the evoked/late consideration set (Crompton, 1992), the DRM or CCA measure should be included in each of these three choice set stages to have any chance of being selected as a final choice.

### **Strengths**

The Choice Set approach was initiated as a practical alternative to other behavioural approaches, which were criticised as being too complex, generalised and difficult to test empirically (Bagozzi, 1984). Choice Set models attempt to illustrate the same process in a different way, while implicitly accepting the main assumptions of behavioural models. Rather than being a strong theoretical exercise, the strength of the Choice Set approach is that it clarifies the process that decision-makers go through to reach a final decision (Sirakaya & Woodside, 2005). The Choice Set approach therefore is an analytical tool that can illuminate the relative strengths and weaknesses of DRM and CCA measures at different transition points in the decision-making process (Spiggle & Sewall, 1987).

### **Limitations**

The Choice Set model is based in the structural cognitive approach to decision-making. For the purposes of this research, the main limitation of the Choice Set approach relates to the fact that it is not an explanatory model. For example, it cannot explain the roles of the variables that significantly affect suppliers' DRM or CCA behavioural intention to implement a chosen measure(s). Moreover, once a choice of a DRM or CCA measure has been made, it cannot shed insight on the probability of that measure being implemented. To overcome these analytical limitations, it is necessary to supplement the APC and Choice Set models with an explanatory model that can answer these questions. This is where the Theory of Planned Behaviour can help.

### **2.6.3 Sub-theory 2: The Theory of Planned Behaviour**

An extension of the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB) as proposed by Icek Ajzen in 1985 is widely considered the dominant attitude – behaviour model (Sirakaya & Woodside, 2005). According to the theory, a person's intention to perform (or not to perform) a behaviour is the most important immediate determinant of that behavioural action (Ajzen, 1980, 1985, 2005). Intentions and behaviours are a function of three basic determinants: 1) *attitude toward the behaviour* – that is the individual's positive or negative evaluation of performing the behaviour, 2) *subjective norm* – the person's perception of social pressure to perform or not to perform the behaviour, and 3) *perceived behavioural control* – the individual's perceived sense of self-efficacy or ability to perform the

behaviour, taking into account some of the real constraints that may exist (Ajzen, 2005). With the exception of behaviour, the variables in the TPB model are all psychological constructs or beliefs. A graphical representation of the basic model of the TPB is presented in Figure 2.4.

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#### **Figure 2.4 Basic model of the Theory of Planned Behaviour (Ajzen, 2005)**

In this research programme, a tourism supplier's attitude (ATT) towards using a specific DRM or CCA strategy or measure are a function of:

1. Beliefs that adjustment using a specific DRM or CCA strategy or measure leads to certain positive or negative outcomes (b); and
2. Evaluation of the expected outcomes from using a specific DRM or CCA strategy or measure (e).

An overall attitude composite is expressed by the formula:

$$ATT \propto \sum b_i e_i$$

Subjective norm (SN) is a function of a tourism supplier's:

1. Beliefs that specific referents will expect or approve of the supplier using a specific DRM or CCA strategy or measure (n); and
2. Evaluation of perceived social pressure from specific referents to use a specific DRM or CCA measure or strategy (m).

An overall normative composite is expressed by the formula:

$$SN \propto \sum n_i m_i$$

Perceived Behavioural Control (PBC) is a function of a tourism supplier's:

1. Beliefs about self-efficacy or ability to use a specific DRM or CCA strategy or measure (c); and
2. Evaluation of self-efficacy or ability to use a specific DRM or CCA strategy or measure (p).

The overall control belief composite is expressed by the formula:

$$PBC \propto \sum c_i p_i$$

### **Strengths**

The TPB has general acceptance in the literature as a partial explanatory model for human and organisational behaviours. In fact, many applications of the TPB in a great variety of behavioural domains (Armitage & Conner, 2001; Godin & Kok, 1996; Sutton, 1998) including tourism (Quintal, Lee, & Soutar, 2010; Wang & Ritchie, 2012, 2013) and DRM (McIvor & Paton, 2007a) have supported its underlying tenets.

Francis et al. (2004) note that the TPB is appropriate to predict the occurrence of a specific behaviour provided that the behaviour is intentional. Since in line with Smit and Skinner (2002), this research programme makes the assumption that DRM and CCA efforts of supply-side stakeholders are intentional or planned, it is appropriate to use the TPB to predict behavioural intentions. In fact, the TPB has been tested with good results in Wang and Ritchie (2012). The TPB therefore provides an appropriate framework for testing the contribution of CRP to behavioural intention to implement the PARD strategies.

### **Limitations**

For the purposes of this research programme, limitations with the use of the TPB do exist. For example, due to its generalised nature, it does not account for the role of climate risk perception in behavioural intention. Moreover, it treats affective variables in a limited manner and finally, it is unable to provide insights on the normative appropriateness of behaviour.

#### *Absence of the role of climate risk perception in behavioural intention*

There is evidence to support the theory that responses to climate risk may be influenced by differences in how tourism stakeholders perceive climate change (Blennow & Persson, 2009; Moser, 2005; Patt & Dessai, 2005; Patt & Schröter, 2008; Schröter et al., 2005). According to the APC model, hazard perception triggers the process that leads to the final choice of an adjustment measure (Kates, 1971). Moreover, a theoretical position validated by the tourism



literature (Bird et al., 2010; Drabek, 1994b; Meheux & Parker, 2006) and others in the wider literature (Botzen et al., 2009; Miceli et al., 2008; Peacock et al., 2005; Smit & Skinner, 2002) is that risk perception is directly positively related to protective behaviour. This research programme therefore hypothesises that climate risk perception is a major contributor to a hoteliers' and tourism policy-makers' intention to adapt using a specific CCA strategy.

#### *Limited treatment of affective variables*

The TPB is based on a cognitive processing model and as such overlooks affective variables, (e.g., worry) treating these in a limited manner (Sutton, 1997; Weinstein, 1993). By contrast, numerous psychometric studies have consistently demonstrated the key role of affective processes in judgement, decision-making and risk perception (Slovic, 2000; Slovic et al., 2004; Slovic & Peters, 2006). One such study done by Fischhoff, Slovic, Lichtenstein, Read, & Combs (1978) noted that the characteristic most highly correlated with perceived risk was the degree to which a hazard evoked feelings of worry or dread.

#### *Inability to provide insights on the normative appropriateness of behaviour*

The Theory of Planned Behaviour is useful for predicting behavioural intentions but it is not as useful in determining whether the intended behaviour is appropriate. For example, the TPB can provide a measure of the significance of SN in contributing to protective behavioural intention but it cannot go further by offering insight on the normative appropriateness of the behavioural intention.

In summary, for this research programme, the basic form of Ajzen's TPB does not adequately reflect all of the variables that are thought to have a significant relationship with behavioural intention to engage in protective behaviour using the PARD strategies. To compensate for the model's inherent limitations, operational components from Ajzen's TPB (namely attitude, subjective norm and perceived behavioural control) have been integrated with the key concept of climate risk perception which includes an affect dimension, to produce a comprehensive and more generalisable framework to understand the structure and function of the antecedents of coastal tourism supply-side stakeholders' behavioural intentions. The proposed extended model is illustrated (Figure 2.5).

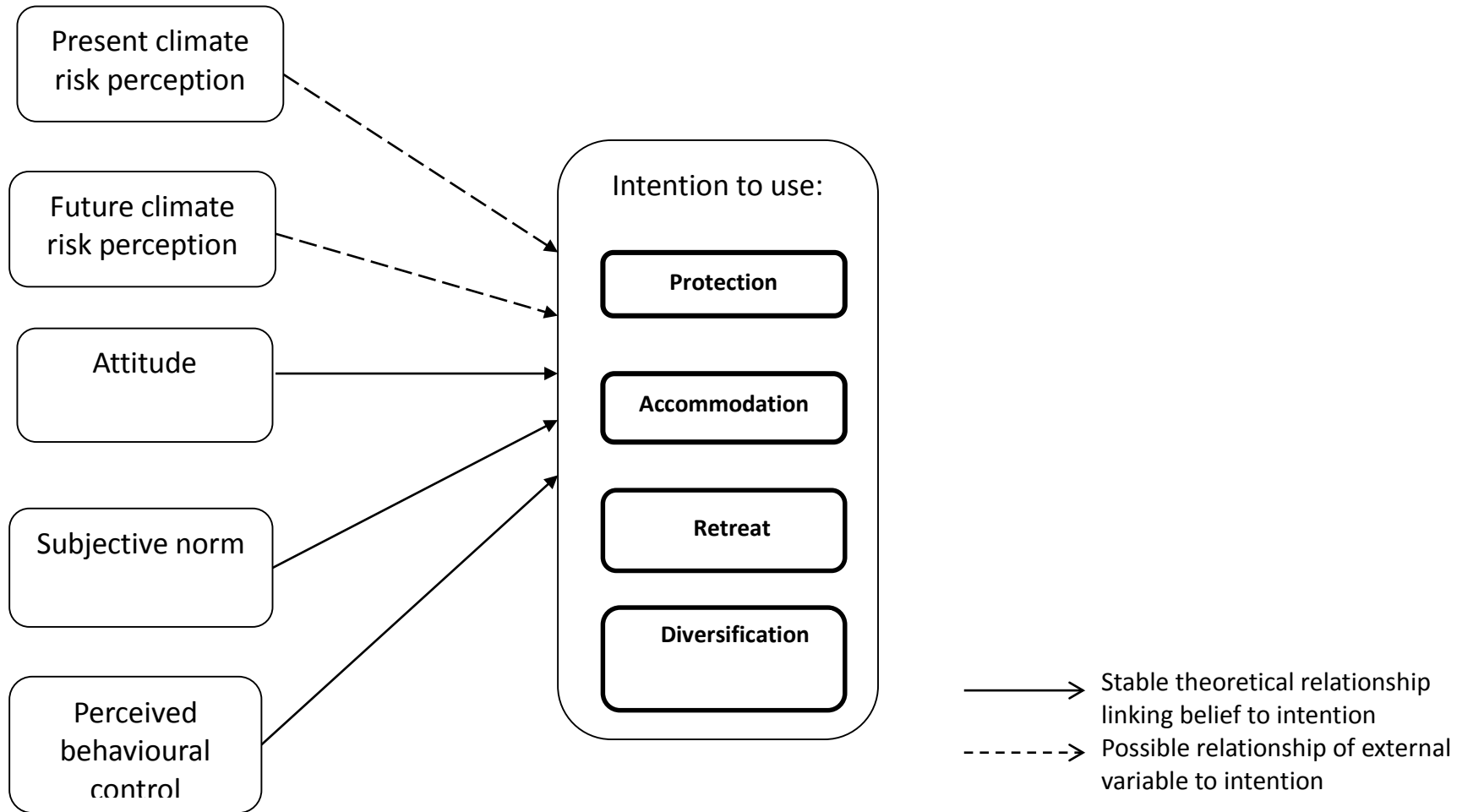


Figure 2.5 Extended model of the Theory of Planned Behaviour. Adapted from Ajzen (2005)

In this extended model, the relationship between the determinants in the formation of intention is a linear function of ATT, SN, and PBC and Present CRP and Future CRP which can be expressed algebraically as:

$$BI = \text{intercept} + w_1 \text{ ATT} + w_2 \text{ SN} + w_3 \text{ PBC} + w_4 \text{ Present CRP} + w_5 \text{ Future CRP}$$

in which BI is behavioural intention, ATT is attitude, SN is subjective norm, PBC is perceived behavioural control, Present CRP is perceptions of knowledge and worry of the risk posed by climate-related hazards at the present time, Future CRP is perceptions of knowledge and worry of the risk posed by climate-related hazards within the next 15 years and  $w_1, w_2, w_3, w_4$  and  $w_5$  are weights indicating the relative importance of ATT, SN, PBC, Present and Future CRP. It is hypothesised that these variables are likely to influence intention. Therefore they will all be tested. The link between intention and behaviour is not depicted because it will not be tested.

This enhanced model aims to enrich the basic operational form of the TPB by making the model more applicable to the research context. The resulting analysis can provide insights on which factors most influence supply-side stakeholders' intention to engage in protective behaviour using the PARD strategies, as well as, a probability measure of the likelihood that supply-side stakeholders intend to act on the four strategies.

#### **2.6.4 A new, inter-linked theoretical framework**

This research programme aims to offer insights on an issue that forms a key element in the study of tourism today: the dynamics underpinning suppliers' DRM and CCA decision-making processes. Given the centrality of the decision-making process to DRM and CCA behaviour, a clear understanding of the complexities and inter-relationships of the major contributing variables grouped into relevant decision stages is an important research agenda. In much the same way that few studies were available that made the empirical link between DRM and CCA decision-making processes, there was a corresponding lack of a comprehensive theoretical framework in the literature for the study of this research problem. There was therefore a need to devise a multi-disciplinary theoretical framework to achieve the research goals.

Since multiple decision theories used together are likely to explain a wider range of decision behaviour across an expanded range of contexts (Prideaux, 2009), in this research both "process/behavioural" (e.g., APC and TPB) and "structural/choice-set" approaches have been adopted in describing and explaining how the protective decision-making process occurs. The inter-linked theoretical framework comprises of three sequentially applied components to devise a new synthesised framework (Figure 2.6). The analytical process begins by using the Adjustment Process Control: Managerial Adjustment Decision Model articulated by Kates (1971) to analyse the nature of the adjustment decision-making process of coastal tourism suppliers to climate risk. It then applies the Choice Set approach advanced by many authors (e.g., Crompton (1992), Crompton and Ankomah (1993) and Sirakaya and Woodside (2005)) to examine the range and structure of tourism policy-makers' and hoteliers' decision sets. Building on the results of this phase of analysis, the next phase develops and tests an extended model of the Theory of Planned Behaviour to examine the structure and relative

significance of antecedents of behavioural intention of coastal tourism supply-side stakeholders to implement the PARD strategies.

Sequential application of the APC model, the Choice Set approach and the TPB decision-making models within a larger, multi-disciplinary theoretical perspective allows for a breadth of analysis that converges in an enhanced inter-linked framework. The APC, Choice Set and TPB frameworks are just three of several other frameworks that may be applicable. While other models exist (see Table 2.4), these suffer from analytical and operational limits that preclude them from being used in this research. Kates' (1971) APC model provides an adequate contextualist framework that forms the overarching backdrop for the examination of the protective decision-making process and the nature, structure and function of the variables found in the Choice Set and TPB models. The Choice Set and TPB models have the advantages of: 1) having been widely tested with good results, and 2) having many available resources to guide their operationalisation and use in this research. The new inter-linked framework has the capability to provide quantifiable measures of psychological determinants, to identify correlations between determinants and thereafter provide a platform for constructing explanation. As a result, the new framework is both descriptive and explanatory.

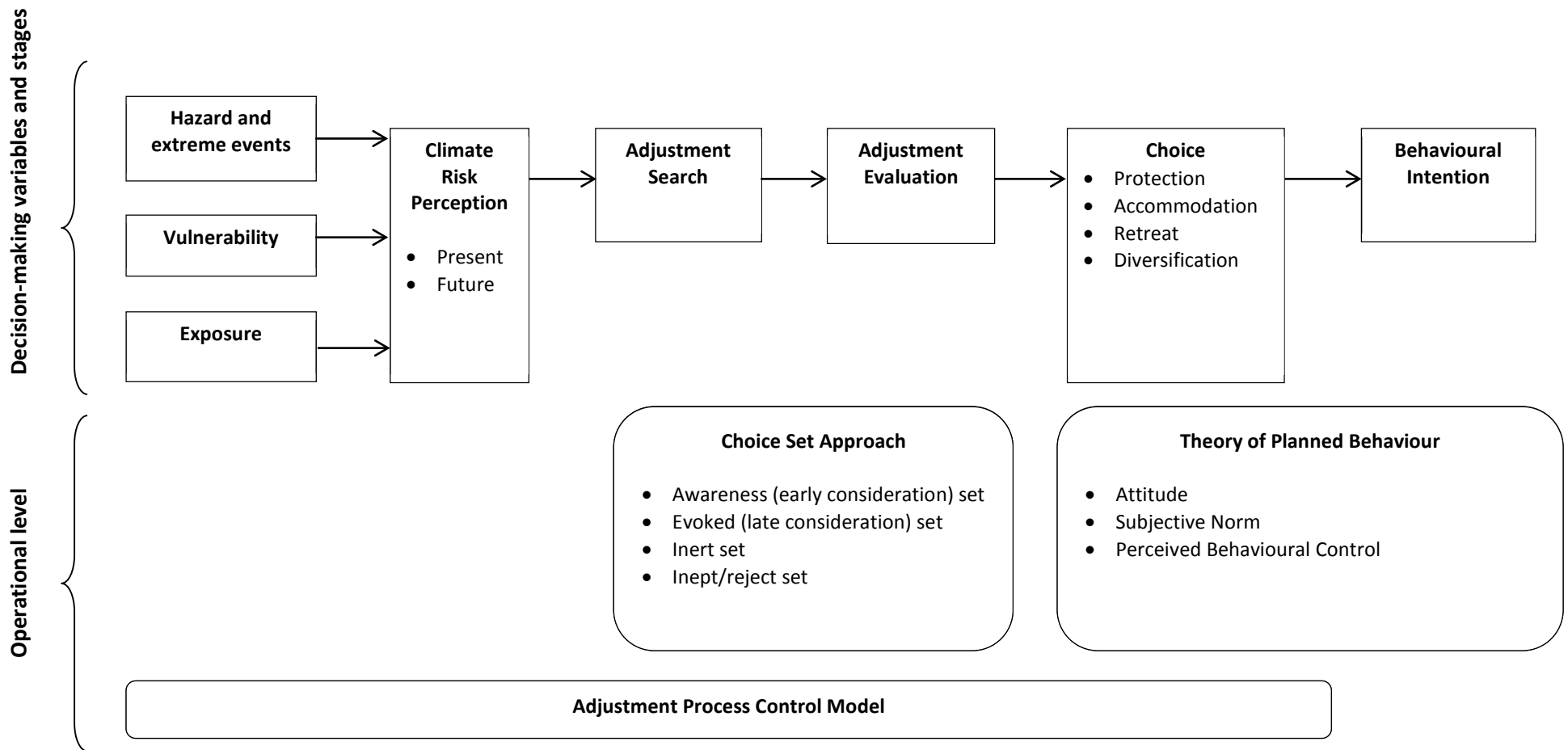


Figure 2.6 Schematic of the inter-linked theoretical framework

A summary of the components of the inter-linked theoretical framework and their functional roles is presented in Table 2.5.

**Table 2.5 Overview of the inter-linked theoretical framework**

Kates (1971) General Systems model including the APC model	Choice Set approach	Theory of Planned Behaviour
<ul style="list-style-type: none"> <li>• Provides a contextual framework</li>   <li>• Facilitates broad analysis of the DRM and CCA decision-making process</li>             <li>• Determines the role of climate risk perception in triggering the DRM and CCA decision-making processes</li> </ul>	<ul style="list-style-type: none"> <li>• Clarifies the adjustment search stage by determining the size, composition and structure of hoteliers' and tourism policy-makers' DRM and CCA choice sets</li>   <li>• Examines how hoteliers and tourism policy-makers evaluate and categorise DRM measures and the PARD strategies which are outcomes of the adjustment search stage</li>   <li>• Facilitates the identification of the critical factors that influence the search, evaluation and choice of adjustment(s)</li> </ul>	<ul style="list-style-type: none"> <li>• Qualitatively determines hoteliers' and tourism policy-makers' attitudes, perceptions of social pressure, and perceptions of perceived control over implementing DRM and CCA measures and strategies</li>   <li>• Quantitatively measures hoteliers' and tourism policy-makers' attitudes, perceptions of social pressure, and perceptions of perceived control over implementing DRM and CCA strategies and measures</li>   <li>• Examines the relative contribution of CRP, ATT, SN and PBC to hoteliers' and tourism policy-makers' behavioural intention to implement the PARD strategies</li>       <li>• Predicts hoteliers' and tourism policy-makers' intention to use the PARD strategies to adapt to climate change</li> </ul>

In addition to being consistent with the broader literatures on behavioural decision-making, this overarching theoretical framework provides a well-defined structure that allows for the investigation of the formation of suppliers' adaptation intentions by simultaneously considering risk perception, attitudinal, normative and control factors.

The strength of the framework lies in its flexibility that allows for an understanding of the role of multiple, theoretically sound variables within an overarching decision-making process. In this way, it is similar to Paton (2003) Socio-Cognitive Model. The staged process also complements the approach used in that model. Moreover, the framework shares elements of its design with Wang and Ritchie (2010) Onion Model for Strategic Crisis Planning (OMSCP), for example, in using the TPB constructs and method of operationalisation.

However, this new framework is primarily different in its intent and purpose. The objective is not to construct an exhaustive model but rather to provide a conceptually sound context in which to examine the relationships among a range of variables that are hypothetically pertinent to DRM and CCA decision-making in the tourism context. Moreover, many of the theoretical assumptions that underpin this multi-disciplinary framework have been developed through research studies based in the developed world context. Whether these frameworks are appropriate for the Caribbean coastal tourism context remains to be tested. The new, inter-linked framework provides a context to characterise the nature, structure and function of the major research constructs and hypothesised relationships in a research context where protective behaviour decision-making is of considerable value to international tourism and the economies of SIDS, but limited prior research is available that describes how these decisions are made. This is an important first step to understanding how decisions can be improved.

## **2.7 Summary**

This chapter presented a review of the literature. It identified two Research Issues and on this basis, three models were identified, refined and inter-linked to form the overarching theoretical framework for investigating the research problem. Eight primary research questions, five research propositions and twelve hypotheses (summarised in Table 2.6) emerged as requiring research attention and were proposed as a guide to data collection and analysis. Chapter 3 will discuss how this was done.

**Table 2.6 List of research issues, questions, propositions and hypotheses investigated by this research programme**

Research Issue	Research questions	Research propositions	Hypotheses
<p>RI 1: The DRM and CCA decision-making processes of supply-side stakeholders are not well understood. However, understanding these process and the nature, structure and function of their main determinants may be key to predicting DRM and CCA behavioural intention.</p>	<p>RQ 1.1: What is the nature, structure and function of risk, attitudinal, normative and control perceptions in DRM and CCA decision-making?</p> <p>RQ 1.2: What is the size, composition and range of suppliers' DRM and CCA awareness sets?</p>	<p>RP 1.1.1: A range of climatic and non-climatic decision variables are associated with the DRM and CCA decision-making processes.</p> <p>RP 1.1.2: The nature, structure and function of the determinants of DRM and CCA have implications for protective behaviour outcomes.</p> <p>RP 1.2: The size, composition, and range of measures within hoteliers' and tourism policy-makers' DRM and CCA awareness sets have implications for protective behaviour outcomes.</p>	<p>H 1.1.1: There is a significant difference between Present and Future CRP for hoteliers and policy-makers.</p> <p>H 1.1.2: There is a significant difference in the levels of Present and Future CRP between and hoteliers and policy-makers.</p> <p>H 1.1.3: There are significant differences in the attitudes, subjective norm, perceived behavioural control and intentions of hoteliers and policy-makers to use the PARD strategies to adapt to climate change.</p> <p>H 1.1.4: There is a significant linear relationship between hoteliers' and policy-makers' attitudes, subjective norm, perceived behavioural control and climate risk perception and their intentions to adapt using the PARD strategies.</p> <p>H 1.1.5: There are significant differences in hoteliers' and policy-makers' perceptions of social pressure to use the PARD strategies to adapt to climate change.</p> <p>H 1.1.6: There is a significant linear relationship between hoteliers' past adjustment behaviour and 1) present and 2) future climate risk perception.</p>



Research Issue	Research questions	Research propositions	Hypotheses
	RQ 1.3: How are adjustments evaluated?	RP 1.3.1: Adjustment measures are evaluated on a wide range of criteria.  RP 1.3.2: The most likely CCA strategies are those that modify existing hotelier practices and tourism policies.	
RI 2: DRM and CCA perception gaps across hoteliers, policymakers and tourists may inhibit coherent response action	RQ 2.1: To what extent are there DRM perception gaps across hoteliers, policy-makers and tourists?  RQ 2.2: To what extent are there CCA perception gaps across hoteliers, policy-makers and tourists?  RQ 2.3: How are perceptions of adjustment attributes associated with decision-making?  RQ 2.2: To what extent are there beach perception gaps across hoteliers, policy-makers and tourists?  RQ 2.5: How are beach perceptions associated with decision-making?		H 2.1: There is a significant difference in the levels of DRM perceptions across hoteliers, policy-makers and tourists.  H 2.2: There are significant differences in the way hoteliers, policy-makers and tourists perceive the PARD strategies.  H 2.3: PARD perceptions are significantly associated with hoteliers' and tourism policy-makers' likelihood to use a specific PARD strategy or tourists' likelihood to visit a destination that has used a specific PARD strategy.  H 2.4: There are significant differences in the way hoteliers, policy-makers and tourists perceive the importance of the appearance and proximity of the beach.  H 2.5: There is a significant difference between the levels of beach and DRM perceptions across hoteliers, policy-makers, and tourists.  H 2.6: Beach perception is significantly associated with hoteliers' and tourism policy-makers' likelihood to use a specific PARD strategy or tourists' likelihood to visit a destination that has used a specific PARD strategy.

## Chapter 3

# Methodology

### 3.1 Introduction

This chapter presents an overview of the methodology used for the research programme. This Section introduces the Chapter. The Chapter then presents a discussion of the researcher's worldview (Section 3.2); continues with a discussion of the research methodology and strategy and is followed by a discussion justifying the key research elements (Section 3.3). An outline of the plan of the research detailing each research method for each stage of the research is thereafter presented (Sections 3.4-3.7). Section 3.8 summarises the Chapter.

### 3.2 Research paradigm, methodology and strategy

The researcher adopted a pragmatic worldview which focuses on using a selection of approaches that are available and most appropriate to understand the research problem (Creswell, 2009). Since the present research aims to describe, explain, and predict decision-making, drawing on both quantitative and qualitative methodologies was necessary and led to the adoption of a mixed methods research strategy. The major advantage of this approach was that it enabled the limitations of each methodology to be overcome (Jennings, 2010). The research programme is characterised by a series of four distinct yet inter-related studies that are: qualitative or quantitative in nature, and address a different research question within the same broad programmatic aim (Figure 3.1) (Morse & Niehaus, 2009).

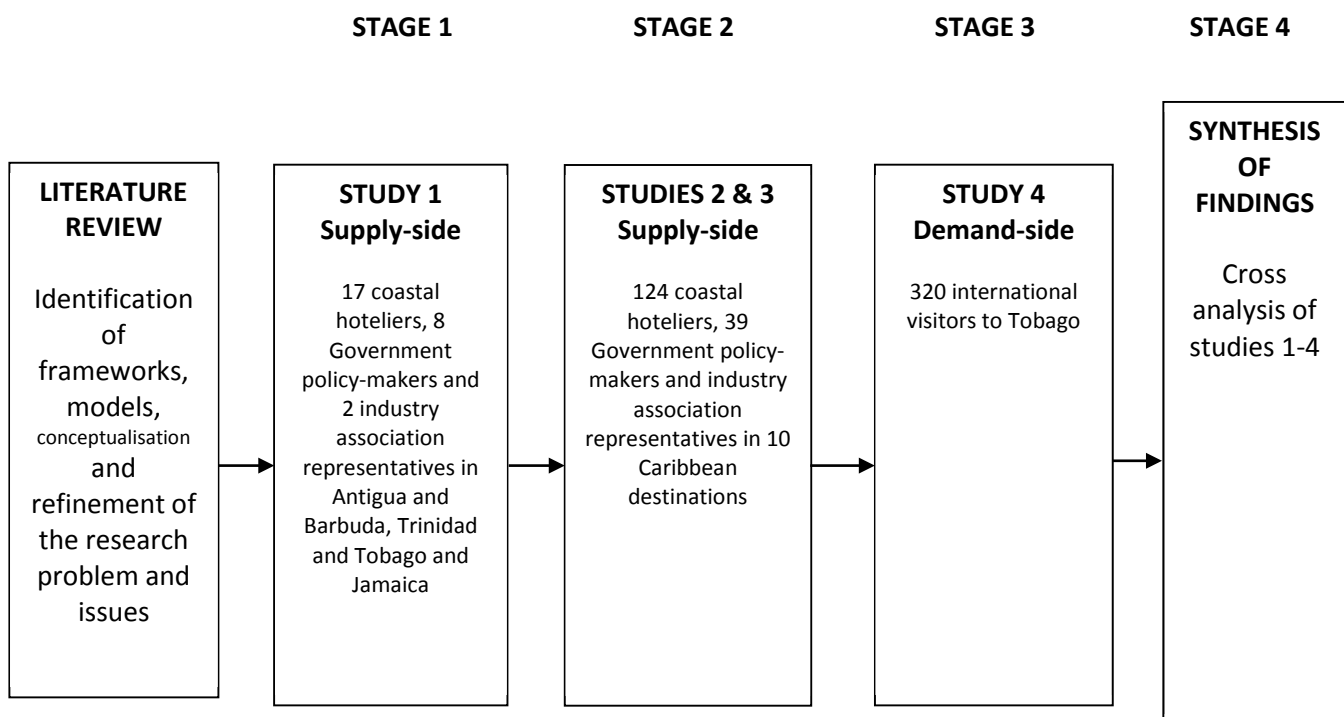


Figure 3.1 Studies conducted as part of the multi-stage, mixed methods strategy

This research strategy adopted exploratory, descriptive and explanatory designs at different stages. All three types of research played a distinct and complementary role. For example, the literature review was used to gain background information about the research problem, to clarify the Research Issues, to generate research questions, propositions and hypotheses, to identify a comprehensive list of research variables, and to develop a new inter-linked theoretical framework to guide the examination of the research problem. Exploratory research was conducted in Stage 1 to gain real world insights about the research problem and issues through semi-structured interviews. Stage 1 was also descriptive in describing the supplier decision-making process and the variables that contribute to it. Since descriptive research does not establish associations between variables, explanatory research was conducted in Stages 2 and 3 through surveys using structured questionnaires. The data gathered through the surveys was modelled using regression techniques to explain how variables were related, as well as, to predict behavioural outcomes.

The sequential programme design in which a succession of research projects were each informed by the findings of the former and that utilised complementary methodologies throughout, enabled the researcher, in the first instance, to explore respondent views in qualitative detail in Stage 1 with the intent of building on these views with broad, numeric quantitative research involving hypothesis testing in Stages 2 and 3. In this way, supplementary quantitative research was used to generalise qualitative findings to the larger population. Qualitative and quantitative data was merged into one large database and the results used side by side to complement and reinforce each other in Stage 4. For example, in Chapter 4 qualitative quotes are used to support statistical results.

### **3.3 Justification of the key research elements**

Since there was sufficient prior theory as a guide to the collection of structured and replicable content, this research adopted a case study approach (Yin, 2009, 2011) with evidence being grounded in the Caribbean coastal tourism context of ten destinations. Each of the main elements associated with the case study will now be discussed.

#### **3.3.1 Ten Caribbean destinations**

In general, the Caribbean was chosen for two reasons. The first reason centred around the importance of tourism to the economies of many Caribbean SIDS (Duval, 2004; McElroy, 2003; Pattullo, 1996; World Tourism Organization, 2012). Thus, there are several anticipated benefits associated with providing the evidence base on which appropriate DRM and CCA policy decisions can be made for this key regional industry. Second, Caribbean islands have been identified as a priority for further DRM (Collymore, 2006; Mahon et al., 2012; Pelling & Uitto, 2001) and CCA research (Hay, 2013; Hay, Forbes, & Mimura, 2013; Mycoo, 2013; Scott & Becken, 2010).

The ten destinations of Antigua and Barbuda, the Bahamas, Barbados, Belize, Grenada, Jamaica, Saint Lucia, Saint Kitts and Nevis, Saint Vincent and the Grenadines and Trinidad and Tobago were chosen because they were assumed to reflect a representative range of experience in terms of: 1) dependency on tourism, as well as, 2) exposure and vulnerability

to climate variability, extremes and change. This assumption was based on an examination of tourism statistics compiled by the World Travel and Tourism Council, climate and disaster risk indices provided by the Caribbean Climate Risk Atlas developed by Caribsave, the World Risk Index developed by Buendnis Entwicklung Hilft and UNU-EHS, the Climate Risk Index developed by Germanwatch, as well as, vulnerability indices reported in the Climate Change Vulnerability Map developed by Maplecroft.

### **3.3.2 Coastal tourism**

The importance of the coastal zone for tourism was emphasised by Phillips & Jones (2006). Coastal tourism has been identified as one of the oldest, largest and fastest growing tourism activity segments globally (Hall, 2001; Honey & Krantz, 2007, 2012; Miller, 1993; Phillips & House, 2009; Scott, Gössling, & Hall, 2012). Coastal tourism is both a driver of coastal change and affected negatively by it (Schleupner, 2008). It is on the coast that extreme weather and climate events interacting with exposed and vulnerable human and natural systems can lead to disasters (IPCC, 2012). In fact, coastal tourism has been identified as one of the tourism typologies most at risk (Garcia et al., 2006; IPCC, 2007; Johnston et al., 2007; Scott & McBoyle, 2007; Wall, 1998), justifying its choice for further research.

### **3.3.3 Tourists, hoteliers and policy-makers**

Three groups were the focus of study for this research: 1) hoteliers, 2) policy-makers, and 3) tourists. The perceptions of hoteliers are of interest because of the fixed nature of coastal hotels (Linnenluecke & Griffiths, 2013). Similarly, since the static character of destinations render them the most vulnerable and least adaptable within the tourism system (Becken & Hay, 2007; Kaján & Saarinen, 2013; Wall, 1998), the views of tourism policy-makers have also been deemed worthy of study. It should be noted that the views of industry association stakeholders have been grouped with those of government stakeholders. While recognising that government officers are more distant than industry association stakeholders in the nature of their relationship with hoteliers, these two groups nevertheless share some similarities: 1) both groups facilitate the development of the tourism industry, and 2) both groups are not involved in the tactical day-to-day decision-making of hoteliers, but rather they work at a more strategic level. The perceptions of tourists are of interest since tourists have the largest adaptive capacity of elements within the tourism system (Gössling, Scott, Hall, Ceron, & Dubois, 2012).

Combining and comparing the views of hoteliers, policy-makers and tourists allows for the generation of knowledge about perception differences across the three groups. One practical benefit of doing this relates to the opportunity it affords tourism policy-makers to support the DRM and CCA adjustment processes of tourism businesses with the aim of aligning industry behaviour towards tourist preferences for DRM and CCA strategies within a sustainable tourism development context.

### 3.3.4 The Protection, Accommodation, Retreat and Diversification strategies

A range of stand-alone adjustments to climate risk on the coast have been proposed generally (Clark, 1996; IPCC, 1990; Kay & Alder, 1999; Linham & Nicholls, 2010) and in the specific context of the Caribbean (Cammers, 1997, 1998a, 1998b, 2001; Mycoo, 2013; Mycoo & Chadwick, 2012). Coastal adjustments are best implemented within the broader process of coastal planning and management, in general, and Integrated Coastal Zone Management (ICZM) in particular. ICZM focuses on integrating and balancing multiple objectives, including the enhancement of adaptive capacity (IPCC, 2007; Kay & Alder, 1999). In addition, it has been argued that alternatives to hard engineering solutions that are sensitive to cultural and environmental concerns should be considered (Jacobson & Rennie, 1991). As Table 3.1 shows, the Protection, Accommodation and Retreat strategies have consistently been identified as adaptation options over the last two decades.

**Table 3.1 Overview of coastal adjustments**

Adjustment	Description/example	Source
Protection	Array of hard (dikes, levees, floodwalls, seawalls, revetments, bulkheads, groins, detached breakwaters, infrastructure modifications, floodgates or tidal barriers, saltwater intrusion barriers and raising existing defensive structures) and soft structural solutions (beach filling and subsequent renourishment, dune building, wetland/mangrove creation, artificial seaweed, artificial reef creation, rehabilitation of natural coral enhance growth, increasing coastal protection, instituting pollution controls, preventing the harvesting of mangroves applied alone or in combination)	IPCC (1990)
	Groins - perpendicular structures to the coastline used with beach nourishment to trap sand	El Raey et al. (1999)
	Breakwaters - submerged breakwaters; rip rap along the shore; dikes	El Raey et al. (1999)
	Manage the hazard by reducing the probability of occurrence through hard structural options (sea dikes; storm surge barriers and closure dams, levees, floodwalls; seawalls, revetments, bulkheads; groynes; detached breakwaters; floodgates and tidal barriers; saltwater intrusion barriers; freshwater injection; upgrade drainage systems; polders) and soft structural options (periodic beach nourishment; sediment management; dune restoration/rehabilitation and creation; wetland restoration and creation)	Nicholls (2011)
	Beach nourishment; artificial sand dunes and dune rehabilitation; seawalls; sea dikes; storm surge barriers and closure dams; land claim	Linham and Nicholls (2010)
Accommodation	Elevation of buildings on piles; building codes that specify minimum floor elevations and piling depths, as well as, structural bracings; drainage could be modified; storm warning and preparedness plans; conversion of land uses; prohibit filling wetlands; damming rivers; mining coral and beach sands and cutting mangroves; undeveloped coastal land set aside; requiring private insurance coverage	IPCC (1990)
	Manage the hazard by reducing its impacts through emergency planning such as early warning systems and evacuation systems; hazard insurance; modification of land use and practice; modification of building styles and codes such as floodwise buildings; strict regulation of hazard zones; improved drainage such as increased diameter of pipes and increased	Nicholls (2011)

Adjustment	Description/example	Source
	pump capacity; desalination such as desalination plants Flood-proofing; wetland restoration; floating agricultural systems; flood hazard mapping; flood warnings	Linham and Nicholls (2010)
	Beach nourishment - depositing sand onto open beaches, beach scraping, building artificial dunes as storm buffers and beach sand reservoirs, laying pipes underneath the beach to suck in the water and trap sand Land use change - change land use in vulnerable areas	El Raey et al. (1999) El Raey et al. (1999)
Retreat	Prevent development in areas near the coast; allow development to take place on the condition that it will be abandoned if necessary (planned phase out); no direct government role other than through withdrawal of subsidies and provision of information about associated risks	IPCC (1990)
(Planned) Retreat	Manage the hazard by reducing exposure in a planned or managed manner through increasing or establishing setback zones; locating threatened buildings; phased out or no development in susceptible areas; presumed mobility, rolling easements; managed realignment/forbid hard defences; creating upland buffers Managed realignment; coastal setbacks	Nicholls (2011) Linham and Nicholls (2010)
Mixed/Hybrid	Accommodation/retreat such as land use planning/hazard delineation; change water abstraction	Nicholls (2011)
No action		El Raey et al. (1999)
Business as usual option		El Raey et al. (1999)

Source: IPCC (1990); El-Raey, Dewidar, and El-Hattab (1999); Nicholls (2011); Linham and Nicholls (2010)

Table 3.1 makes clear that: 1) the coastal planning and management thinking has not evolved radically beyond the Protection, Accommodation and Retreat paradigms for coastal adaptation, 2) with many individual adjustments are able to be grouped under these three broad strategies, and 3) the Protection, Accommodation and Retreat strategies are still dominant in the contemporary management of coastal risk. While strictly speaking, Diversification of the tourism product is a form of Accommodation, it has been proposed as a viable adaptation strategy in the tourism planning literature (Becken & Hay, 2007; Payet, 2008) and has been included as a distinctly separate strategy because of the tourism-specific focus of this research.

### 3.4 Stage 1: Semi-structured interviewing method

This Section details the semi-structured interviewing method used in Stage 1 of the research. One of the aims of this stage was to validate and refine the constructs found in the

overarching theoretical framework that was identified and presented in Chapter 2. Another aim was to elicit in-depth information about Research Issue 1 from hoteliers, industry association officials and policy-makers respectively.

In conducting semi-structured interviews, it was important to achieve validity and reliability. Yin (1994) notes four tests of validity and reliability namely, 1) construct validity, 2) internal validity, 3) external validity, and 4) reliability. This research included several checks built into elements of its design in an effort to secure validity and reliability as follows (Table 3.2):

**Table 3.2 Validity and reliability for semi-structured interviewing stage**

Test	Definition	Elements of research design
Construct validity	Refers to the development of suitable operational measures for concepts being investigated	<ul style="list-style-type: none"> <li>• Interview questions were carefully worded to reflect theoretical interpretations of concepts found in the literature</li> <li>• Triangulated research questions were used, that is, two or more interview questions addressed the same subject matter from different angles</li> <li>• Data was collected from multiple expert sources</li> <li>• Largely pre-determined, focused questioning with flexibility to ask additional questions and probe</li> </ul>
Internal validity	Refers to causal relationships and the influence of one variable on other variables	<ul style="list-style-type: none"> <li>• A cross-section of heterogeneous opinions relevant to the Research Issues was captured</li> </ul>
External validity	Refers to the ability of the research findings to be generalised	<ul style="list-style-type: none"> <li>• Achieved through interviewee selection of 27 hoteliers, policy-makers and industry association officials in three Caribbean islands that reflect a representative range of experience for theoretical replication</li> </ul>
Reliability	Refers to the consistency of a technique to measure the concepts it purports to measure allowing for replication	<ul style="list-style-type: none"> <li>• Interview schedule developed</li> <li>• Structured interview process (recording and writing data)</li> <li>• Structured data analysis process (interpreting data)</li> <li>• Use of a steering committee (consultation with two supervisors in the design and administration of the interview programme)</li> </ul>

Source: Modified from Yin (1994)

### 3.4.1 Interview schedule design

Two independent but in their main parts, identical interview protocols (Appendices A-B for hoteliers and policy-makers respectively) of open-ended, general thematic questions were developed. The design of the interview protocol was driven by Study 1’s research questions which were directly related to the ten main theoretical constructs and decision-making stages (for example, adjustment search and evaluation) drawn from the APC model, the Choice Set approach and the TPB as follows:

- I. Adjustment Process Control: Managerial Adjustment Decision Model
  1. Climate risk perception threshold
  2. Adjustment search
  3. Adjustment evaluation
  
- II. Choice Set
  4. Awareness (early consideration) set
  5. Evoked (late consideration) set
  6. Inert set
  7. Inept/reject set
  
- III. Theory of Planned Behaviour
  8. Attitude
  9. Subjective norm
  10. Perceived behavioural control

Where relevant, theoretical constructs were extended by concepts validated in wider studies available in the wider literature. For example, since Kates (1971) suggests that a breach of the hazard perception threshold is the motivating trigger that activates adjustment search, evaluation and adoption, this research investigates this premise. However, given Kates' limited conceptualisation that focuses solely on cognition, the conceptualisation of the threshold is broadened to include an examination of the climate risk perception construct by incorporating respondent views not only regarding the probability of hazard occurrence but also by relating the consequences of hazard occurrence to the impact on supply-side respondents' plant, infrastructure and business. The CRP construct is appraised along four dimensions suggested in the wider literature: 1) cognitive properties ("awareness" as proposed by Kates (1971), 2) affective properties ("worry" as proposed by Fischhoff et al. (1978)), 3) present, and 4) future perceptions (Kunreuther et al., 2009; Kunreuther et al., 2002) of climate-related hazards, vulnerability and exposure (Becken et al., 2014). In another example, subjective norm has two dimensions referring to: 1) social pressure to adapt, and 2) sources of social pressure to adapt, (i.e., a question was dedicated to finding out who were the sources of social pressure). For ease of analysis, constructs and their factors have been theoretically coded as shown in Table 3.3:



**Table 3.3 Links among frameworks, theoretical constructs and interview protocol question(s)**

Framework	Theoretical constructs and dimensions	Interview protocol question(s)
APC	1. Climate risk perception threshold (CRP)	
	a. Cognition (awareness/knowledge of present and future perceptions of hazards, vulnerability and exposure)	1,2,13,14,15,16,24
	b. Affect (worry about present and future hazards, vulnerability and exposure )	3,15, 24
	2. Adjustment Search (AS)	
	a. Theoretical range of possible hazard adjustments	5,17,18
	b. Available adjustments	5,17
	3. Adjustment Evaluation (AE)	
	a. Adjustment attributes	19
	Choice Set	4. Awareness (early consideration) set
5. Evoked (late consideration) set		
6. Inert set		
7. Inept/reject set		
TPB	8. Attitude (ATT)	
	a.Positive or negative evaluation of engaging in DRM and CCA	5,6
	9. Subjective norm (SN)	
	a.Important referents	
	10. Perceived behavioural control (PBC)	
	a. Barriers	6
b.Facilitators	6	

Selected examples of how each question on the interview protocol<sup>3</sup> was categorised and labelled according to their associated framework construct and stage<sup>4</sup> is presented in Table 3.4 with a full example given in Appendix D.

<sup>3</sup> The interview protocol for policy-makers is used here.

<sup>4</sup> In some cases, questions are multi-dimensional and may address more than one theoretical construct.

**Table 3.4 Examples of interview protocol question categorisation**

Ref	Question	Code
1	Can you tell me which physical hazards affect your destination coastline (if a prompt is needed e.g., severe storms, hurricanes, coastal erosion, storm surge, coastal flooding)?	RP_Cog_Aware
5	Can you think of the possible things your management team might be able to do to help the tourism industry prepare for and respond to the physical hazards that affect your coastline?	ATT_Pos_Neg AS_Theo_Adjust AS_Av_Adjust
19	What do you think would make it easier for your organisation to help hoteliers to prepare for and respond to climate change impacts that may affect your destination?	AE_Adopt_Fac PBC_Sit_Fac
20	Are there any individuals or groups who would encourage or approve of you preparing for and responding to impacts due to climate change?	SN_In_Norm

### 3.4.2 Sampling design

Study 1 uses a purposive sample of coastal hoteliers, tourism policy-makers and industry association representatives in the Caribbean destinations of Antigua and Barbuda, Jamaica and Trinidad and Tobago.

### 3.4.3 Interviews

Data for Study 1 was collected in one-on-one personal interviews conducted by the researcher during April – June 2011. All respondents were contacted via e-mail inviting them to participate by agreeing to a 30 minute interview. Where interest was found, follow-up telephone calls were made and e-mails sent to finalise the date and time of the interviews. All interviews were conducted in the natural work setting of respondents. Coastal hoteliers were further asked for an opportunity to tour the hotel premises after the interview. This was used as an opportunity to clarify points raised in response to questions in the interviews, as well as, to observe adjustment measures mentioned in the interview. Where appropriate, pictures and notes were taken, and notes, where taken, were written up after the interview. Interviews were recorded using an Olympus digital voice recorder and typically ranged from 30 to 45 minutes. Some interviews (three interviews) extended towards 60 minutes, but this was rare.

#### *Respondent Profile*

In selecting respondents, care was taken to ensure that: 1) respondents' hotels satisfied the required criteria for inclusion namely that the hotel was sited within 800 m from the high water mark (Jackson, 2004), 2) respondents held a senior decision-making position in their organisation, 3) a sufficiently variable mix of respondents from small, medium and large hotels was included, and 4) a range of approximately ten views was included in each of the three destinations. To secure the first three criteria, hoteliers were first screened through a check on Google Earth to ensure that the hotel was located within 800 m from the high water mark. A second check of the hotel profile on Trip Advisor or alternatively, the hotel website confirmed the location, type and size of the hotel.

Seventeen senior managers and/or owners of small, medium and large, low-lying, coastal hotels; two industry association officials of Hotel and Tourism Associations; and eight senior managers and technical staff attached to the Ministries of Tourism and associated public sector organisations were interviewed (Table 3.5).

**Table 3.5 Respondents in Study 1**

<b>Respondent type</b>	<b>ID</b>	<b>Position/organisation</b>
<b>Antigua and Barbuda</b>		
Hotelier	1. PRI_AB_2	Ass. General Manager, 80 rooms
	2. PRI_AB_4	Dept. Manager, 464 rooms
	3. PRI_AB_5	General Manager, 72 rooms
	4. PRI_AB_6	General Manager, 60 rooms
	5. PRI_AB_9	General Manager, 373 rooms
	6. PRI_AB_10	Duty Manager, 181 rooms
	7. PRI_AB_11	General Manager, 14 rooms
Industry association	-	-
Policy-maker	8. PUB_AB_1	Ministry of Tourism
	9. PUB_AB_3	Tourism Authority
	10. PUB_AB_7	Tourism Authority
	11. PUB_AB_8	Ministry of Tourism
<b>Jamaica</b>		
Hotelier	12. PRI_JA_3	Dept. Manager, 250 rooms
	13. PRI_JA_4	Dept. Manager, 350 rooms
	14. PRI_JA_5	Hotel Manager, 430 rooms
	15. PRI_JA_6	General Manager, 427 rooms
Industry association	16. PRI_JA_1	Executive Director
Policy-maker	17. PUB_JA_2	Ministry of Tourism
<b>Trinidad and Tobago</b>		
Hotelier	18. PRI_TT_3	Ass. General Manager, 57 rooms
	19. PRI_TT_4	Dept. Manager, 25 rooms
	20. PRI_TT_6	Dept. Manager, 55 rooms
	21. PRI_TT_7	Chief Engineer, 178 rooms
	22. PRI_TT_8	Owner/Manager, 31 rooms
	23. PRI_TT_9	Operations Manager, 38 rooms
	Industry association	24. PRI_TT_10
Policy-maker	25. PUB_TT_1	Ministry of Tourism
	26. PUB_TT_2	Tourism Development Company
	27. PUB_TT_5	Department of Natural Resources

#### **3.4.4 Data preparation and analysis**

Data preparation involved the researcher transcribing recorded audio of the interviews into Microsoft Word files using DSS Olympus software. Since the researcher collected the data, there was some prior familiarity with the dataset. The transcription process was, therefore, a useful means of being re-familiarised with the data.

Full transcripts were compiled and checked for grammatical errors before they were sent via e-mail to respondents for checking. This process yielded no changes to original transcripts. The transcribed data was then entered into NVivo software (version 10) for researcher-led and computer aided coding as a precursor to analysis. NVivo is a qualitative analysis software. The researcher's use of NVivo was guided by: 1) a hands-on tutorial by a fellow, knowledgeable graduate student, and 2) two manuals (Bazeley, 2007; Gibbs, 2002). The transcribed data was coded in accordance with Braun & Clarke (2006). Coding was done at three levels from the most descriptive to the most interpretative. Descriptive coding involves naming chunks of text being analysed. Interpretive codes follow a deeper level of interpretation/(re)construction by making inferences.

Data extracts were coded inclusively so that a little of the surrounding data was kept if relevant. The coding approach was recursive and iterative. Individual data extracts were coded once, or coded many times, as relevant. The content of the entire dataset was coded. At the end of the process, a list of codes mapped to themes had been identified across the dataset (Appendix D). This coding process was part of a thematic analysis approach (Braun & Clarke, 2006). For the analysis, the data was organised into theory-driven meaningful groups. Patterns or themes were identified at a semantic or explicit surface level. Generally, the researcher was not looking for anything beyond what a respondent said and a simple, largely uni-directional relationship between meaning, experience and language was assumed. Contradictions, tensions, inconsistencies and variations in the data were noted and where interesting, were identified for reporting.

#### **3.4.5 Results**

Analysis of qualitative interview data from coastal hoteliers and tourism policy-makers represents the first empirical investigation of the Research Issues and problem. It became clear from the analysis that the results of this stage of qualitative research had several implications for the quantitative research stages and that alterations would be needed.

Findings from the interviews confirmed many of the components of the theoretical framework initially developed in Chapter 2 as appropriate in this context (e.g., the conceptualisation of climate risk perception, attitude, subjective norm and perceived behavioural control). Hoteliers' and tourism policy-makers' perceptions of the importance of the proximity and appearance of and managerial implications. This highlighted the need to explore a new research path by empirically measuring perceptions of the importance of the proximity and appearance of the beach, as well as, the perceptions of the importance of DRM considerations in tourists' choice of accommodation. It was also thought useful to test the

interaction between these two new variables. This was not envisioned when the research was initially conceptualised. In light of this, three new hypotheses were identified for testing:

*H 2.4: There are significant differences in the way hoteliers, policy-makers and tourists perceive the importance of the appearance and proximity of the beach.*

*H 2.5: There is a significant difference between the levels of beach and DRM perceptions across hoteliers, policy-makers, and tourists.*

*H 2.6: Beach perception is significantly associated with suppliers' likelihood to use a specific PARD strategy or tourists' likelihood to visit a destination that has used a specific PARD strategy.*

There was also an indication from the interviews that past experience may be a factor in determining attitudes. However, the examination of the contribution of past experience to attitude (as an independent, direct variable) was outside the methodological scope of this thesis as this would require an indirect measurement model and associated analysis design.

In summary, this initial round of interviews enabled the appropriateness and the comprehensiveness of the framework to be assessed, resulted in minor revisions to the initial theoretical framework, the addition of two major variables and three new hypotheses for testing and informed the construction of standardised questionnaires used in the subsequent surveys of hoteliers, policymakers and tourists.

### **3.5 Stage 2: Supplier survey method**

Stage 2 involved the conduct of two concurrent surveys of coastal hoteliers and tourism policy-makers in ten Caribbean destinations. This stage used a mixed mode of implementation via online and paper-based questionnaires. Qualtrics is an online survey management system to which Lincoln University provides access for its researchers and which was used for the online survey. Qualtrics has been used by other researchers doing similar work to conduct online surveys with reportedly good results (Doyle, McClure, Johnston, & Paton, 2014; Wang & Ritchie, 2012). Serving the questionnaire via Qualtrics enabled the researcher to reach respondents in all ten Caribbean destinations efficiently and at low cost. It was also an equitable approach to survey administration as a cross-section of respondents in all ten Caribbean destinations had an opportunity to participate, regardless of whether they chose to accept the invitation. However, since the response rate is fairly low for online surveys - 34% according to Shih and Xitao Fan (2008) - this survey was supplemented with three questionnaire-based surveys with tourism policy-makers at a regional conference in Trinidad and Tobago and with coastal hoteliers and policy-makers in Barbados. Although this may have introduced some instrument bias into the approach, it was felt this would be small and manageable and the increase in data would more than compensate for the potential bias.

In conducting quantitative surveys, it was important to achieve validity and reliability. Fink (2013) notes that there are several types of validity (Table 3.6). Construct validity, which according to Fink (2013, p. 77) is "established experimentally through trying the survey on people whom experts say do and do not exhibit the behaviour associated with the construct",

as well as, test-retest validity which is “computed by administering a survey to the same group on two different occasions and then correlating the scores from one time to the next” (Fink, 2013, p. 77) and equivalence reliability which is “determined by giving two or more forms of the survey to two or more groups that have been randomly selected” (Fink, 2013, p. 77) were regarded as not practicable for this research. Table 3.6 shows how predictive, concurrent, content validity and reliability were ensured for Studies 2 and 3.

**Table 3.6 Validity and reliability for supplier survey stage**

Test	Definition	Elements of research design
Predictive validity	A survey’s data can forecast respondents’ ability to behave in a certain way	<ul style="list-style-type: none"> <li>• Study results were compared to the results of similar studies</li> </ul>
Concurrent validity	Data from a new survey correlates to data from a previously established one	Study results were compared to the results of similar studies
Content validity	Refers to the extent to which a survey’s scales are representative of the constructs being measured	<ul style="list-style-type: none"> <li>• Referring to appropriate theories about the main constructs (for example, the Theory of Planned Behaviour)</li> <li>• Having the researcher’s supervisors check whether the items were representative of the constructs being measured</li> </ul>
Reliability	Refers to how internally consistent the questions on a survey are measuring the constructs they are supposed to measure	<ul style="list-style-type: none"> <li>• Demonstrated through the report of Cronbach’s alpha which describes how well items complement each other on the same dimension</li> </ul>

Source: Fink (2013)

### Extended TPB questionnaire design

French and Hankins (2003) note that the majority of TPB research is concerned with conducting surveys to predict variance in an outcome variable. In line with these authors, the focus of Stage 2 of this research was to use the extended TPB model to determine significant contributors to behavioural intention to adapt to climate change using the PARD strategies. Two studies (Studies 2 and 3) conducted with hoteliers and tourism policy-makers were implemented in this stage. A questionnaire-based survey using an extended<sup>5</sup> direct measure TPB questionnaire was used to collect quantitative data for Studies 2 and 3. Two new instruments to suit the research purpose were developed based on the review of the literature (Chapter 2), the results of Study 1, as well as, a generic template of a field questionnaire produced by Aizen (n.d.). Procedures for the design and development of modified forms of the original instrument are available (Ajzen, 1980, 2005; Francis, Eccles, et

<sup>5</sup> Extended in the sense that: 1) asked a variety of other questions in addition to TPB related questions, and 2) it measured variables related to the extended TPB model developed in Chapter 2 (see Section 2.6.3).

al., 2004) and these were followed. A summary of how variables were operationalised is presented in Table 3.7.

**Table 3.7 Variables, definitions, operationalisation and scales for Studies 2 and 3**

<b>Variable</b>	<b>Conceptual definition</b>	<b>Operationalisation</b>
Beach perception	Perception of the importance of the proximity and appearance of the beach in tourist accommodation choice	2 items rating the importance of proximity and appearance of beach in tourist accommodation choice 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 2 items
DRM perception	Perception of the importance of DRM considerations in tourist accommodation choice	3 items rating the importance of DRM measures in tourist accommodation choice 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 3 items
*Past adjustment behaviour	Perception of the level of DRM implementation at the hotel	Measured for hoteliers only Self-report of past DRM implementation across 5 items Measured on a 5-point Likert type scale response format Composite variable developed made up of aggregate score 5 items
Protection attributes	Perceptions of the desirability of the features associated with the Protection strategy	4 items rating the desirability of specific strategy features 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 4 items
Accommodation attributes	Perceptions of the desirability of the features associated with the Accommodation strategy	4 items rating the desirability of specific strategy features 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 4 items
Retreat attributes	Perceptions of the desirability of the features associated with the Retreat strategy	4 items rating the desirability of specific strategy features 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 4 items
Diversification attributes	Perceptions of the desirability of the features associated with the Diversification strategy	3 items rating the desirability of specific strategy features 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 3 items
Present climate risk perception	Perceptions of knowledge and worry of the risk posed by coastal erosion, hurricanes and sea level rise on hotel/destination at the present time	3 cognitive and 3 affective items Cognitive and affective sub-scales amalgamated into a total present CRP score 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 6 items
Future climate risk perception	Perceptions of knowledge and worry of the risk posed by coastal erosion, hurricanes and sea level rise on hotel/destination within the next 15 years	3 cognitive and 3 affective items Cognitive and affective sub-scales amalgamated into a total future CRP score 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 6 items

<b>Variable</b>	<b>Conceptual definition</b>	<b>Operationalisation</b>
Attitude	Perception of the advantages and disadvantages of using the PARD strategies to adapt to climate change	Measured for each adaptation strategy with 3 items 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 3 items
Subjective norm	Perception of social pressure to use the PARD strategies to adapt to climate change	Measured for each adaptation strategy with 3 items 7-option Likert-type scale response format Composite variable developed made up of aggregate score of 3 items
Perceived behavioural control	Perception of self-efficacy to use the PARD strategies to adapt to climate change	Measured for each adaptation strategy with 3 items 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 3 items
Behavioural intention	Intention to use the PARD strategies to adapt to climate change	Measured for each adaptation strategy with 3 items 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 3 items
Protection likelihood	Likelihood to use Protection to adapt to climate change	Measured with 1 item 7-option Likert-type scale response format
Accommodation likelihood	Likelihood to use Accommodation to adapt to climate change	Measured with 1 item 7-option Likert-type scale response format
Retreat likelihood	Likelihood to use Retreat to adapt to climate change	Measured with 1 item 7-option Likert type scale response format
Diversification likelihood	Likelihood to use Diversification to adapt to climate change	Measured with 1 item 7-option Likert-type scale response format
Hotel/destination profile	N/A	Number of coastal hotels, number of hotel rooms, number of employees, distance in relation to the high water mark and hotel buildings
Respondent demographic profile	N/A	Sex, age, job position and years of experience

Note: \* Measured only with coastal hoteliers. This measure discerned how prevalent the implementation of DRM was in the Caribbean coastal tourism operator context.

In total, there were approximately 120 items organised under nine question categories designed in line with general survey design recommendations provided by Fink (2013). Examples of question categories include those on beach perception, perceptions of the importance of DRM, perceptions of the PARD strategy attributes, climate risk perception, past adjustment behaviour (measured only with coastal hoteliers), attitude, subjective norm, perceived behavioural control, and intention to adapt to climate change using the PARD strategies. These question categories were in addition to demographic and hotel/destination profile questions. A 7-point Likert-type scale response format was most often recommended in the TPB literature (Francis, Eccles, et al., 2004) and this approach was adopted for all TPB related constructs, as well as, other variables. The exceptions were a 5-point rating scale for the Past Adjustment Behaviour variable and nominal scales used for demographic variables. In line with research that suggests that the inclusion of no-opinion options in attitude measures may not enhance data quality and instead may preclude measurement of some



meaningful opinions (Krosnick et al., 2002), there was no use of a 'non-response' option in supplier questionnaires.

In addition to the design considerations related to the conceptual content of the questionnaires, the researcher also had to ensure that the surveys satisfied good user design principles. The developers of Qualtrics (Qualtrics Labs Inc., Provo, UT, USA) offer web-based resources (such as videos, handouts), as well as, web-based tutorials for researchers. The researcher engaged with these resources and participated in online tutorials offered by Qualtrics on three occasions until confidence was gained in using the software. Supplementary assistance in the use of Qualtrics for survey design was provided by an appointed member of the Library, Teaching and Learning Services at Lincoln University.

Due to the length of the questionnaire and the amount of time estimated to complete it, care was exercised in drafting elements of the questionnaires' design. For example, careful thought was put into the selection, wording and ordering of questions. To facilitate respondent understanding and avoid bias, the PARD strategies were called Approach A, B, C and D on the questionnaire. Instructions were provided for completing each question. In the online survey environment, questions were divided according to themes on different screens so that there was a concise, logical flow to each Section. A progress bar kept respondents up-to-date on their progress in the Qualtrics environment. In addition, care was taken to counterbalance positive and negative statements to avoid an acquiescence response set. Therefore, there were 18 negative statements included on the questionnaire. Design considerations were further refined at two later stages in the research process namely, the pre-test stage and the Human Ethics Committee approval stage.

### **3.5.1 Sampling design**

This research initially proposed to use a simple random sample of hoteliers and tourism policy-makers in ten Caribbean destinations. However, as the research progressed, it became clear that the size of the theoretical population of coastal hoteliers and tourism policy-makers in the ten Caribbean destinations was considered to be unknown. This was confirmed from the interviews done in Study 1 in which policy-makers (for example, PUB\_TT\_1) and industry representatives (for example, PRI\_TT\_10) stated that not all hotels were members of the local hotel association, and therefore were not a part of the official listing of destination hotels. In addition to this, efforts to obtain official hotelier and tourism policy-maker listings from regional and national organisations met with only limited success, mainly due to proprietary and privacy concerns.

As a result, the researcher made alternative estimations based on: 1) membership lists obtained from the Caribbean Tourism Organisation (CTO) and the Caribbean Hotel and Tourism Association (CHTA), and 2) information compiled from internet searches of national hotel and tourism associations, national tourism boards, and aggregated online hotel lists. It was estimated that approximately 784 coastal hotels, 24 government organisations (for example, Ministries of Tourism and national Tourism Boards) and 15 industry organisations (for example, hotel and tourism associations) operating in the ten Caribbean destinations of interest could qualify for inclusion in this research (Table 3.8).

**Table 3.8 Theoretical population for Study 2**

Destination	Number of			Total potential respondent organisations
	Hotels	Government organisations	Industry organisations	
Antigua and Barbuda	40	2	1	43
The Bahamas	64	1	3	68
Barbados	53	3	1	57
Belize	420	3	2	425
Grenada	20	2	1	23
Jamaica	82	3	1	86
Saint Lucia	48	2	2	52
Saint Kitts and Nevis	11	3	1	15
Saint Vincent and the Grenadines	26	2	1	29
Trinidad and Tobago	20	3	2	25
<b>Total</b>	<b>784</b>	<b>24</b>	<b>15</b>	<b>823</b>

Hotels were thereafter screened for the requirement to be located within 800 m from the high water mark. Care was taken not to re-sample the 27 respondents interviewed in Study 1. At the end of the process, an initial inventory of 620 email addresses was compiled (Table 3.9).

**Table 3.9 Inventory of e-mail addresses by destination**

Destination	Number of e-mail addresses
Antigua and Barbuda	64
The Bahamas	61
Barbados	80
Belize	71
Grenada	50
Jamaica	67
Saint Kitts and Nevis	65
Saint Lucia	59
Saint Vincent and the Grenadines	52
Trinidad and Tobago	51
<b>Total</b>	<b>620</b>

Additional snowballing work yielded a further 23 e-mail addresses. The final hotelier and policy-maker panels consisted of 590 and 53 e-mail addresses for hoteliers and tourism policy-makers respectively.

In determining the necessary size of the sample for Studies 2 and 3, the general rule of thumb used was that a minimum of 10-15 subjects per variable is required for regression analysis (Hair, Black, Babin, & Anderson, 2010). Since there were 6 key variables being examined in the extended TPB model in this research, a range of 60-90 hoteliers and policy-makers respectively was thought to be ideal.

Given that the response rate for surveys is fairly low, it was considered appropriate that e-mails would be sent to all 643 e-mail addresses. E-mails were sent to e-mail addresses for the duration of the main survey. This represented a 'best effort' attempt to survey hoteliers and policy-makers in the ten Caribbean destinations.

### **3.5.2 Ethical considerations**

#### *HEC approval process*

This study involved human subjects and required the approval of the Lincoln University Human Ethics Committee (HEC). HEC approval for the pre-test was received on March 27, 2013. Approval for the main survey was received on April 15, 2013. Copies of the approval forms are attached as Appendices E and F respectively.

#### *Respondent rights*

Respondents' rights to voluntary consent, anonymity and conditional withdrawal were assured. The paper-based and online questionnaires were designed in such a way that anonymous consent was included using: 1) a consent tick or click box on the first page of the questionnaire, 2) a labelling system that assigned an anonymous pre-defined unique identifying code (ID) to each respondent, and 3) the right to conditional withdrawal using their unique ID by a specified date. In addition, the Research Information Sheet (RIS) contained information on the purpose of the survey, the terms and conditions of the respondent's participation, their rights, and contact information for the researcher and her supervisors at Lincoln University. Respondents were encouraged to contact the research team with any questions or concerns they may have had.

### **3.5.3 Pre-tests**

Two small, targeted pre-tests which commenced simultaneously on March 28, 2013 were conducted. Pre-test 1 was conducted with Ph.D. and Masters candidates at Lincoln University. Graduate students were assigned to a hotelier or policy-maker group respectively and sent either an online or paper-based version of the questionnaire to fill out. They were encouraged to provide feedback on language, concepts, the time taken to fill out the questionnaire, as well as, general suggestions for improvement. Pre-test 2 was done with members of the theoretical population. E-mails were sent to 30 potential respondents asking them to complete the survey and provide feedback on the questionnaire by asking the following questions at the end of the survey: 1) Did you have any problems answering this questionnaire at any stage? 2) Were there any words or sentences that you did not understand? 3) Were the questions arranged in a logical order? 4) Did the online survey software work correctly? 5) Do you think that there is anything that I can do to improve the survey experience for respondents in the future?

Based on the feedback from thirteen graduate students and five tourism suppliers, semantic changes were made to the questionnaire. Two complementary versions of the questionnaire (one for coastal hoteliers and the other for industry representatives and government tourism policy-makers respectively) were finalised (Appendices G and H). From the pre-tests, it was

determined that time to complete the survey was approximately 20 minutes. It became apparent from the pre-test with hoteliers and tourism policy-makers that the response rate would be particularly low and the decision was made at this stage to employ additional means (e.g., the hand out of questionnaires at an industry conference described below) to increase response.

#### **3.5.4 Main survey**

The main survey period was mid-April to mid-June 2013. The survey used a mixed mode implementation strategy in which the main mode was via an online survey using Qualtrics Survey Research Suite software supplemented by three paper-based surveys with tourism policy-makers in Trinidad and coastal hoteliers and policy-makers in Barbados.

##### *Qualtrics online survey*

E-mails inviting potential respondents to participate in the survey were sent to all 643 e-mail addresses on the master list on April 15, 2013. The initial contact e-mail provided background information about the survey, encouraged participation and offered a token reward in the form of research results. The e-mail contained a link to the online survey environment hosted by Qualtrics. When a respondent clicked the link and entered the survey, one filter question, "There is a paper-based version of this questionnaire. Have you already completed a paper-based version of this questionnaire?" was asked to ensure that the potential respondent was not sampled twice. Only if the respondent answered "no" did the online survey proceed.

Attempts to minimise non-response to the online survey included placing a short paragraph providing details about the survey in the CHTA's membership e-newsletter in May 2013 (<http://www.caribbeanhotelandtourism.com/eblasts/monthly-newsletter/052013/latest-news.html#seventh>). E-mails and follow-up telephone calls were made to each national hotel and tourism association asking for cooperation and support in informing their respective memberships of the opportunity to participate in the survey. In at least four cases, it was confirmed that an e-mail invitation was circulated to the hotel association membership.

A total of four e-mail reminders were sent during the course of the survey.

##### *Policy-maker survey, Trinidad and Tobago*

There was an opportunity for researcher-led data collection at a regional tourism conference in the Caribbean nation of Trinidad and Tobago. This conference was hosted by the Caribbean Tourism Organisation as the 14th Sustainable Tourism Conference (CTO-STC14) held April 15-18, 2013. CTO-STC14 drew over 350 delegates from the CTO's 30 member countries, and as such it was an opportunity to recruit tourism policy-makers using a paper-based questionnaire.

Permission was obtained from the CTO to recruit at the Conference venue, the Hyatt Hotel, Port-of-Spain, Trinidad. In the lead up to the conference, the researcher was invited to make a brief presentation to the CTO's Sustainable Tourism Technical Committee (STTC) on April 15, 2013 to garner support for the main survey. Where interest was shown by STTC members, follow-up e-mails were exchanged, allowing for snowballing in finding suitable respondents.

On conference days, the researcher was positioned in a small space in the conference booth area where a poster advertising the survey was put on display. Recruitment of respondents generally took place in this area, as well as, through directly approaching potential respondents. The first filter question asked was whether the individual was a manager attached to a coastal hotel, hotel or tourism industry association or Government tourism organisation within the ten Caribbean destinations of interest. All those attending the CTO Conference where the survey was distributed who were not managers attached to a coastal hotel, hotel and tourism industry association or Government tourism organisation in one of the ten Caribbean destinations delimited for this research were excluded from participating. If the individual answered “yes”, a second screening question “There is an online version of this questionnaire. Have you completed an online version of this questionnaire?” was asked. The potential respondent was considered as fitting the research criteria only if they answered “no”. The research was thereafter explained and participation was requested.

#### *Policy-maker and hotelier survey - Barbados*

The survey of hoteliers on the Caribbean island of Barbados took place in April 2013. This was a ‘best effort’ survey in which General Managers of all coastal hotels on the island were reached via telephone, using the Barbados Yellow Pages as the sampling frame. The research was briefly explained and where interest was shown, follow-up emails were sent containing a formal invitation to participate. A date was agreed on which 2-3 questionnaires would be delivered to the hotel, and another date on which completed questionnaires would be collected. A similar process was conducted for policy-makers on the island of Barbados.

#### *Respondent profiles*

The final samples of hoteliers and policy-makers are comprised of self-selected or organisation nominated managers attached to coastal hotels, hotel and tourism industry associations, as well as, Government tourism organisations who are over the age of 18 in ten Caribbean destinations.

There were 124 hoteliers in the final hotelier sample (Table 3.10). Most respondents were located in Belize ( $n=41$ ), Barbados ( $n=36$ ) and the Bahamas ( $n=19$ ). The sample consisted of slightly more males ( $n=66$ ) than females ( $n=57$ ). The largest group of hoteliers were aged between 41-55 ( $n=54$ ). Most respondents were owners and General Managers although Department Heads and other members of the hotel management team (e.g., Executive Committee Members, Property Managers) were also represented in the sample. The majority of hoteliers had more than 15 years of industry experience ( $n=45$ ) and were employed at their current organisation for 1-5 years ( $n=52$ ). Most managers labelled their properties as sole ownerships ( $n=69$ ), as privately operated ( $n=40$ ) and locally owned ( $n=36$ ). While there were some foreign owned hotels ( $n=20$ ), there were no publicly operated hotels represented in the sample. The typical hotel had a mean of 46.09 rooms ( $SD=67.17$ ), 63.52 employees ( $SD=125.42$ ) and was located 71.99 metres ( $SD=106.83$ ) from the high water mark.

There were 39 tourism policy-makers in the final policy-maker sample (Table 3.10). Most tourism policy-makers were from Trinidad and Tobago ( $n=10$ ) followed by Saint Vincent and the Grenadines ( $n=6$ ), Saint Lucia ( $n=5$ ) and Barbados ( $n=5$ ). There were more females ( $n=30$ )

than males ( $n=7$ ). The age group with the largest number of respondents was the 26-40 age group ( $n=19$ ). Respondents identified themselves as Product Development professionals ( $n=7$ ), as Executive Management ( $n=5$ ), Investment ( $n=5$ ), Marketing ( $n=4$ ), Policy and Planning ( $n=4$ ), as well as, other types of relevant professionals. Many respondents had between 6-10 years of industry experience ( $n=13$ ) and like hoteliers, were employed at their current organisation for 1-5 years ( $n=20$ ). Most respondents were attached to Ministries of Tourism ( $n=20$ ), Hotel and/or Tourism Associations ( $n=7$ ), as well as, Tourism Development Companies ( $n=5$ ).

**Table 3.10 Descriptive statistics for hotelier and policy-maker demographic and organisational variables**

Variable	Hoteliers ( $n=124$ )		Policy-makers ( $n=39$ )	
	Response categories	Frequency	Response categories	Frequency
Location	Antigua and Barbuda	7	Antigua and Barbuda	4
	Barbados	36	Barbados	5
	The Bahamas	19	The Bahamas	1
	Belize	41	Belize	2
	Grenada	6	Grenada	2
	Jamaica	5	Jamaica	1
	Saint Lucia	2	Saint Lucia	5
	Saint Kitts and Nevis	1	Saint Kitts and Nevis	2
	Saint Vincent and the Grenadines	4	Saint Vincent and the Grenadines	6
	Trinidad and Tobago	3	Trinidad and Tobago	10
Sex	Male	66	Male	7
	Female	57	Female	30
Age	18-25 years	3	18-25 years	1
	26-40 years	25	26-40 years	19
	41-55 years	54	41-55 years	8
	56-70 years	30	56-70 years	4
	Over 70 years	4	Over 70 years	0
<sup>a</sup> Organisation	Sole ownership	69	Ministry of Tourism	20
	Privately operated	40	Tourism Development Company	5
	Locally-owned	36	Hotel and/or Tourism Association	7
	Foreign-owned	20	Related Government Agency	2
	Strategic alliance	19	Tourism Product/ Investment Company	1
	Management contract	8	Tourism Authority	1
	Joint venture	7	Tourism Board	1
	Franchise	1	Tourism Marketing Organisation	1

Variable	Hoteliers (n=124)		Policy-makers (n=39)	
	Response categories	Frequency	Response categories	Frequency
Position	Other	1	Other	0
	Owner	54	Product Development	8
	General Manager	29	Executive Management	6
	Department Head	14	Investment	5
	CEO/Managing Director	9	Policy and Planning	4
	Executive Committee Member	5	Marketing	4
	Property Manager	1	Finance	3
	Assistant Manager	2	Research and Education	3
Years of Industry Experience	1-5 years	18	1-5 years	7
	6-10 years	18	6-10 years	13
	11-15 years	18	11-15 years	5
	16-20 years	22	16-20 years	2
	Over 20 years	45	Over 20 years	2
Years Employed with Current Organisation	1-5 years	52	1-5 years	20
	6-10 years	29	6-10 years	8
	11-15 years	11	11-15 years	4
	16-20 years	16	16-20 years	1
	Over 20 years	12	Over 20 years	1

Note: <sup>a</sup> Multiple responses allowed.

### 3.5.5 Data preparation

A total of 136 hotelier responses and 51 policy-maker responses were collected for Studies 2 and 3 respectively. However, some questionnaires were discarded due to insufficient response on questionnaire items, leaving 124 useable hotelier questionnaires and 39 useable policy-maker questionnaires.

Coding sheets of questionnaire items, SPSS variable names, and coding instructions were created to guide data entry (Appendices I and J). The paper-based questionnaires were coded and entered into Excel. Cells in Excel were left blank if data was missing. All data entries from the paper-based questionnaires were re-checked by the researcher for consistency. The entries were found to be largely consistent. Where there were errors, these were corrected. Since Qualtrics makes the online survey output available in an Excel format, these results were merged with the paper-based data and then the master data file was imported into the

Statistical Package for the Social Sciences (SPSS) (version 21) programme for quantitative analysis. SPSS is a research package commonly used by social scientists for this type of research, with several credible studies in peer reviewed journals having used SPSS to undertake analysis similar to Studies 2 and 3.

Frequencies were subsequently run on each survey item to ensure that the entire dataset was free from coding errors. Since all respondents did not answer all questions on the questionnaire, diagnostic tests relating to missing value analysis (Little, 1988) were run on the hotelier and tourism policy-maker datasets. In each case, Little's MCAR test statistic was not significant, indicating that data was missing completely at random. No imputation of missing values was done. In an effort to illuminate the basic characteristics of the data and underlying relationships, the data was graphically examined. Histograms provided an opportunity for univariate profiling while scatterplot matrices were examined for bivariate profiling of relationships between key variables. Boxplots were also used to examine group differences. Results from tests of normality, skewness, kurtosis and heteroscedasticity were deemed to be acceptable. For example, very few variables had absolute values of Skew index over 3.0 and Kurtosis index over 10.0 (Kline, 2009, p. 240). No transformation of variables was undertaken.

In line with similar studies (Wang & Ritchie, 2012, 2013), the structure of the main analysis variables were examined prior to analysis by running Principal Components Analysis (PCA) with VARIMAX rotation. This was done for the coastal hotelier and tourism policy-maker datasets (see Appendices K and L respectively for a report of loadings from the rotated component matrix, eigenvalues, % of variance, the Kaiser-Meyer-Olkin (KMO) measures, Bartlett's test and Cronbach's alphas). Although there are some KMO values that were less than 0.50, a few Bartlett's values that were more than 0.05 indicating that these variables were problematic<sup>6</sup>, the majority of variables demonstrated acceptable factorability and reliability. Cronbach's alphas which are measures of construct reliability were also calculated. Hair, Anderson, Tatham, and Black (1998) suggest values of 0.60 to 0.70 to be the lower limit of acceptability while Fink (2013) reports that reliability co-efficients of 0.50 or above are acceptable to compare groups. The reliability analysis was similarly problematic on some subjective norm and perceived behavioural control measures. In sum, this does suggest a need to treat the results of the analysis using the constructs that did not meet acceptability levels with caution.

### **3.5.6 Data analysis**

Data was analysed following procedures defined by Tabachnick and Fidell (2007), Hair et al. (1998) and Hair et al. (2010). Data from the surveys were regarded as continuous allowing for the means and standard deviations to be calculated and parametric statistical tests to be applied (Fink, 2013, p. 45). The conduct of the multivariate statistics analysis was guided: 1) in weekly sessions with the researcher's supervisory team, 2) by several tutorial sessions with two knowledgeable postgraduates, and 3) by a number of manuals and textbooks (Berkman

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<sup>6</sup> This can be attributed to the broad definition of the subjective norm and perceived behavioural control constructs. For example, SN examined perceptions of social pressure around three distinct groups, as well as, motivation to comply with each group.



& Reise, 2012; Field, 2009; Hair et al., 1998; Hair et al., 2010; Pallant, 2007; Tabachnick & Fidell, 2007; Wagner, 2011).

Descriptive statistics (means, standard deviations, range) and Pearson correlations were calculated for the main analysis variables and their composites. Missing data was treated using pairwise deletion (available-case analysis) by SPSS which maximizes all data available by an analysis by analysis basis. Multivariate relationships were examined by looking at residual histograms to check the assumption about normal distribution, partial regression plots, residual plots and normal probability plots of the residuals. Outlier cases (i.e. cases where Cook's Distance measured  $>1$ ) were identified and removed. The possibility of multicollinearity among the predictor variables was tested using the Durbin-Watson statistic. In all instances, this statistic was close to 2, suggesting no correlation among the explanatory variables.

In line with many studies in the literature on the TPB (Francis, Eccles, et al., 2004; Francis, Johnston, Eccles, Grimshaw, & Kaner, 2004), multiple linear regression analysis was used, and in particular, the Forced Entry method of regression. In this method, all predictors are forced into the model simultaneously (Field, 2009, p. 212). The method relies on the theoretical choice of predictors. No decision is made about the entry order of predictors. Studenmund and Cassidy (1987) believe that this is the only appropriate method for theory testing. For the multiple regression analysis, intention was entered as the dependent variable, and the measures of attitude, subjective norm, perceived behavioural control and present and future climate risk perception as the predictor variables. Simple linear regressions were also run to examine relationships between two variables as necessary. Full results are reported in Chapters 4 and 5 of this thesis.

### **3.6 Stage 3: Tourist survey method**

This Section details the tourist survey method used in Stage 3 of the research. This survey was conducted to provide insights on the normative appropriateness of the predicted supplier behaviour examined in Studies 2 and 3. The examination of perception gaps between demand and supply-side stakeholders is particularly crucial because such gaps may affect the undertaking of concerted action between suppliers and their market. By synthesising and comparing the views of hoteliers, policy-makers and tourists on the PARD strategies and other key variables, a perception gap analysis becomes possible.

#### **3.6.1 Tourist questionnaire design**

The design of the tourist questionnaire was driven by the need to relate tourist perceptions to those of suppliers on key research variables. Since there are no published instruments that closely match Study 4's research purpose, a new instrument was developed. The questionnaire largely focused on examining perceptions associated with the importance of the proximity and appearance of the beach in tourist choice of accommodation, the importance of DRM considerations in tourist choice of accommodation, perceptions of the PARD strategies and their associated attributes, and likelihood to choose a destination that

has used a particular PARD strategy to adapt to CC. The three page self-completion questionnaire (Appendix M) comprised of 40 items organised into eight question categories. A summary of key variables and how they were operationalised is presented in Table 3.11.

**Table 3.11 Variables, definitions, survey questions and scales for Study 4**

Variable	Conceptual definition	Operationalisation
Beach perception	Perception of the importance of the proximity and appearance of the beach in choice of accommodation	2 items rating the importance of proximity and appearance of beach in tourist accommodation choice 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 2 items
DRM perception	Perception of the importance of the DRM in the choice of accommodation	3 items rating the importance of DRM measures in tourist accommodation choice 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 3 items
Protection attributes	Perceptions of the desirability of the features associated with the Protection strategy	4 items rating the desirability of specific strategy features 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 4 items
Accommodation attributes	Perceptions of the desirability of the features associated with the Accommodation strategy	3 items rating the desirability of specific strategy features 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 4 items
Retreat attributes	Perceptions of the desirability of the features associated with the Retreat strategy	4 items rating the desirability of specific strategy features 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 4 items
Diversification attributes	Perceptions of the desirability of the features associated with the Diversification strategy	3 items rating the desirability of specific strategy features 7-point Likert-type scale response format Composite variable developed made up of aggregate score of 3 items
Protection likelihood	Likelihood to use Protection to adapt to climate change	Measured with 1 item 7-option Likert-type scale response format
Accommodation likelihood	Likelihood to use Accommodation to adapt to climate change	Measured with 1 item 7-option Likert-type scale response format
Retreat likelihood	Likelihood to use Retreat to adapt to climate change	Measured with 1 item 7-option Likert-type scale response format
Diversification likelihood	Likelihood to use Diversification to adapt to climate change	Measured with 1 item 7-option Likert-type scale response format
Respondent demographic profile	N/A	Sex, age, country, number of times to the Caribbean, stayed in coastal accommodation

### **3.6.2 Sampling design**

This study used a convenience sample of international tourists visiting the Caribbean island of Tobago, who were over the age of 18, and who represent a range of nationalities and other demographic characteristics. Domestic tourists, international tourists aged under 18 years, as well as, tourists who could not speak English well enough to read and understand the questionnaire were excluded from participating in the survey.

### **3.6.3 Ethical considerations**

#### *HEC approval*

Study 4 involved human participants and as such required the approval of the Lincoln University HEC. The HEC approval process flagged the possible existence of a methodological artefact. Specifically, the Committee asked about the order of the following question on the questionnaire: Do you think there is a need for coastal hotels in the Caribbean to prepare for CC? It was posited that if this question was asked lower down in the questionnaire, respondents' answers would be different. This possibility was tested with respondents in the pre-test phase using two versions of the questionnaire which were developed for this purpose (see Section 3.6.4 for results). HEC approval was granted on December 19, 2011 (Appendix N).

#### *Respondent rights*

Respondent rights were assured by describing the research, the voluntary nature of participation, and the anonymous nature of the responses. A copy of the recruitment script is attached as Appendix O. As much time as was necessary was given for the participant to read the Research Information Sheet (RIS). Once the respondent read the RIS, the researcher again asked if the respondent was willing to participate. Due to the use of an anonymous consent box, individual respondents were not identified by the data collected. Moreover, the only demographic questions asked of respondents related to age, sex and country of residence.

### **3.6.4 Pre-tests**

The questionnaire was pre-tested twice with tourists to ensure that the instructions, questions, and scale items were clear. Test 1 was done with twenty international tourists on two popular beaches in Tobago (Crown Point and Pigeon Point beaches). Test 2 was done in the departure lounge of the ANR Robinson International Airport and on one popular beach in Tobago. Each time, the instrument was revised to accommodate improvements suggested by respondents. A major finding of Test 1 was that a methodological artefact seemed to exist with version 2 of two versions of the questionnaire which were developed to test for the possible existence of a methodological artefact. Table 3.12 illustrates:

**Table 3.12 Methodological artefact test results**

Questionnaire version	Placement of question “Do you think there is a need for coastal hotels in the Caribbean to prepare for CC?”	Sample	Respondents who answered ‘Yes’	Respondents who answered ‘No’
Version 1	Placed as question 2	10	6	4
Version 2	Placed as question 4	10	10	0

These results suggested that the placement of question 2 in version 2 of the questionnaire which asked the respondent about items that may have been important to them in choosing a hotel and question 3 which asked the respondent to rate the importance of a list of hazard events that may have an impact on the quality of their beach vacation offered a ‘learning opportunity’ that led to a positive response to question 4. This ‘learning opportunity’ is not present in version 1 because these questions were placed after respondents were asked whether they thought that there was a need for coastal hotels in the Caribbean to prepare for climate change. The implication was that version 2 should be discarded and version 1 used because this ‘learning opportunity’ introduced a systematic response bias.

Version 1 of the questionnaire was re-served in Test 2 with ten tourists. It was observed that the questionnaire generally took no more than 10 minutes to complete. After completing the questionnaire in the field, three questions were asked of respondents: 1) Did you have any problems answering this questionnaire? 2) Were there any words or sentences that you did not understand? and 3) Do you think that there is anything that I can do to improve the survey experience for other people who may answer this questionnaire in the future? These questions sought to check for any ambiguity, misunderstanding or confusion of terms and/or questions. Minor changes were made to some statements so that they were easier to understand.

### **3.6.5 Main survey**

The main survey period for Study 4 was January - March 2012. This was within the Caribbean’s peak winter season and also coincided with Trinidad & Tobago’s annual Carnival festival. Research respondents were recruited at various beaches throughout the island of Tobago, as well as, at the island’s airport. Tobago has approximately 25 beach sites and the researcher made an attempt to recruit respondents at each of these sites. Where permission was needed for any particular site (for example, the airport, Pigeon Point beach, and Storebay beach), this was sought and gained before surveying was conducted. Permission to recruit was asked from the airport and seaport authorities, as well as, the the Pigeon Point and Storebay management teams. Permission was received from the ANR International Airport, Pigeon Point and Storebay management teams and the researcher recruited at these locations accordingly. Since the seaport never responded, no recruitment was undertaken there.

At all locations, the researcher ensured that she operated outside of the flow of traffic for people to participate in the survey without impeding the movement of others or without people feeling scrutinised or pressured to respond. On each site, the researcher approached any persons or group of persons who appeared to be international tourists. Every person or group of persons to cross the researcher's path as she walked the length of the beach was

approached. One filter question was used to establish that the person or group of persons approached was/were international tourist(s). The researcher began the questionnaire administration process by verbally explaining the project. Thereafter, the respondent was invited to read the information sheet (front page of the questionnaire) which included further explanatory information. The information sheet which contained contact details for the research team was detachable from the rest of the questionnaire and was made available to respondents to keep.

At the airport, every effort was made to remain close to seating so that respondents had the opportunity to be seated while they took the survey. On the beach, respondents were usually already seated on the sand or on a beach chair. To ensure privacy, the researcher stepped a short distance away from respondents while they answered the questionnaire. The researcher was available to answer any questions respondents had whilst completing the questionnaire. The researcher kept a log of the number of individuals who declined ( $n=83$ ). No demographic or other information was collected from persons who refused to complete the questionnaire.

### *Respondent profiles*

Although 372 questionnaires were collected, some were discarded due to outlier responses, not answering a significant portion of the survey and not meeting the survey participation criteria. For example, some questionnaires were filled in by stopover cruise ship passengers or in transit airport lounge passengers ( $n=47$ ).

The final sample is comprised of 320 tourist responses. There were 174 females and 145 males (Table 3.13). The majority of tourists identified themselves as belonging to the 26-40 ( $n=101$ ), 41-55 ( $n=86$ ) and 56-70 ( $n=89$ ) age groups. Most international visitors were from the United Kingdom ( $n=184$ ), the United States ( $n=47$ ) and Canada ( $n=24$ ). The typical tourist had a mean number of 8.28 visits ( $SD=12.180$ ) and stayed in coastal accommodation a mean number of 5.81 times ( $SD=7.843$ ). The majority were visiting for the beach ( $n=225$ ) followed by culture ( $n=137$ ) on their current trip to Tobago.

**Table 3.13 Descriptive statistics for tourist demographic variables**

Tourists (N=320)		
Variable	Response categories	Frequency
Sex	Male	145
	Female	174
Age	18-25 years	26
	26-40 years	101
	41-55 years	86
	56-70 years	89
	Over 70 years	16
<sup>a</sup> Country	United Kingdom	184
	United States of America	47
	Canada	24
	Germany	22
	Sweden	18
	Norway	7
	France	4
	Other	14
<sup>b</sup> Reason for visit	Beach	225
	Culture	137
	Friends/family	51
	Trinidad and Tobago Carnival	40
	Nature	20
	Sports	16
	Business	9
	Rest/relaxation	9
	Education	6
	Yachting	2

Note: <sup>a</sup> Other = The Netherlands, Switzerland, Nepal, Suriname, Dominican Republic, Venezuela, Columbia, Finland, Denmark, Malta. <sup>b</sup> Multiple responses allowed.

### 3.6.6 Data preparation

The dataset was coded (see Appendix P for a copy of the coding sheet) and entered into Excel for data cleaning. Data preparation largely followed the procedures described in Section 3.5.5.

### **3.6.7 Data analysis**

The cleaned dataset was subsequently entered into SPSS which was used to calculate the mean, standard deviation, frequency, distribution and ranking of each PARD attribute for tourists. The tourist measures were combined with similar measures from hoteliers and policy-makers for comparison using parametric statistics. Independent sample *t*-tests, one-way ANOVAs and MANOVAs were run to examine significant differences across the three groups on main analysis variables.

## **3.7 Stage 4: Synthesis**

The final stage of the research involved combining and comparing the results of the four studies into a synthesis. The presentation of the remaining thesis chapters reflects this. For example, Chapter 4 uses a mixed method presentation of quantitative and qualitative data from three studies namely interviews of 17 hoteliers, 2 industry association representatives and 8 tourism policy-makers and surveys of 124 hoteliers and 39 policy-makers. Generally, qualitative quotes are supplemented by quantitative measures. Chapter 5 presents the results of the analysis of hoteliers, policy-makers and tourists perceptions on common measures. This chapter is solely quantitative in nature. Chapter 6 discusses the results of Chapters 4 and 5 and necessarily uses both quantitative and qualitative results and a mixed method presentation to achieve its goal. The final chapter presents conclusions and implications of the research in light of its limitations.

## **3.8 Summary**

This chapter discussed the research methodology and methods employed to collect suitably valid and reliable data to answer the research questions posed in this research programme. The following chapters will discuss the findings of the research.

## Chapter 4

# Examining the disaster risk management and climate change adaptation decision-making processes of Caribbean coastal tourism suppliers

### 4.1 Introduction

The previous chapters have identified and discussed the research issues and methodology. One of the key issues that emerged in Chapter 2 is the need to better understand the stages of the supplier DRM and CCA decision-making processes, as well as, the nature, structure and function of their main determinants. In this Chapter, this issue is explored qualitatively and quantitatively using data from Studies 1, 2 and 3. Parts of the results of this thesis have been reported in Mahon et al. (2012). However, it should be noted that the thematic focus of that paper was significantly different to what is reported here.

### 4.2 Nature of antecedents to intention to engage in disaster risk management

This Section examines the nature of the antecedents to intention to adjust to present-day climate-related events. For this analysis, 'nature' refers to the fundamental characteristics of the research construct which can be described qualitatively. As discussed in Chapter 2, climate risk perception refers to a supplier's perceptions of hazard, vulnerability and exposure – three key determinants of disaster risk. Climate risk perception includes a temporal component that is critical to the present investigation. Attitude focuses on a supplier's positive or negative evaluation of adjusting to present climate-related hazards, expressed through a supplier's perceptions of the advantages and disadvantages of adjusting. Subjective norm focuses on a supplier's perceptions of social pressure to adjust or not to adjust to present-day climate-related hazards. A supplier's perceptions of the people or groups that would approve or disapprove of adjustment are considered. Perceived behavioural control focuses on the supplier's perceived sense of self-efficacy or ability to engage in adjustment to present-day climate-related hazards, taking into account some of the real constraints that may exist. A supplier's perceptions of: 1) the barriers preventing, and 2) the motivators encouraging adjustment are important considerations.

#### 4.2.1 Present climate risk perception

The discussion of present climate risk perception is divided into two Sections: 1) a discussion of respondents' perceptions of hazards, including weather and extreme events, and 2) a discussion of respondents' perceptions of their vulnerability and exposure.



#### 4.2.1..1 Perceptions of hazards, including weather and extreme events

Thirteen hazards representing a range of natural, socio-natural, and anthropogenic hazards were reported to currently affect respondents (Table 4.1).

**Table 4.1 Respondent reports of the range of present-day hazards**

All hazards experienced
Weather and climate-related hazards:
Severe weather systems including tropical storms and hurricanes
Coastal erosion
Storm surge
Coastal flooding
Unusual precipitation patterns and heavy rains
Drought
Other hazards:
Volcanic ash
Rogue waves
Tidal rise (within the tidal range)
Landslips
Dirt and other by-products that travel from inland storm drainage out to the coast
Land based sources of marine pollution
Jellyfish

Six of the thirteen hazards reported were weather and climate-related. The hazards most frequently reported by hoteliers and policy-makers respectively were coastal erosion and severe storms including hurricanes (Table 4.2). These were also reported to be the hazards that were most likely to affect respondents overall, followed to a lesser extent by storm surge and coastal flooding. All of these hazards are weather and climate-related and are all relevant in a climate change context.

**Table 4.2 Respondent references to hazards experienced most frequently**

Hazards	# of times mentioned by country			
	Antigua and Barbuda	Jamaica	Trinidad and Tobago	Total
Coastal erosion	160	141	177	<b>478</b>
Severe storms including hurricanes	156	151	113	<b>420</b>
Storm surge	78	46	51	<b>175</b>
Coastal flooding	28	14	21	<b>63</b>

The range of identified hazards is indicative of multiple environmental stresses experienced in the operating environment of the coastal zone. Respondents often identified a differential mix of hazards reflecting the variability of the perception of hazards. Respondents in Antigua

and Barbuda and Jamaica made more frequent reference to experiencing hurricanes than respondents in Trinidad and Tobago.

Respondents did not mention that they were affected by earthquakes and tsunamis although a few of them (n=6) acknowledged that they were exposed to these two hazards.

Regarding perceptions of the frequency and intensity of hazards, stakeholders acknowledge that hazard occurrence is frequent with variability in intensity depending on the hazard in question. One hotelier referred to the probability of hurricanes affecting any one of the Caribbean islands this way: "...like winning the lottery..." (PRI\_AB\_2, Hotelier, Antigua and Barbuda) – entirely a question of chance.

#### **4.2.1..2 Perceptions of vulnerability and exposure**

Of the 17 hoteliers interviewed, field observations confirmed that most hotels operate within 100 m of the high water mark. Moreover, the quantitative survey results reveal that the average distance of buildings from the high water mark reported by the 124 hoteliers is 71.99 m ( $SD=106.83$ ). Thus, hotels by virtue of their location are highly exposed.

However, hoteliers were likely to view their exposure as an opportunity: "This industry was born on people being able to sleep and roll out their bed and go and lie on beach chairs and enjoy themselves" (PRI\_AB\_3, Hotelier, Antigua and Barbuda). A key aspect of the business opportunity is related to the acceptance of exposure. Hoteliers do not view their exposure as contributing to risk; rather operating within 100 m of the high water mark is at the core of their competitive advantage.

This is one example of perceptual vulnerability. However, there were others. Hoteliers' strong notions of their beach tourism identity emerged as a key theme related to vulnerability. Caribbean destinations are known for 'sun, sea and sand' and hoteliers and policy-makers alike display strong emotional connections to their participation in beach tourism:

"...I mean we're an island....if we lose our coast, then beach tourism will be finished. And all the investors would be wiped out.... And the rest of the country that is so dependent on tourism" (PRI\_JA\_1, Industry association representative, Jamaica).

"...because if you lose...God forbid you lose the sand ...what are we offering in terms of the tourism product? That means we'll be increasing the pressure on our eco-tourism side of things" (PUB\_TT\_5, Policy-maker, Trinidad and Tobago).

"...we will do anything... so that we... still call [ourselves] a beachfront property instead of calling it a seafront property..." (PRI\_JA\_3, Hotelier, Jamaica).

High perceived international tourist demand for a sun, sea and sand tourism product is another vulnerability driver. For suppliers, especially coastal hoteliers, tourists do not appear to be actively demanding that a hotel operates a prescribed distance from the sea. A dichotomy is therefore created between operating a reasonably safe distance away from the high water mark and operating as close as possible to it for the economic rewards that hoteliers receive in return.

Comparatively lower tourist demand for a disaster resistant product was another important vulnerability factor, as while fairly important in their own right, hoteliers perceived that closeness to the beach seems to hold more importance with tourists than other features associated with a disaster resistant tourism product. It may be difficult for hoteliers to balance a lack of tourist demand for DRM with parallel claims for a tourism product that is right on the beach.

Other vulnerability factors were structural in nature: slow, disjointed mainstreaming of the DRM agenda; historically deficient development planning, monitoring and enforcement; a limited range of tourism development options; lack of resources to devote to DRM; and a disproportionate dependence on tourism relative to other industries. Finally, there were also behavioural vulnerability factors identified: human-induced loss and degradation of coastal ecosystems; lack of a multi-hazard approach; limited use of risk assessment and a disconnect in dialogue between hoteliers and policy-makers. While summarised here, a fuller analysis of suppliers' perceptions of vulnerability is available in Appendix Q.

#### **4.2.2 Attitude towards engaging in disaster risk management**

When asked whether there is a need to prepare for present-day coastal and hydro-meteorological hazards, hoteliers ( $M=5.98$ ,  $SD=1.49$ ) and policy-makers ( $M=6.51$ ,  $SD=1.10$ ) highly agree that there is a need to prepare<sup>7</sup>.

One hotelier in Trinidad and Tobago for example, is of the view that:

“...there are not any disadvantages in preparing for natural hazards... Some persons may say they purchased a lot of equipment during their preparation, but in my view these things can be kept for other times, for example, lanterns, candles and first aid kits...” (PRI\_TT\_3, Hotelier, Trinidad and Tobago). A policy-maker in Antigua and Barbuda echoed this sentiment saying:

“...I think it is always best to prepare for natural disasters especially those that can be predicted such as hurricanes. Sometimes plans are in place and nothing happens and in small economies, the resources expended could have been used elsewhere. However, when considering that lives could be lost without proper preparation, then preparation will always win out...” (PUB\_AB\_1, Policy-maker, Antigua and Barbuda).

This policy-maker's comment reflects an understanding of probabilities of hazard event occurrence and preparation based on this. The statement also makes reference to the reality of having competing objectives in the face of limited resources.

Hoteliers most frequently mentioned advantages of engaging in adjustment behaviour related to protecting: 1) property, 2) guests, and 3) the livelihoods of hotel employees and of the managers themselves. In the words of one hotelier, they prepare because otherwise they would be “...putting people at risk...” (PRI\_AB\_2, Hotelier, Antigua and Barbuda). The broad

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<sup>7</sup> Note this was not measured for tourists.

economy was generally not identified by hoteliers. In contrast, for policy-makers, the main advantage of adjusting to present-day climate-related hazards was mainly related to protecting a key economic sector and the wider national economy that depends on tourism. Tourists as people or guests were seldom volunteered in policy-maker responses.

Generally, hoteliers and policy-makers broadly identified several advantages to investing in DRM measures including: reduced damages and financial losses to businesses (e.g., downtime due to closure, replacement costs); mitigation of the potential for insurance costs to escalate dramatically; reduced risk of casualties and fatalities; improved international tourist perception of safety at hotels and the destination; protection of business reputation; protection of the economy; continuance of the way of life of the residents; peace of mind of residents; reduced cost to the State to restore after the event; minimization of the loss of natural and built assets; and faster economic recovery.

Disadvantages of adjusting to present-day climate-related hazards were discussed largely in terms of cost. Respondents identified the following costs at the government, sectoral and business levels: the cost of retro-fitting; of training staff; of hiring additional staff and/or expertise; of conducting vulnerability studies and the cost of installation of mitigation measures. For example, according to one Tobagonian hotelier (PRI\_TT\_3), coastal defence typically costs “millions of dollars” while one Jamaican hotelier (PRI\_JA\_4) made clear that the cost of beach replenishment is very high. To implement beach replenishment, PRI\_JA\_4 identified that there are costs associated with licensing, the importation of the sand from another island, as well as, expert labour to do the replenishment job. This respondent also mentioned the cost of potential disruption if the hotel were to be closed while replenishing the beach.

Lack of investment in DRM was perceived to have its own costs. For example, one public official in Trinidad and Tobago acknowledged that there is usually a large “...price tag attached to the clean-up, as well as, any type of ...mitigation measure that is put in place thereafter...” (PRI\_TT\_10, Industry association representative, Trinidad and Tobago). One Jamaican hotelier (PRI\_JA\_4) made clear that the possibility of incurring liability and reputational costs with clients and tour operators is already very real with liability claims routinely being made by tourists that are disappointed by the environmental amenity of the beach. Finally, this hotelier discussed the financial and operational consequences for hotels that install ill-conceived coastal defence measures and for the Governments that approve them.

A key theme associated with respondents’ attitude towards DRM was the relative importance of adjustment measures to the accommodation choices of the international tourist market. Some respondents believe that guests desire adjustments that protect the quality of their vacation. Some hoteliers, for example, are of the opinion that visitors are looking for hotels that have disaster plans in place and that catering to this market demand for a safe vacation has an advantage:

“...you have to respond to people’s fears, wants, needs... and obviously when people travel...just look at hurricanes... people travel now... during the hurricane season. They gravitate to the ones [hotels and tour operators] who can afford it...more to the tour operators that offer hurricane insurance or the hotels that give you a guarantee if they are

affected by a hurricane. It's the same principle with coastal impact ...if they find that people [hoteliers and tour operators] help to protect their vacations...by all means you're going to have the impact with visitors" (PRI\_JA\_4, Hotelier, Jamaica).

In line with hoteliers' affinity for environmental management as a key DRM category, many hoteliers reported that environmental management adjustments are done particularly with the environmentally conscious guest in mind. Policy-makers also support the view that adjustments could be a selling point for destinations and properties. For example, one policy-maker was of the opinion that investment in DRM was worthwhile because tourists "...want to know that somebody is taking care of their interest ...you know, that they're safe. Safety is a big thing..." (PUB\_AB\_3, Policy-maker, Antigua and Barbuda).

However, some ambivalence in attitudes seems to exist. Some respondents, for example, were of the belief that DRM has no influence on visitor decisions:

"...the average tourist does not put a great deal of thought into their vacation where it pertains to disaster management - this is low on their list of priorities. Because the average vacation is about 7 days, people think they can never be affected..." (PRI\_TT\_8, Hotelier, Trinidad and Tobago).

One hotelier in Antigua noted that he had never been asked by a guest if the hotel had a disaster plan.

#### **4.2.3 Perceptions of social pressure to engage in disaster risk management**

Most respondents think that important referents approve of their adjustment behaviour. For hoteliers, guests, including local and international visitors, as well as, corporate clients; Government and its ministries and agencies (such as the Ministry, Boards or organisations responsible for tourism, environment, fisheries, disaster management, planning, meteorology and emergency response); environmental NGOs; and community groups were the most common groups mentioned. As the intermediaries between suppliers and the market, international tour operators were also a key referent group mentioned by hoteliers as any hotel in Caribbean SIDS that deals with international tour operators are obliged to have a hurricane manual. The interviews revealed that plans, manuals and standard operating procedures for the hurricane hazard, as well as, the upgrading and updating of these are common. Surprisingly, the opinions and actions of hoteliers in other destinations were not believed to have an influence on the adjustment decision-making of hoteliers. In fact, the majority of hoteliers and tourism policy-makers responded that they while they were aware that other hotels and or destinations were impacted by climate-related hazards, they had little or no knowledge of what these entities have done to prepare or respond. Hoteliers are more likely to know what others are doing in their immediate strip of coastal beach or in other parts of the same country:

"I see like the newer properties that are being built here in Jamaica, they seem to put in...what I call break walls so the ocean doesn't break and protects the beach and protects

erosion of the beach so that the waves again are not coming in to the property so strong...” (PRI\_JA\_6, Hotelier, Jamaica).

Policy-makers mentioned a different list of important referents than hoteliers. For this group, hoteliers; other policy-makers in the Government; politicians and the public were perceived to approve of them assisting hoteliers to prepare for and respond to climate-related hazards.

A few respondents were of the view that there were individuals or groups that would discourage or disapprove of them adjusting to present-day climate-related hazards. Hoteliers identified environmental lobbyists while policy-makers identified “individuals or people who like to maintain the status quo” (PUB\_AB\_8, Policy-maker, Antigua and Barbuda).

#### **4.2.4 Perceptions of self-efficacy to engage in disaster risk management**

When asked for a self-evaluation of their ability to deal with climate-related hazards, the majority of respondents indicated that they were confident. Only one was not confident. Hoteliers display very high perceptions of self-efficacy for dealing with present-day climate-risks: “I think that we are pretty much ready and we are very confident” (PRI\_AB\_10, Hotelier, Antigua and Barbuda)/ “...we are more than ready...” (PRI\_AB\_10, Hotelier, Antigua and Barbuda). Hoteliers have “...had quite a lot of years of experience and we have a lot of training...” (PRI\_AB\_4, Hotelier, Antigua and Barbuda). They are confident that they prepare well: “I think we’re confident that we’re doing all we can do...” (PRI\_AB\_11, Hotelier, Antigua and Barbuda). They think that their buildings are strong and resistant to extreme events: “...our buildings are strong enough, I know we could handle a hurricane” (PRI\_TT\_4, Hotelier, Trinidad and Tobago). They think that they are “...pretty secure...we’re pretty ok...” (PRI\_TT\_6, Hotelier, Trinidad and Tobago) and they do not “...really see any problem at all...” (PRI\_AB\_6, Hotelier, Antigua and Barbuda). Their experience with past hazard impact has reinforced their outlook in a positive way: “...we’ve pulled through quite well...” (PRI\_AB\_4, Hotelier, Antigua and Barbuda). They believe they can influence and control the outcome of the present impact of weather and climate extremes on their business. They take this responsibility seriously and are independent in their responses to present-day hazards. In fact, some engage in hazard and disaster management irrespective of Government assistance:

“Help from the government...not really.... Obviously, if the electric lines are down for example...water...they will come and restore those. However, we have our own water plant on property, desalination plant. We have two big generators in the back. Normally, we’re ok...” (PRI\_AB\_5, Hotelier, Antigua and Barbuda).

The sentiment of one hotelier attached to a regional hotel chain also makes this clear:

“...I mean we are a company that operates hotels... 20 hotels and all of them are located on beaches. All of them are located on...on the shorelines of islands in the Caribbean so we are very aware of ... the possible threats or hazards to the coastline, so I think we are able to deal with it very well...” (PRI\_AB\_9, Hotelier, Antigua and Barbuda).

By contrast, policy-makers are more cautious in their assessment, acknowledging that although destinations have come a long way since the first tourism developments on island, there was still a long way to go.

In general, hoteliers did not consider that there were many factors that would prevent them from managing present-day hazards. However, two barriers identified by hoteliers were 1) the dynamics of the event: “Our ability all depends upon the severity of the storm or the hurricane...” (PRI\_JA\_3, Hotelier, Jamaica) and whether or not enough lead time or notification (in the case of severe weather systems) was given to them by the local authorities to prepare: “Likewise with the hurricanes and the storms, once we get the bulletin, what we do is take down umbrellas and things that we know can blow away” (PRI\_TT\_3, Hotelier, Trinidad and Tobago). In addition, hoteliers do recognise that there are some things that are outside their experience or control that may affect their ability to respond to present climate-related hazards. One hotelier, for example, noted that although their hotel was well prepared: “...if there’s things that you haven’t forecasted then you might be in trouble ...” (PRI\_AB\_2, Hotelier, Antigua and Barbuda). That thought was echoed by another hotelier in Trinidad that noted that “...this is Nature and it’s not totally in our hands really....” (PRI\_TT\_6, Hotelier, Trinidad and Tobago). Both hoteliers were nevertheless confident that they were prepared.

For tourism policy-makers, the quality and efficiency of networks, coordination and respondent relations: “...we have to work together as one if we are going to ensure that the industry is sustainable....” (PUB\_AB\_8, Policy-maker, Antigua and Barbuda); and resource availability (human, financial and otherwise): “Our Association is limited to three people so as an Association we can do very little to help....” (PRI\_TT\_10, Industry association representative, Trinidad and Tobago) were key barriers. For example, many aspects associated with physical development are outside the direct ambit of the tourism portfolio and they must therefore “...reach out to the other Divisions and have them do the implementation...” (PUB\_TT\_5, Policy-maker, Trinidad and Tobago). Another tourism policy-maker in Trinidad (PUB\_TT\_1) thought that although there was good awareness and education among the respondent groups with which they work closely, “...it may not be enough... because Trinidad has a large coastal zone and we only have jurisdiction or activities in certain portions of it...”. Moreover, there were other respondent groups such as fishermen and local communities that could be better engaged, but the resources to carry out this work were limited. Overall, however, tourism policy-makers still rate their performance as “effective”: “...It has been effective. We have been... pretty much effective. We have a good working relationship with most...all of the Divisions on the island in terms of implementing and suggestions...” (PUB\_TT\_5, Policy-maker, Trinidad and Tobago), with the caveat that more work can still be done.

### **4.3 Experience with extreme events and disasters**

This Section examines the realisation of disaster risk. Eight extreme events and disasters were highlighted by respondents. Six of these events were related to hurricanes that dated as far back as Hurricane Charlie in 1951 and as recently as Hurricane Earl in 2010 (Table 4.3).

**Table 4.3 Respondent reports of disasters, extreme events and impacts**

Extreme event/disaster	Year	Destination affected
Hurricane Charlie	1951	Jamaica
Hurricane Gilbert	1988	Jamaica
Hurricane Hugo	1989	Antigua and Barbuda
Hurricane Luis	1995	Antigua and Barbuda
Hurricane Ivan	2004	Trinidad and Tobago
Rough seas	2008/9	Trinidad and Tobago
Hurricane Earl	2010	Antigua and Barbuda
Rainstorm	2010	Antigua and Barbuda

As Table 4.3 shows, according to respondents, there were eight memorable events over a sixty year timeline, an average of less than one memorable event per decade.

The agents of destruction most frequently reported were water damage, wind damage, coastal surge/inundation, beach erosion and excessive sediment deposits. Reports of moderate to major damage and/or loss were common at the level of the individual hotel. Damage and loss were structural and non-structural in nature (Table 4.4).

**Table 4.4 Respondent reports of types of damage and loss**

Category	Types of loss and damage
Structural	<ul style="list-style-type: none"> <li>• Property damage including loss of furniture, fallen fences, damage to roofs</li> <li>• Damage to surrounding areas and infrastructure</li> </ul>
Non-structural	<ul style="list-style-type: none"> <li>• Loss of property plants and fallen trees</li> <li>• Loss of beach</li> <li>• Damaged reefs</li> <li>• Loss of coastal vegetation</li> <li>• Perception of being closed for business after an extreme event or disaster by tourists</li> <li>• Tourism sites and beaches cut off by landslides*</li> </ul>

Note: \* This was only reported in Trinidad and Tobago.

Respondents' varied reports of damage and/or loss associated with these extreme events and disasters indicates that there is differential hazard impact contingent on the dynamics of the event (e.g., magnitude/size of the event, when, where), the natural operating environment (e.g., site attributes, geographical and climatic setting) and the property profile (particularly regarding the level of DRM measures that were already implemented at the time of hazard impact). For example, Hurricane Earl had differential impact on two hotels in Antigua and Barbuda (water damage to rooms as reported by PRI\_AB\_10, a manager of 181 room hotel versus environmental damage to the beach as reported by PRI\_AB\_9, the manager of a large hotel):

“...quite interestingly we have had major ...not devastation per say...we've had some damages from a few hurricanes in the past....my years of being here dates to four years



and as recent as last year we had a hurricane. I think it's Hurricane Earl which mainly gave us a lot of water damage in terms of flooding of rooms...." (PRI\_AB\_10, Hotelier, Antigua and Barbuda).

"We had for instance a hurricane last year. Hurricane Earl on 30 and 31 of August which took away about 75% of the beach that was there at the time..." (PRI\_AB\_9, Hotelier, Antigua and Barbuda).

In another example, Hurricane Ivan, severely affected hotels owned by two regional hotel chains in Jamaica (as reported by PRI\_JA\_3, a manager at a 250 room hotel) but caused minimal damage to a hotel in Trinidad and Tobago (as reported by PRI\_TT\_8, the owner/manager at a 31 room hotel):

"Let me think about it. Yes, Negril, Jamaica ... with ...Hurricane Ivan... they got affected really bad and it affected Sandals and Beaches hotels...the hotels themselves. It took them almost 4-5 months for them to come back because the property itself was really damaged by it and the coastline because of the tides, we couldn't see things for at least a week because the water, the level went so high..." (PRI\_JA\_3, Hotelier, Jamaica).

"In 2004, we had a situation with Tropical Storm Ivan where most of the damage was actually wind and rain. Although sea levels were a bit higher, we did not suffer damage..." (PRI\_TT\_8, Hotelier, Trinidad and Tobago).

This damage and loss translate into direct and indirect costs incurred because of hazard and disaster impact. Hoteliers commonly mentioned clean-up costs, as well as, financial resources spent on re-sanding and replenishing the beach. At the destination level, policy-makers reported that international tourists' perception of the destination being closed for business after an event, even when this was not the case, was a driver of further loss of national and business revenue. The impact of these events underscore the fact that coastal hotels are already at risk to climate-related hazards.

#### **4.4 Past adjustment behaviour**

To discern how prevalent the implementation of DRM was in the Caribbean coastal tourism context, five adjustment measures were examined quantitatively with hoteliers (Table 4.5). Four of these individual measures: 1) using artificial defence structures; 2) investing in the resistance of hotel buildings and infrastructure; 3) preparing or revising disaster plans; and 4) providing information about disaster response procedures to guests, were widely reported by respondents in the qualitative interviews as measures that fall within the Protection and Accommodation classification while one (offering guests guarantees of personal safety) was less widely reported but was relevant to the study context. These individual measures were combined into a composite measure that could then be related to other quantitative measures of determinants of engaging in DRM (such as climate risk perception). Alternatively, this composite measure provided a contextual measure that facilitates analysis of how the determinants interact to determine a particular behavioural outcome.

**Table 4.5 Descriptive statistics for hotelier past adjustment behaviour**

Items	Hoteliers		
	<i>N</i>	<i>M</i>	<i>SD</i>
<sup>a</sup> Used artificial defence structures (concrete walls, rock structures)	112	2.50	1.64
<sup>a</sup> Invested in the resistance of hotel buildings and infrastructure	105	3.18	1.57
<sup>a</sup> Prepared or revised disaster plans	116	3.71	1.33
<sup>a</sup> Offered guests guarantees of personal safety from natural disasters	110	2.65	1.67
<sup>a</sup> Provided information about disaster response procedures to guests	118	3.86	1.35
<sup>b</sup> <b>Total index of past adjustment behaviour</b>	<b>96</b>	<b>15.69</b>	<b>4.78</b>

Note: <sup>a</sup> Items measured on a 5-point Likert-type scale where 1 = never and 5 = all the time. <sup>b</sup> Composite variable made up of aggregate score of 5 items. Range from 5=low past adjustment behaviour to 25=high past adjustment behaviour. Higher scores indicate greater past adjustment behaviour.

Hoteliers' self-report of their past adjustment behaviour on these five DRM measures revealed that adjustment behaviour was only slightly above the midpoint of 15 ( $M=15.70$ ,  $SD=4.69$ ). Hoteliers already use artificial defence structures ( $M=2.5$ ,  $SD=1.64$ ), invest in the resistance of hotel buildings and infrastructure ( $M=3.18$ ,  $SD=1.57$ ), prepare or revise disaster plans ( $M=3.71$ ,  $SD=1.33$ ), offer guests guarantees of personal safety from disasters ( $M=2.65$ ,  $SD=1.67$ ), and provide information about disaster response procedures ( $M=3.86$ ,  $SD=1.35$ ). Mean scores reveal that using artificial defence structures (e.g., concrete walls and rock structures) and offering guests guarantees of personal safety from natural disasters are less frequently implemented measures than investing in the resistance of hotel buildings and infrastructure, preparing or revising disaster plans or providing information about disaster response procedures to guests. These quantitative results reinforced the qualitative findings which revealed that hoteliers already Protect and Accommodate.

## 4.5 Nature of antecedents to intention to engage in climate change adaptation

### 4.5.1 Future climate risk perception

The discussion of future climate risk perception is divided into four Sections: 1) perceptions of climate change, 2) perceptions of future changes in hazards including weather and extreme events due to climate change, 3) perceptions of future changes in vulnerability and exposure, and 4) perceptions of experience with a changing climate.

#### 4.5.1.1 Perceptions of climate change

All respondents display knowledge/awareness of climate change. Five areas of uncertainty and confusion were noted.

The first area of uncertainty was related to the nature of climate change or that it is happening:

“I’m sure most of us don’t know half. We might see something on TV that says “global....you know there’s global change...there’s climate change and something is happening” but we are not very sure...” (PRI\_AB\_10, Hotelier, Antigua and Barbuda)

“...Now I’m speaking as a total (*laughs*) non-scientific person. So, I am feeling well, ok fine, this is all part of the climate change thing...It may not be...” (PRI\_JA\_1, Industry association representative, Jamaica)

“So there are changes happening. What are there...what is affecting it? I cannot tell. I am not a scientist...” (PRI\_AB\_9, Hotelier, Antigua and Barbuda)

“...well if it all comes true...” (PRI\_AB\_6, Hotelier, Antigua and Barbuda)

Secondly, there was uncertainty about the dynamics of the phenomenon, particularly the effect that a change in climate will have on present-day severe weather and extreme events, as well as, new phenomenon such as sea level rise,

“...if it is proven that hurricanes will increase...” (PUB\_JA\_2, Policy-maker, Jamaica)

“A rise in sea level I guess would affect some of them somehow .....I don’t know how. I don’t know how significant the rise is. I don’t know enough about it to say...” (PRI\_TT\_10, Industry association representative, Trinidad and Tobago)

Thirdly, respondents displayed temporal uncertainty associated with the pace of change:

“...I believe that based on the rate and pace of sea level rise...I mean because we not sure, based on that uncertainty...” (PUB\_TT\_2, Policy-maker, Trinidad and Tobago).

Fourthly, there was confusion about whether climate change can be avoided:

“...the choices that you gave me are quite passive in a way because you’re not doing anything about global warming. So you’re saying it’s inevitable, it’s going to happen. Well that’s not what the scientists are saying. They’re saying if we carry on living the way we do, then it will happen but if we ... are trying to be more environmentally...you know cautious and aware we might avoid it...” (PRI\_AB\_2, Hotelier, Antigua and Barbuda)

Finally, respondents were uncertain about how climatic changes will impact the tourism industry:

“...We don’t know if increasing temperature in say Europe and North America will affect our winter tourist season ...if it will discourage visitors from coming and encourage them to stay within their own destinations because it will be a little bit warmer. We don’t know if this threshold of for comfort will be exceeded within the Caribbean and so making it hotter and visitors may not feel that is a comfortable situation for them to be in. We don’t know that yet so we can’t say if that will affect the sector...” (PUB\_JA\_2, Policy-maker, Jamaica)

These beliefs reflecting uncertainty and confusion by at least 8 of 27 respondents (the majority,  $n=7$ , attached to the private sector) have implications for perceptions of changes in hazards, vulnerability and exposure.

#### **4.5.1..2 Perceptions of future changes in hazards including weather and extreme events due to climate change**

Respondents identified ten changes in hazard frequency and intensity, as well as, other hazards as follows:

1. Sea level rise
2. Increase in temperature
3. Increase in beach erosion
4. Exacerbated drought
5. More frequent and intense events
6. More severe weather events, surges, inundation, floods
7. Increase in precipitation – “bad weather” generally, extreme rainfall, extreme weather patterns, floods
8. Multiple hits by severe weather systems
9. Increased land-based sediment discharges
10. Increased danger of unstable natural environment

#### **4.5.1..3 Perceptions of future changes in vulnerability and exposure**

Perceptions of changes in vulnerability (e.g., changes in capacity to keep tourists safe, the structural integrity of buildings and infrastructure) seem to be explicitly tied to changes in hazards and other environmental conditions.

Respondents mentioned inundation for hotels built at or below sea level being a problem going forward:

“It’s going to be a serious problem especially with the ocean level rising every year. It’s going to be a serious problem for this hotel because as far as I know the hotel is built below sea level...” (PRI\_AB\_4, Hotelier, Antigua and Barbuda).

“...because a lot of them are within the active beach zone, I think that the problems would be structure...they would be about the structural integrity of their property... if you have water coming into your building...coming into your foundation...it’s salt water. If this is happening more frequently... I think that if a guest comes to your hotel at a time when all of this is happening then just the fear that it would generate...you know that they wouldn’t want to come back to your property...” (PUB\_AB\_1, Policy-maker, Antigua and Barbuda).

“Well if it’s going to happen more, it’s just, it’s just going to destroy our place ...at least the front and then that will be an area that we are not going to be able to use and everything else will come with that you know...We’re not going to have business of the

restaurant and the rooms and...it's just depressing to think about that..." (PRI\_TT\_4, Hotelier, Trinidad and Tobago).

There was recognition of changes in hurricane occurrence and temperature increases impacting business:

"Whereas it might not be as serious today. I'm sure that in ...in a couple years, it will get more serious. I mean we've seen the rise of the hurricane season where people are predicting more active hurricane seasons as a result of the climate change. We're seeing that when it's hot, it's very hot. When we have rains, we have floods. So all of these things are things that are going to affect our business. Our business is based on sunshine unfortunately, and perfect weather and the beaches so anything that affects that is an issue to us and if not now...very soon..." (PRI\_JA\_5, Hotelier, Jamaica).

"I don't...think any hotel could really withstand multiple hits from a hurricane but given the forecast, the likelihood of more hurricanes gaining landform is becoming more possible and so that in itself is the greatest threat...in terms of climate change..." (PRI\_JA\_5, Hotelier, Jamaica).

When asked to evaluate how serious a problem climate change would be for the industry and how the challenges associated with climate change are different from the problems faced with hazards today, respondents generally fell into one of four categories.

Group 1 believed that climate change is a serious threat that will bring worse conditions:

"Well I would think that they would be more severe. I mean we have had hurricanes in the past. We have had floods in the past. We have had dry weather and soil erosion...we had...you know...all of that. But this clearly would be more widespread and ...all encompassing...basically. More widespread, severe ..." (PRI\_JA\_1, Industry association representative, Jamaica).

"...they're not much different but what will happen in the future is the frequency will increase.... the last 10 years we can't recall a direct hit. We've had skirmishes but not a direct hit... but if the frequency is predicted and comes true ...then, yeah, you might have 1 in 10 years and 2 in ten years. Now that is where the issue becomes critical for us..." (PRI\_JA\_5, Hotelier, Jamaica).

Group 2 thought that climate change challenges are comparable to challenges today:

"Well I may be wrong but...in terms of the economic impact...it is basically the same. In terms of the need for the country to prepare to mitigate those hazards, the necessity still arises but I think from a strict climate point of view what we are witnessing is one impacting on the other and causing sometimes new phenomenon to develop that at least we don't expect. So I don't think we can really isolate one from the other..." (PUB\_AB\_8, Policy-maker, Antigua and Barbuda).

Group 3 perceived that climate change is catastrophic and/or transformational:

“...I think in the long term, it’ll be a big opportunity...” (PRI\_JA\_6, Hotelier, Jamaica).

“I think climate change can definitely wreck the whole industry of tourism...” (PRI\_AB\_10, Hotelier, Antigua and Barbuda).

“I think it’s a very, very serious problem and if you were going on a scale of 1 to 10...1 the highest, I would rank it as a 1...” (PUB\_AB\_1, Policy-maker, Antigua and Barbuda).

Finally, Group 4 displayed climate change apathy and/or ignorance:

“Well you see ...it’s not being recognised as a threat and because it’s not being recognised as a threat, I don’t know if they will choose to react or do anything now....because they don’t see a need right now...possibly...” (PRI\_TT\_10, Industry association representative, Trinidad and Tobago).

“I’m not sure....Because I’ve never really investigated it. I’ve never done any research on it” (PRI\_TT\_3, Hotelier, Trinidad and Tobago).

“I haven’t seen anything like that so I wouldn’t be able to say you know...if I haven’t seen any high waves and really egress onto the property...” (PRI\_TT\_7, Chief Hotel Engineer, Trinidad and Tobago).

Group 1 represented the majority of respondents.

The language used to describe future expectations of loss or damage associated with climate change (“depressing to think about it”, “it’s sad”, “destroy our place”, “lost”, “serious problem”) reflects respondents’ feelings of worry regarding the largely perceived negative impact of climate change on their plant, infrastructure and business.

Most respondents thought that climate change was a serious or very serious problem believing that the coastal operating environment is becoming or will become more adverse as a result of it. This is a source of worry for them. A largely negative inventory of future hazard expectations suggests that respondents are sufficiently aware of climate change and worried by it to act. This result supports Affect being a key component of the composite construct of climate risk perception specifically with regard to climate change.

#### **4.5.1..4 Perceptions of experience with a changing climate**

Respondents’ perceptions of the timeline associated with climate change can be used as a proxy for their perceptions of experience with a changing climate. Two distinct groups were apparent.

Group 1 which represented the majority of respondents believed that climate change is happening now:

“Climate change is a reality – you see its effects everyday – abnormal weather patterns etc...” (PRI\_TT\_8, Hotelier, Trinidad and Tobago).

“... given the fact that these reefs are under threat because of the same climate change and the rise in temperature where you saw either 2 or 3 years ago where we had the massive coral bleaching...” (PUB\_TT\_5, Policy-maker, Trinidad and Tobago).

“...we’ve seen the effects already...” (PRI\_JA\_1, Industry association representative, Jamaica).

Group 2 believed that climate change will happen in the future:

“Whereas it might not be as serious today. I’m sure that ....in a couple years, it will get more serious” (PRI\_JA\_5, Hotelier, Jamaica).

“Yeah...we’re probably sitting pretty for a while...” (PUB\_AB\_3, Policy-maker, Antigua and Barbuda).

#### **4.5.2 Attitude towards engaging in climate change adaptation**

When measured quantitatively hoteliers<sup>8</sup> ( $M=5.85$ ,  $SD=1.48$ ), and policy-makers<sup>9</sup> ( $M=6.62$ ,  $SD=0.67$ ) were unanimously of the opinion that there is a need to adapt to climate change. This quantitative result was in line with hoteliers’ and policy-makers’ high positive attitude towards CCA, which was considered worthwhile by the majority, with doing little to nothing rejected as being ineffective. The majority of respondents generally thought that doing little to nothing was “...not a choice for us” (PRI\_AB\_9, Hotelier, Antigua and Barbuda). CCA planning was considered to be worthwhile. Doing little to nothing was perceived as “foolish” and “dangerous”: “Well that’s always dangerous. In my view, if you do nothing, and something happens, you just could be wiped out...” (PUB\_AB\_3, Policy-maker, Antigua and Barbuda). Doing nothing was likened to “...effectively waiting for a disaster to happen...” (PRI\_AB\_2, Hotelier, Antigua and Barbuda). Generally, respondents felt strongly about taking action: “...I cannot just sit down and let everything fall down...” (PRI\_TT\_4, Hotelier, Trinidad and Tobago). They prefer to “work with knowledgeable people” and “take preventative measures” because “...if we do nothing, we’re going to end up with nothing....to be able to showcase to our guests” (PRI\_JA\_6, Hotelier, Jamaica).

Doing little to nothing was also perceived as ineffective “...given the closeness of most hotels to the coast...” (PUB\_TT\_5, Policy-maker, Trinidad and Tobago). It is also a costly option: “...doing nothing is definitely not an alternative... The cost of doing nothing is also too high” (PUB\_JA\_2, Policy-maker, Jamaica). As one hotelier explained, doing nothing did not address the threat to the very survival of the property and the employees that depend on coastal hotels:

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<sup>8</sup> Measured on a 7-point Likert-type scale.

<sup>9</sup> Measured on a 7-point Likert-type scale.

“...if you are made aware of a situation and you know it’s going to affect your 216 rooms and your little over a hundred employees...I know that surely you would want to jump in and get something done in order to protect and you know sustain (this)...” (PRI\_AB\_10, Hotelier, Antigua and Barbuda).

A minority commented that doing little to nothing was the easiest option and for some, it may be the only option that they have. One policy-maker in Antigua and Barbuda (PUB\_AB\_1), for example, suggested that “based on the financial situation of many (hoteliers)... they would opt for this...”. This may also be a default position adopted by hoteliers in Trinidad and Tobago due to low risk perception associated with climate change, low salience of climate change, climate change apathy or ignorance.

Adapting to climate change is generally seen as necessary for survival and there is evidence of a positive attitude amongst most respondents. One industry association executive noted:

“.....I would say definitely there is greater consciousness, greater understanding and acceptance that this is a problem that will affect us in the future and that we do need to do something about it...” (PRI\_JA\_1, Industry association representative, Jamaica).

At the same time, respondents are ambivalent about how they will adapt to climate change. This ambivalence seems to be driven by uncertainty about what to do or indecisiveness about how best to adapt: “...The problem is really sort of concerted action...” (PRI\_JA\_1, Industry association representative, Jamaica). Specifically, this respondent who is an industry association representative identified leadership on the issue of climate change as a concern:

“...I think climate change for the government is still something that they talk about but I don’t know what they’ve done and I don’t know what plan is in place so we can only take steps that appear to us to be practical to mitigate the impact...” (PRI\_JA\_4, Hotelier, Jamaica).

#### **4.5.1 Perceptions of social pressure to engage in climate change adaptation**

In general, there was evidence of perceptions of social pressure to engage in CCA with respondents indicating that the same groups of important referents that approve of them adjusting to present-day climate-related extremes and disasters would also approve of them adapting to climate change. Interestingly, hoteliers and policy-makers consider each other to be important referents. In fact, in at least one case, hoteliers were an especially influential referent group for policy-makers. One Trinidad and Tobago policy-maker (PUB\_TT\_1) noted: “...another thing that’s driving the Ministry to move into a more strategic approach to climate change is the calls from the sector itself in how to deal with these types of crisis...”. Local and international visitors remain a very important referent group for hoteliers as do Government and its ministries and agencies, environmental NGOs and community groups.

Tourism policy-makers believe that hoteliers, politicians, other government policy-makers and the general public will approve of them assisting the industry to adapt to climate change.



As in their response to a similar question on climate-related hazards, policy-makers did not explicitly identify local or international guests as a key referent group.

Some respondents were of the view that there potentially were individuals or groups that would discourage or disapprove of them preparing for and responding to climate change impacts. Groups mentioned were environmental lobbyists, some members of the public, particularly “Citizens who are not fully informed of the situation...” (PRI\_TT\_6, Hotelier, Trinidad and Tobago); and “...guests who are not environmentally conscious” (PRI\_TT\_6, Hotelier, Trinidad and Tobago). Policy-makers on the other hand identified developers or interest groups, particularly those that may have an environmentally controversial tourism development project in the pipeline, and fishermen:

“...I can’t think of a group off-hand except the fishermen because I’m not sure if they understand what we’d be talking about in terms of... they might not see ... that we’re trying to protect our village as opposed to stopping them from doing things...” (PUB\_TT\_2, Policy-maker, Trinidad and Tobago).

From PRI\_AB\_4’s (a hotelier in Antigua and Barbuda) comment, the same may be true of hoteliers.

#### **4.5.2 Perceptions of self-efficacy to engage in climate change adaptation**

Respondents are generally confident that for now they are prepared and can deal with climate-related impacts. However, there is recognition that these impacts may get worse and they may experience difficulties in the future. When asked for a self-evaluation of their ability to deal with the impacts of climate change, at least two respondents thought that the response to this question was situational while another two respondents could not offer an answer. Of the remaining responses, the majority of respondents (both hoteliers and policy-makers) indicated that they were less than confident. It was apparent that respondents’ perceptions of self-efficacy seemed to shift slightly lower when thinking about climate change:

“...I think that climate change and as a hotel...it’s not something that we can do on our own. We need to probably foster with other government organisations and people like yourself who understand ...to come in and make us more aware and educate us....” (PRI\_AB\_10, Hotelier, Antigua and Barbuda).

There is an expectation of leadership by Government: “You know the Government probably needs to...I don’t know if they have a plan for how they propose to go about dealing with the climate change thing” (PRI\_JA\_1, Industry association representative, Jamaica). Collective action in dealing with climate change is preferred:

“...collectively .... been working on a plan to see how we plan for the future in terms of protecting the environment and protecting ourselves from these hazards such as a hurricane and so forth but that I guess will come out in the future so as a group what our response will be...”(PRI\_JA\_5, Hotelier, Jamaica).

“...we readily want to work with tourism counterparts with whatever is planned...”  
(PRI\_TT\_6, Hotelier, Trinidad and Tobago).

Hoteliers’ responses revealed that they are less confident about preparing for and responding to climate change than they are about preparing for and responding to present-day climate-related hazards. Hoteliers expect that the Government will: 1) formulate and lead a response and 2) partner with them in responding to climate change. One hotelier in Trinidad and Tobago (PRI\_TT\_4) asked: “... how do you go about it? How do you...where do you get the help to do all those things?, while a hotelier in Antigua and Barbuda (PRI\_AB\_10) admitted: “...in order for us to act on it positively... partnering would definitely be the first and better way forward...”. For some hoteliers, Government guidance about how best to adapt to the impacts of climate change may stimulate greater action:

“...if today let’s say, if they (Government policy-makers) suggest to the hotel.. “ok you do xyz to prevent the soil erosion or the beach erosion...”, the hotel will definitely do because it’s in their interest. So we will do anything to make it happen so that we still have we still call [ourselves] a beachfront property instead of calling it a seafront property... but it still it has to be properly guideline to us what and how it can be done and where it can be done, and what is the possible scenario and of course everything is the cost and the budget but of course we as a hotel in our own benefit and in our own benefit for our guest, we will definitely agree to that suggestion...”( PRI\_JA\_3, Hotelier, Jamaica).

Some are already accustomed to partnering with Government. For example, one hotelier in Tobago (PRI\_TT\_3) explained: “...We will have to go to them because every time when we see the erosion we normally go to them...”.

In contrast to their response to this question for present-day climate-related risk, hoteliers identified a number of barriers that would prevent them from adapting to climate change including cost: “...Finances. That’s the first thing...” (PRI\_AB\_4, Hotelier, Antigua and Barbuda); the necessary manpower (PRI\_TT\_4, Hotelier, Trinidad and Tobago) to adapt, as well as, insurmountable environmental challenges described by one respondent in this way: “...if Nature throws an unusual bag of calamity with variables you could never imagine” (PRI\_TT\_8, Hotelier, Trinidad and Tobago). Hoteliers also identified a number of factors that would facilitate their adaptation process. Greater awareness and education based on more information provided by authorities; information on how sea level rise “may affect my coastline or the... island coastline” (PRI\_AB\_9, Hotelier, Antigua and Barbuda); climate change monitoring and response projects and programmes; additional hard structures (breakwalls, seawalls); an increased focus on preparedness; and tax concessions and interest free loans to “bonafide hoteliers” for building adaptations that require significant capital were facilitating factors mentioned. In addition, working in collaboration with other hotels on the same coastline that may be similarly affected was thought to be good because “... at the end of the day everybody is going to be affected...” (PRI\_TT\_4, Hotelier, Trinidad and Tobago).

Policy-makers thought that a clear national climate change policy; increased resources, in particular in the form of finances and human resources in relevant Government Departments; institutional strengthening (e.g., training); more research and data to inform processes and more decision management tools were facilitators of their work with the industry on climate

change issues. Education was also identified as key, particularly by industry association representatives: “Well first of all, let us start with education...which as I’ve said ...we have started but still there needs to be more and it probably needs to be more systematic...” (PRI\_JA\_1, Industry association representative, Jamaica).

Industry association representatives do not feel conversant in climate change science:

“What we...from our point of view...what the Association does is facilitate education so if it were to become a concern or somebody in the Association would express a need then for education, we would facilitate the process. We would find the correct people to inform them, find the correct people to train them...” (PRI\_TT\_10, Industry association representative, Trinidad and Tobago).

A key barrier that was identified was that tourism policy-makers cannot help the industry to adapt in isolation. As one policy-maker in Jamaica made clear:

“...our ability to help the sector is really tied to how well we partner with other Agencies of Government who have the direct remit for certain areas that we do not. So for example, sea defence is not the Ministry’s responsibility but we can collaborate with the responsible Agency...” (PUB\_JA\_2).

Policy-maker responses similarly emphasised their inability to give guidance and advice to the industry. For example, tourism policy-makers expressed the need for more studies on the type of physical responses that would be appropriate to respond to a changing climate: “... we don’t have the studies available on what is the right sides, type and placement of the structure...” (PUB\_TT\_2, Policy-maker, Trinidad and Tobago).

## **4.6 Structure of antecedents to intention to engage in climate change adaptation**

This Section describes the structure of climate risk perception, attitude, subjective norm, perceived behavioural control – the variables that are hypothesised to be antecedents to engage in CCA. ‘Structure’ refers to the way in which the complex constructs of climate risk perception, attitude, subjective norm, perceived behavioural control are arranged to form a whole. The descriptive statistics for each construct is first presented followed by the results of statistical tests (Student’s t tests, ANOVAs, MANOVAs) to determine whether there are significant differences in the levels of these variables.

### **4.6.1..1 Climate risk perception**

Based on the findings of the qualitative interviews which showed that certain hazards were key, three environmental threats were hypothesised to pose a risk to tourism businesses now and in the future: 1) coastal erosion, 2) hurricanes, and 3) sea level rise. These threats were examined as two composites, namely as ‘present climate risk perception’ and ‘future climate risk perception’, as well as, individually. Table 4.6 shows the means and standard deviations for individual items, as well as, the two composites of climate risk perception.

**Table 4.6 Means and standard deviations for hotelier and policy-maker climate risk perception**

<sup>a</sup> Items	Hoteliers			Policy-makers		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
<sup>b</sup> As far as I know, coastal erosion poses a risk	122	5.33	1.80	38	6.16	1.22
<sup>b</sup> As far as I know, hurricanes pose no risk (Reverse scored)	124	5.91	1.63	38	6.61	0.76
<sup>b</sup> As far as I know, sea level rise poses a risk	123	5.32	1.71	37	5.89	1.56
<sup>b</sup> I worry about the risk that coastal erosion poses	122	5.08	1.75	38	5.82	1.23
<sup>b<sup>c</sup></sup> I do not worry about the risk that hurricanes pose (Reverse scored)	122	5.87	1.52	38	6.26	1.18
<sup>b</sup> I worry about the risk that sea level rise poses	121	5.08	1.69	38	5.84	1.39
<sup>d</sup> <b>Total present climate risk perception</b>	<b>117</b>	<b>32.68</b>	<b>7.00</b>	<b>37</b>	<b>36.54</b>	<b>5.86</b>
<sup>b</sup> As far as I know, changes to the frequency and severity of coastal erosion as a result of CC will pose no risk	120	5.28	1.65	38	6.18	1.06
<sup>b</sup> As far as I know, changes to the frequency and severity of hurricanes as a result of CC will pose a risk	119	5.76	1.38	38	5.55	1.88
<sup>b</sup> As far as I know, sea level rise as a result of climate change will pose no risk (Reverse scored)	120	5.40	1.54	38	6.50	0.73
<sup>b</sup> I worry about the risk that changes to the frequency and severity of coastal erosion as a result of CC poses	118	5.24	1.56	38	6.03	0.92
<sup>b<sup>c</sup></sup> I do not worry about the risk that changes to the frequency and severity of hurricanes as a result of CC poses (Reverse scored)	119	5.50	1.60	37	6.22	0.98
<sup>b<sup>c</sup></sup> I do not worry about the risk that sea level rise as a result of CC poses (Reverse scored)	118	5.25	1.72	37	5.95	1.31
<sup>e</sup> <b>Total future climate risk perception</b>	<b>115</b>	<b>32.61</b>	<b>7.19</b>	<b>37</b>	<b>36.35</b>	<b>4.66</b>
<sup>f</sup> <b>Total climate risk perception</b>	<b>113</b>	<b>65.20</b>	<b>13.96</b>	<b>36</b>	<b>72.86</b>	<b>9.90</b>

Note: <sup>a</sup> See Appendices G and H for full copies of the questionnaires. <sup>b</sup> Items measured on a 7-point Likert-type scale where 1= Strongly disagree and 7= Strongly agree. <sup>c</sup> Reverse scored <sup>d</sup> Composite variable made up of aggregate score of 6 items. Range from 6 = low present CRP to 42 = high present CRP. Higher scores indicate higher perceived knowledge and worry for risk posed by hazards at the present time <sup>e</sup> Composite variable made up of aggregate score of 6 items. Range from 6 = low future CRP to 42 = high future CRP. Higher scores indicate higher perceived knowledge and worry for risk posed by hazards in the next 15 years <sup>f</sup> Composite variable made up of aggregate score of 12 items. Range from 12 = low total CRP to 84 = high total CRP. Higher scores indicate higher total CRP for present and future hazards.

*Hypothesis 1.1.1: There is a significant difference between Present and Future CRP for hoteliers and policy-makers.*

Results from paired samples *t* tests revealed that this hypothesis is not supported for hoteliers and policy-makers. For hoteliers, results indicate that there is no evidence of a significant difference between Present CRP ( $M=32.89, SD=6.93$ ) and Future CRP ( $M=32.68, SD=7.221$ ),  $t(111) = 0.518, p=0.605$ . For policy-makers, there is also no evidence of a significant difference between Present CRP ( $M=36.58, SD=5.940$ ) and Future CRP ( $M=36.28, SD=4.70$ ),  $t(35) = 0.449, p=0.656$ .

*Hypothesis 1.1.2: There is a significant difference in the levels of Present and Future CRP between hoteliers and policy-makers.*

Two independent samples *t* tests were run. The results showed that there is a statistically significant difference for both Present CRP,  $t(71.22) = -3.323; p = 0.001$  and Future CRP,  $t(94.93) = -3.676; p<0.0005$  between hoteliers and policy-makers. Policy-makers have significantly higher Present CRP ( $M=36.54, SD=5.862$ ) and Future CRP ( $M=36.35, SD=4.656$ ) than hoteliers' Present CRP ( $M=32.68, SD=6.993$ ) and Future CRP ( $M=32.61, SD=7.199$ ).

Next, the composite variables of Present and Future climate risk perception were further examined at the item level to determine whether there are significant differences between groups regarding perceived knowledge and worry of the risk posed by present and future coastal erosion, hurricanes and sea level rise.

Twelve independent samples *t* tests were performed to test for significant difference in the levels of perceived knowledge and worry of the risk posed by present and future coastal erosion, hurricanes and sea level rise between hoteliers and policy-makers. Significant differences between these two groups were confirmed as follows (Table 4.7):

**Table 4.7 Significant *t* test results for perceived knowledge and worry of the risk posed by coastal erosion, hurricanes and sea level rise**

Variables	Hoteliers		Policy-makers		Mean difference	<i>p</i> value	Comparison
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
<sup>a</sup> Knowledge – present coastal erosion	5.33	1.80	6.16	1.22	-0.830*	0.002	Hot < Pol
<sup>a</sup> Knowledge – present hurricanes	5.91	1.63	6.61	0.76	-0.694*	0.000	Hot < Pol

Variables	Hoteliers		Policy-makers		Mean difference	p value	Comparison
	M	SD	M	SD			
<sup>a</sup> Knowledge – future coastal erosion	5.28	1.65	6.18	1.06	-0.901*	0.000	Hot < Pol
<sup>a</sup> Knowledge – future sea level rise	5.40	1.54	6.50	0.73	-1.100*	0.000	Hot < Pol
<sup>a</sup> Worry – future coastal erosion	5.24	1.56	6.03	0.92	-0.789*	0.000	Hot < Pol
<sup>a</sup> Worry – future hurricanes	5.50	1.60	6.22	0.98	-0.712*	0.001	Hot < Pol

Note: <sup>a</sup> Equal variances not assumed \* *t* value significant at  $p < 0.0042$  level (2 tailed).

Hoteliers have significantly lower levels of perceived knowledge of the risk posed by present-day coastal erosion and hurricanes than policy-makers. They also have significantly lower levels of perceived knowledge about the risk posed by future coastal erosion and sea level rise, as well as, lower levels of perceived worry about future coastal erosion and hurricanes.

#### **4.6.1..2 Attitude, subjective norm and perceived behavioural control**

A summary table showing the means and standard deviations for attitude, subjective norm, and perceived behavioural control to use the PARD strategies to adapt to climate change is presented in Table 4.8.

**Table 4.8 Means and standard deviations of attitude, subjective norm, perceived behavioural control and intention for the PARD strategies for hoteliers and policy-makers**

Strategy	Variables/Items	Hoteliers			Policy-makers		
		N	M	SD	N	M	SD
Protection strategy	<sup>a</sup> Attitude:	<b>96</b>	<b>12.57</b>	<b>4.16</b>	<b>30</b>	<b>15.40</b>	<b>3.65</b>
	<sup>b</sup> Using Approach A would be bad practice (Reverse scored)	98	4.12	1.725	31	5.06	1.526
	<sup>b</sup> Using Approach A would be effective	101	4.29	1.571	33	5.21	1.244
	<sup>b</sup> Using Approach A would be necessary	99	4.20	1.732	32	5.09	1.376
	<sup>a</sup> Subjective norm:	<b>98</b>	<b>12.36</b>	<b>3.88</b>	<b>32</b>	<b>14.89</b>	<b>3.80</b>
	<sup>b</sup> Hotel guests would not expect my hotel/organisation to use/support the use of Approach A (Reverse scored)	100	3.95	1.566	33	5.15	1.326
	<sup>b</sup> International tour operators would think that my hotel/organisation should use/support the use of Approach A	101	4.17	1.594	33	4.97	1.287
	<sup>b</sup> Government policy-makers/hoteliers would approve of my hotel/my organisation using/supporting the use of Approach A	99	4.15	1.541	32	4.81	1.635
	<sup>a</sup> Perceived behavioural control:	<b>100</b>	<b>11.89</b>	<b>3.12</b>	<b>29</b>	<b>11.00</b>	<b>3.66</b>
	<sup>b</sup> Using Approach A is entirely up to the management team at my hotel/organisation	102	4.41	1.842	31	2.87	1.928
	<sup>b</sup> Using Approach A would not be feasible (Reverse scored)	101	4.24	1.662	30	5.07	1.507
	<sup>b</sup> Using Approach A would be easy	100	3.24	1.545	31	2.87	1.565
	<sup>a</sup> Intention:	<b>98</b>	<b>12.31</b>	<b>4.396</b>	<b>31</b>	<b>15.61</b>	<b>3.27</b>
	<sup>b</sup> I intend to support the use of Approach A	100	4.18	1.737	33	5.24	1.275
	<sup>b</sup> I expect that my hotel/organisation will use/support the use of Approach A	100	3.99	1.599	32	4.72	1.373
<sup>b</sup> I do not want my hotel/organisation to use/support the use of Approach A (Reverse scored)	101	4.04	1.928	31	5.68	1.492	
Accommodation strategy	<sup>a</sup> Attitude:	<b>94</b>	<b>14.40</b>	<b>3.42</b>	<b>30</b>	<b>17.33</b>	<b>2.23</b>
	<sup>b</sup> Using Approach B would be bad practice (Reverse scored)	96	5.03	1.432	30	6.10	1.094
	<sup>b</sup> Using Approach B would be effective	96	4.96	1.368	30	5.67	.844
	<sup>b</sup> Using Approach B would be necessary	95	4.40	1.560	30	5.57	.971

Strategy	Variables/Items	Hoteliers			Policy-makers		
		N	M	SD	N	M	SD
	<sup>a</sup> <b>Subjective norm:</b>	<b>93</b>	<b>13.94</b>	<b>3.83</b>	<b>30</b>	<b>15.87</b>	<b>2.69</b>
	<sup>b</sup> Hotel guests would not expect my hotel/organisation to use/support the use of Approach B (Reverse scored)	94	4.49	1.550	30	5.77	1.073
	<sup>b</sup> International tour operators would think that my hotel/organisation should use/support the use of Approach B	94	4.72	1.477	30	5.00	1.462
	<sup>b</sup> Government policy-makers/hoteliers would approve of my hotel using Approach B	96	4.75	1.338	30	5.10	1.517
	<sup>a</sup> <b>Perceived behavioural control:</b>	<b>95</b>	<b>12.44</b>	<b>3.13</b>	<b>30</b>	<b>11.43</b>	<b>2.66</b>
	<sup>b</sup> Using Approach B is entirely up to the management team at my hotel/organisation	96	4.66	1.776	30	2.73	1.721
	<sup>b</sup> Using Approach B would not be feasible (Reverse scored)	95	4.46	1.405	30	5.43	1.524
	<sup>b</sup> Using Approach B would be easy	95	3.35	1.655	30	3.27	1.574
	<sup>a</sup> <b>Intention:</b>	<b>91</b>	<b>13.30</b>	<b>4.28</b>	<b>28</b>	<b>16.79</b>	<b>2.38</b>
	<sup>b</sup> I intend to support the use of Approach B	96	4.48	1.661	29	5.52	1.122
	<sup>b</sup> I expect that my hotel/organisation will use/support the use of Approach B	94	4.22	1.660	28	5.00	1.491
	<sup>b</sup> I do not want my hotel/organisation to use/support the use of Approach B (Reverse scored)	93	4.70	1.516	28	6.21	.876
<b>Retreat strategy</b>	<sup>a</sup> <b>Attitude:</b>	<b>91</b>	<b>11.52</b>	<b>3.35</b>	<b>29</b>	<b>15.34</b>	<b>3.62</b>
	<sup>b</sup> Using Approach C would be bad practice (Reverse scored)	95	3.98	1.550	29	5.45	1.478
	<sup>b</sup> Using Approach C would be effective	91	4.04	1.541	29	4.93	1.580
	<sup>b</sup> Using Approach C would be necessary	93	3.42	1.664	29	4.97	1.349
	<sup>a</sup> <b>Subjective norm:</b>	<b>93</b>	<b>9.85</b>	<b>3.58</b>	<b>29</b>	<b>13.48</b>	<b>4.37</b>
	<sup>b</sup> Hotel guests would not expect my hotel/organisation to use/support the use of Approach C (Reverse scored)	95	2.98	1.810	29	4.48	1.682
	<sup>b</sup> International tour operators would think that my hotel/organisation should use/support the use of Approach C	93	3.15	1.459	29	4.17	1.814
	<sup>b</sup> Government policy-makers/hoteliers would approve of my hotel/organisation using/supporting the use of Approach C	95	3.71	1.508	16	5.25	1.125
	<sup>a</sup> <b>Perceived behavioural control:</b>	<b>91</b>	<b>10.14</b>	<b>3.96</b>	<b>26</b>	<b>11.42</b>	<b>3.04</b>
	<sup>b</sup> Using Approach C is entirely up to the management team at my hotel/organisation	94	4.03	2.050	28	3.18	1.827
	<sup>b</sup> Using Approach C would not be feasible (Reverse scored)	93	3.49	1.948	29	5.31	1.228
	<sup>b</sup> Using Approach C would be easy	92	2.68	1.722	27	2.85	1.433



Strategy	Variables/Items	Hoteliers			Policy-makers		
		N	M	SD	N	M	SD
	<sup>a</sup> <b>Intention:</b>	<b>92</b>	<b>9.16</b>	<b>4.26</b>	<b>29</b>	<b>15.69</b>	<b>3.22</b>
	<sup>b</sup> I intend to support the use of Approach C	94	3.15	1.691	30	5.20	1.157
	<sup>b</sup> I expect that my hotel/organisation will use/support the use of Approach C	95	2.75	1.720	29	4.62	1.613
	<sup>b</sup> I do not want my hotel/organisation to use/support the use of Approach C (Reverse scored)	93	3.29	1.845	29	5.90	1.047
Diversification strategy	<sup>a</sup> <b>Attitude:</b>	<b>93</b>	<b>13.62</b>	<b>3.42</b>	<b>28</b>	<b>17.29</b>	<b>2.54</b>
	<sup>b</sup> Using Approach D would be bad practice (Reverse scored)	93	4.78	1.552	29	6.17	.928
	<sup>b</sup> Using Approach D would be effective	94	4.59	1.425	29	5.48	1.153
	<sup>b</sup> Using Approach D would be necessary	95	4.31	1.415	28	5.50	1.036
	<sup>a</sup> <b>Subjective norm:</b>	<b>92</b>	<b>12.14</b>	<b>3.96</b>	<b>29</b>	<b>14.38</b>	<b>4.62</b>
	<sup>b</sup> Hotel guests would not expect my hotel/organisation to use/support the use of Approach D (Reverse scored)	94	4.00	1.600	29	5.10	1.566
	<sup>b</sup> International tour operators would think that my hotel/organisation should use/support the use of Approach D	94	3.80	1.643	29	4.83	1.605
	<sup>b</sup> Government policy-makers/hoteliers would approve of my hotel/organisation using/supporting the use of Approach D	92	4.43	1.470	29	5.07	1.486
	<sup>a</sup> <b>Perceived behavioural control:</b>	<b>92</b>	<b>12.35</b>	<b>3.56</b>	<b>29</b>	<b>12.07</b>	<b>3.13</b>
	<sup>b</sup> Using Approach D is entirely up to the management team at my hotel/organisation	93	4.29	1.897	29	3.07	1.999
	<sup>b</sup> Using Approach D would not be feasible (Reverse scored)	93	4.59	1.576	29	5.86	1.093
	<sup>b</sup> Using Approach D would be easy	93	3.49	1.646	29	3.14	1.274
	<sup>a</sup> <b>Intention:</b>	<b>92</b>	<b>12.28</b>	<b>4.20</b>	<b>29</b>	<b>16.59</b>	<b>2.72</b>
	<sup>b</sup> I intend to support the use of Approach D	94	4.17	1.591	29	5.48	1.056
	<sup>b</sup> I expect that my hotel/organisation will use/support the use of Approach D	93	3.69	1.581	29	5.28	1.306
<sup>b</sup> I do not want my hotel/organisation to use/support the use of Approach D (Reverse scored)	93	4.43	1.684	29	5.83	1.311	

Note: <sup>a</sup> Composite variable made up of aggregate score of 3 items. Range from 3=negative attitude, low subjective norm, low perceived behavioural control and low intention to 21=positive attitude, high subjective norm, high perceived behavioural control and high intention. Higher scores indicate more positive attitude, subjective norm, perceived behavioural control and intention

<sup>b</sup> Items rated on a 7-point Likert-type scale where 1 = Strongly disagree and 7 = Strongly agree.

*Hypothesis 1.1.3: There are significant differences in the attitudes, subjective norm, perceived behavioural control and intentions of hoteliers and policy-makers using the PARD strategies to adapt to climate change.*

The results of sixteen independent samples *t* tests reported in Table 4.9 confirmed several statistically significant differences in attitudes, subjective norms and intentions for the Protection, Accommodation, Retreat and Diversification strategies between hoteliers and policy-makers. Eleven of the 16 tests showed a statistically significant difference.

**Table 4.9 Means, standard deviations and significant *t* test results for attitude, subjective norm, perceived behavioural control and intention for hoteliers and policy-makers for the PARD strategies**

Strategy	Variable	Hoteliers		Policy-makers		Mean difference	<i>p</i> value	Comparison
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Protection	<sup>a</sup> ATT	12.82	4.283	15.24	4.073	-2.827*	0.001	Hot < pol
	<sup>a</sup> SN	12.54	3.950	14.33	3.929	-2.612*	0.001	Hot < pol
	<sup>a</sup> IN	12.33	4.525	15.24	3.491	-3.307*	<0.0005	Hot < pol
Accommodation	<sup>b</sup> ATT	14.38	3.594	17.48	1.965	-2.929*	<0.0005	Hot < pol
	<sup>b</sup> IN	13.32	4.577	16.43	2.441	-3.489*	<0.0005	Hot < pol
Retreat	<sup>a</sup> ATT	11.61	3.342	15.86	3.454	-3.828*	<0.0005	Hot < pol
	<sup>a</sup> SN	10.01	3.474	13.57	4.621	-3.633*	<0.0005	Hot < pol
	<sup>b</sup> IN	9.21	4.209	15.90	3.434	-6.527*	<0.0005	Hot < pol
Diversification	<sup>a</sup> ATT	13.97	3.246	17.43	2.204	-3.662*	<0.0005	Hot < pol
	<sup>a</sup> SN	12.39	4.054	15.05	3.324	-2.859*	0.001	Hot < pol
	<sup>a</sup> IN	12.32	4.295	16.67	2.745	-4.304*	<0.0005	Hot < pol

Note: <sup>a</sup> Equal variances assumed <sup>b</sup> Equal variances not assumed \* *t* value significant at *p* < 0.003 level (2 tailed).

Generally, hoteliers have significantly lower attitudes, subjective norm and intention regarding the Protection, Retreat and Diversification strategies than policy-makers.

For the Accommodation strategy, hoteliers' attitude and intentions are significantly different with hoteliers having lower attitude and intention levels than policy-makers. However, there is no significant difference in the subjective norm levels between hoteliers and policy-makers for the Accommodation strategy.

There is no evidence of significant differences in PBC between hoteliers and tourism policy-makers for any of the PARD strategies. This may be attributed to the broad definition of the

PBC construct. Although significant differences exist at the level of individual items, at the composite level, the variance of individual items may have cancelled out.

In all cases, hoteliers have significantly lower intentions to implement the PARD strategies. An examination of the determinants of behavioural intention can begin to offer an explanation of why hoteliers and policy-makers have different levels of intention to engage in protective behaviour.

#### **4.7 Function of antecedents to intention to engage in climate change adaptation**

This Section presents the findings of an investigation into the function of the climate risk perception, attitude, subjective norm and perceived behavioural control constructs. 'Function' refers to the characteristic behaviour of each construct in relation to and as part of the larger group of constructs in the extended TPB model. This is accomplished through an analysis of the relative significance of the main constructs in the extended regression model that tests the traditional TPB constructs in addition to Present and Future climate risk perception.

To begin, a table (Table 4.10) summarising inter-correlations among these variables is first presented.

**Table 4.10 Means, standard deviations and inter-correlations among extended TPB variables for the PARD strategies for hoteliers and policy-makers**

Variables	Protection						Accommodation						Retreat					Diversification														
	M	SD	1	2	3	4	5	6	M	SD	1	2	3	4	5	6	M	SD	1	2	3	4	5	M	SD	1	2	3	4	5		
Hoteliers	1. IN	12.31	4.396	1					13.30	4.283	1						9.16	4.256	1						12.28	4.202	1					
	2. PCRP	32.68	6.993	.158	1				32.68	6.993	.101	1					32.68	6.993	-.191	1					32.68	6.993	-.019		1			
	3. FCRP	32.61	7.161	.093	<b>.809**</b>	1			32.61	7.161	.102	<b>.809**</b>	1				32.61	7.161	-.071	<b>.809**</b>	1				32.61	7.161	.068	<b>.809**</b>	1			
	4. ATT	12.57	4.162	<b>.805**</b>	.078	.110	1		14.40	3.421	<b>.816**</b>	.154	.152	1			11.52	3.345	<b>.685**</b>	.083	.250*	1			13.62	3.423	<b>.624**</b>	.032	.056	1		
	5. SN	12.36	3.883	<b>.756**</b>	.086	.027	<b>.718**</b>	1	13.94	3.830	<b>.856**</b>	.037	.034	<b>.761**</b>	1	9.85	3.575	<b>.756**</b>	.011	.072	<b>.712**</b>	1	12.14	3.955	<b>.829**</b>	.005	.073	<b>.681**</b>	1			
	6. PBC	11.89	3.120	<b>.533**</b>	-.135	.118	<b>.364**</b>	<b>.416**</b>	1	12.44	3.134	<b>.563**</b>	-.023	.004	<b>.422**</b>	<b>.488**</b>	1	10.14	3.957	<b>.699**</b>	-.110	-.056	<b>.463**</b>	<b>.515**</b>	1	12.35	3.556	<b>.716**</b>	-.003	.066	<b>.538**</b>	<b>.714**</b>
Policy-makers	1. IN	15.61	3.273	1					16.79	2.378	1						15.69	3.219	1						16.59	2.719	1					
	2. PCRP	36.54	5.862	.009	1				36.54	5.862	.431*	1					36.54	5.862	.486**	1					36.54	5.862	.119		1			
	3. FCRP	36.35	4.656	.114	<b>.729**</b>	1			36.35	4.656	.459*	<b>.729**</b>	1				36.35	4.656	.520**	<b>.729**</b>	1				36.35	4.656	.115	<b>.729**</b>	1			
	4. ATT	15.40	3.645	<b>.777**</b>	-.048	.077	1		17.33	2.233	<b>.536**</b>	.247	.204	1			15.34	3.618	<b>.822**</b>	.337	.445*	1			17.29	2.537	<b>.604**</b>	.164	.241	1		
	5. SN	14.97	3.496	<b>.793**</b>	.039	.142	<b>.764**</b>	1	15.87	2.688	<b>.701**</b>	.419*	.315	.433*	1	13.48	4.372	<b>.633**</b>	<b>.589**</b>	.400*	.479**	1	15.00	4.009	<b>.652**</b>	-.145	-.188	<b>.568**</b>	1			
	6. PBC	11.00	3.655	<b>.795**</b>	-.001	.010	<b>.630**</b>	<b>.660**</b>	1	11.43	2.661	.494**	.015	.000	.294	.240	1	11.42	3.035	.446*	-.325	-.164	.472*	.184	1	12.07	3.127	.243	-.415*	-.279	-.067	.202

Note: The number of cases range from  $N= 91$  to  $117$  for hoteliers and  $N= 26$  to  $37$  for policy-makers depending on missing data. \*Correlation in bold is significant with Bonferroni correction ( $p \leq 0.00333$ ) (2-tailed).  $M$ =Mean,  $SD$ =Standard deviation. IN = Intention, PCRP = Present climate risk perception, FCRP = Future climate risk perception, ATT = Attitude, SN = Subjective norm, PBC = Perceived behavioural control

*Hypothesis 1.1.4: There is a significant linear relationship between hoteliers' and policy-makers' intentions to adapt using the PARD strategies, and their attitudes, subjective norm, perceived behavioural control and climate risk perception.*

Eight multiple regressions were run – one for each PARD strategy for hoteliers and policy-makers respectively (Table 4.11).

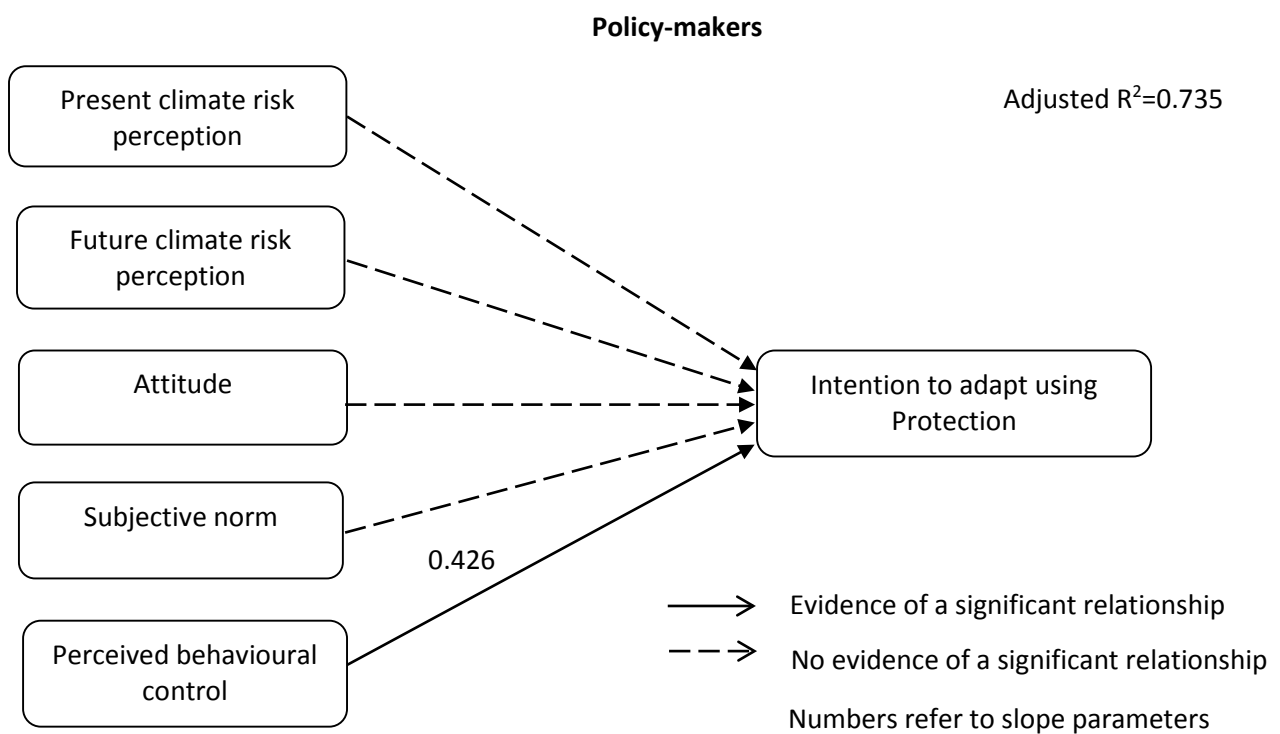
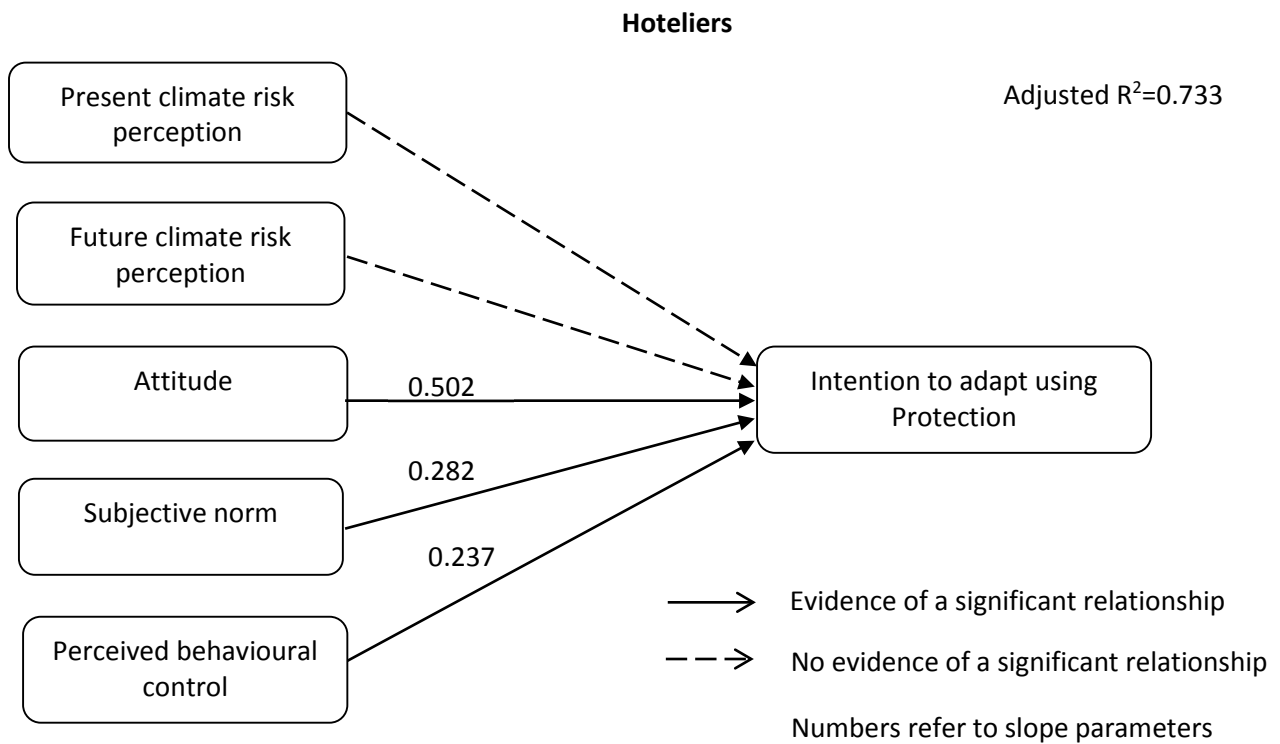
**Table 4.11 Multiple linear regression results of hotelier and policy-maker intentions to adapt to climate change using the PARD strategies**

		Protection	Accommodation	Retreat	Diversification
Predictors		$\beta$	$\beta$	$\beta$	$\beta$
Hoteliers	Present CRP	0.182	-0.041	-0.121	-0.052
	Future CRP	-0.141	0.050	-0.057	0.041
	ATT	0.502*	0.375*	0.258*	0.097
	SN	0.282*	0.500*	0.448*	0.596*
	PBC	0.237*	0.151*	0.319*	0.226*
	Adjusted $R^2$	0.733	0.818	0.771	0.703
	$F (df_N, df_D)$	46.012 (5,77)	74.579(5,77)	55.397(5,76)	41.188(5,80)
Policy-makers	Present CRP	-0.056	-0.074	0.135	0.256
	Future CRP	0.076	0.337	0.098	0.025
	ATT	0.263	0.215	0.543*	0.354
	SN	0.297	0.469*	0.232	0.408*
	PBC	0.426*	0.332*	0.207	0.316
	Adjusted $R^2$	0.735	0.670	0.785	0.504
	$F (df_N, df_D)$	15.442 (5,21)	11.956 (5,22)	19.306 (5,20)	6.279 (5,21)

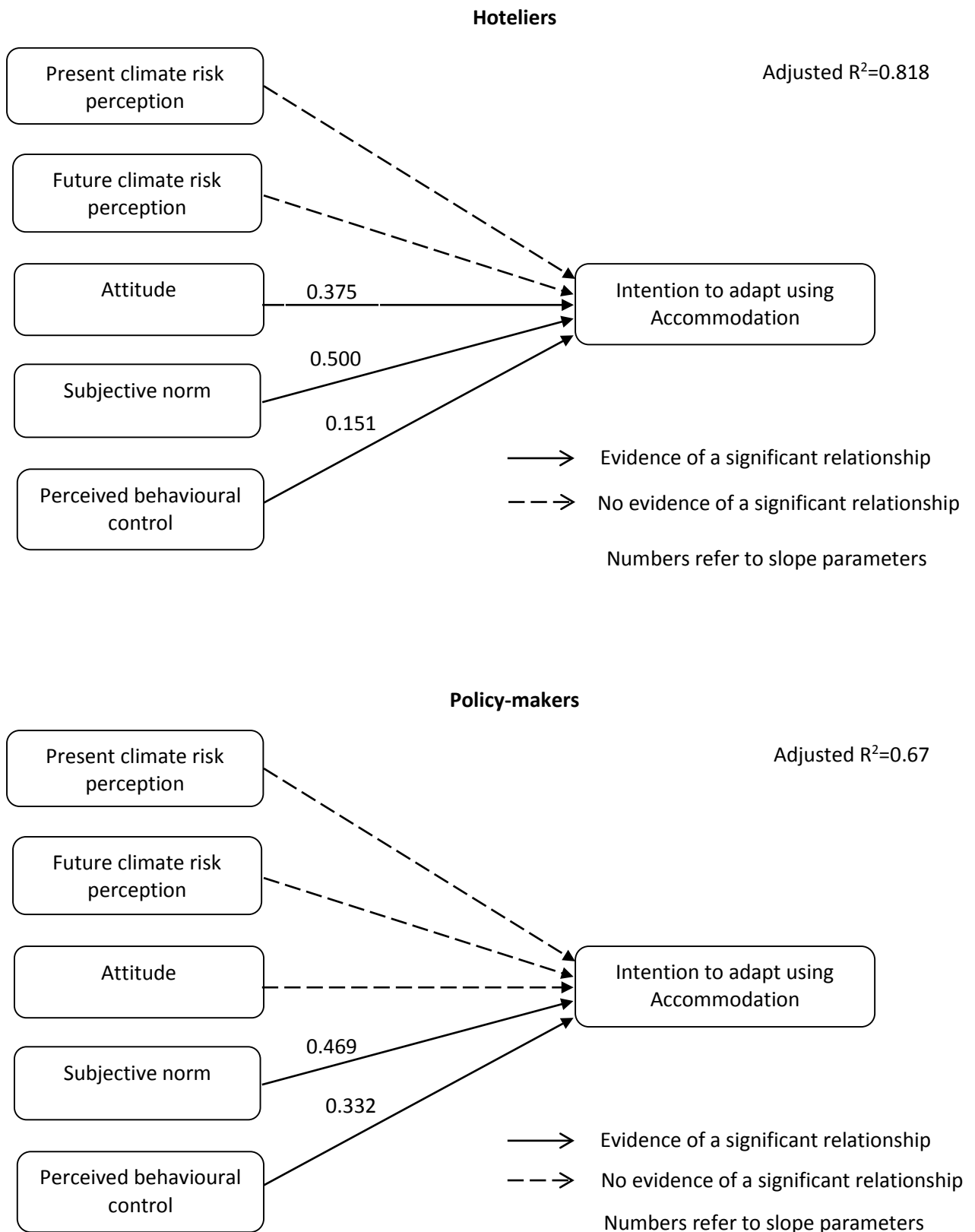
Note: The number of cases range from N= 82 to 86 for hoteliers and N = 26 to 28 for policy-makers depending on missing data.  $\beta$  = standardised coefficient \* $\beta$  significant at  $p \leq 0.05$  level.

Figures 4.1-4.4 schematically depict the relative contribution of these factors to hotelier and policy-maker intentions. An examination of the individual  $\beta$  of each contributing factor revealed that for hoteliers, attitude contributed most significantly to intention to adapt using Protection followed by subjective norm and perceived behavioural control respectively. For policy-makers, perceived behavioural control was the only significant predictor of intention to adapt using the Protection strategy. In relation to the Accommodation strategy, subjective norm contributed most significantly followed by attitude and perceived behavioural control for hoteliers. For policy-makers, subjective norm was the more significant predictor followed by perceived behavioural control. For the Retreat strategy, hoteliers' subjective norm was the most significant predictor followed by perceived behavioural control and attitude. Policy-makers' attitude was the only significant predictor of intention to adapt using Retreat. Hoteliers' intention to adapt using the Diversification strategy was most significantly predicted by subjective norm followed by perceived behavioural control while subjective norm was the only significant predictor of intention to adapt using Diversification for policy-makers.

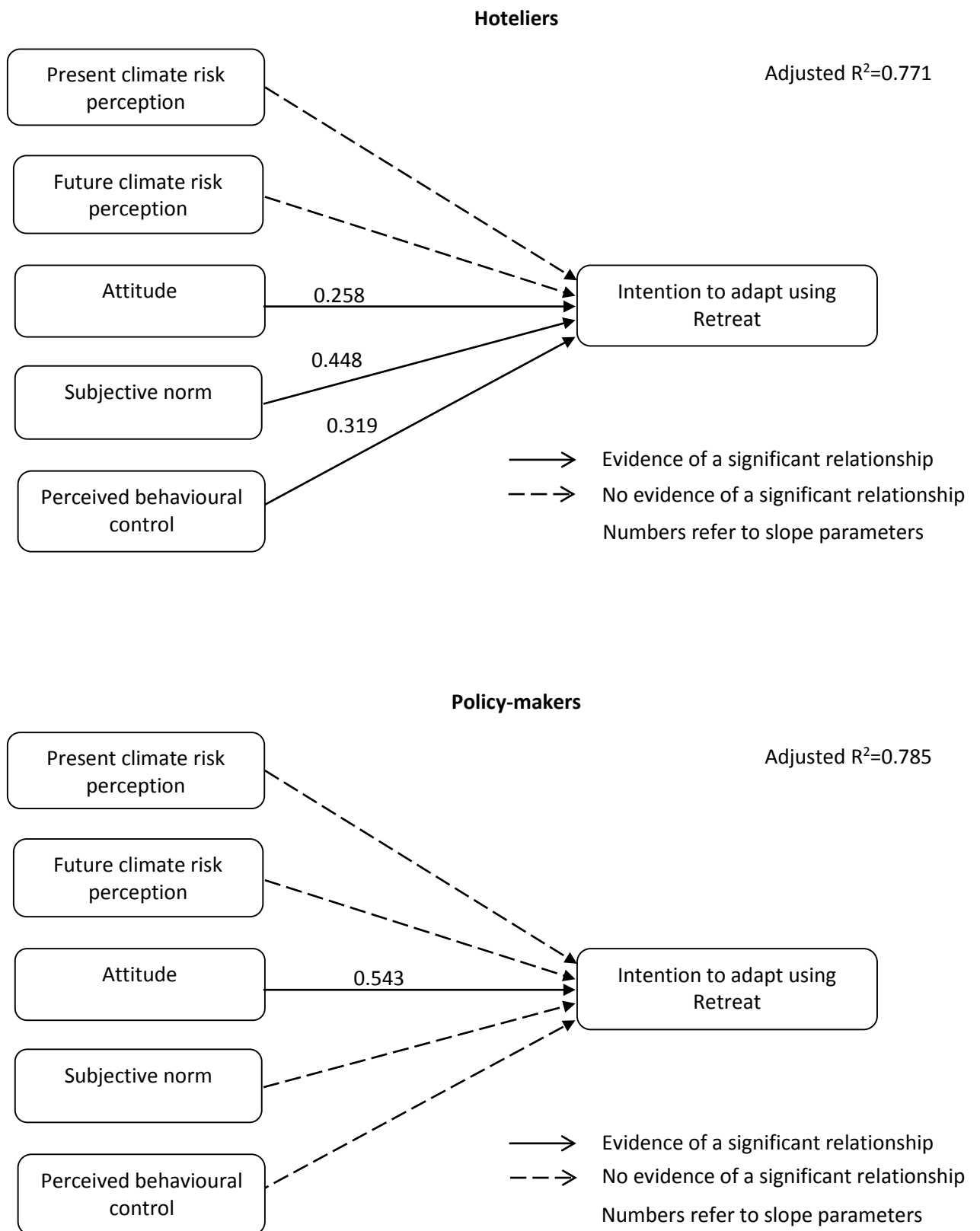
**Figure 4.1 Relative significance of factors contributing to hoteliers' and policy-makers' intention to adapt using the Protection strategy**



**Figure 4.2 Relative significance of factors contributing to hoteliers' and policy-makers' intention to adapt using the Accommodation strategy**

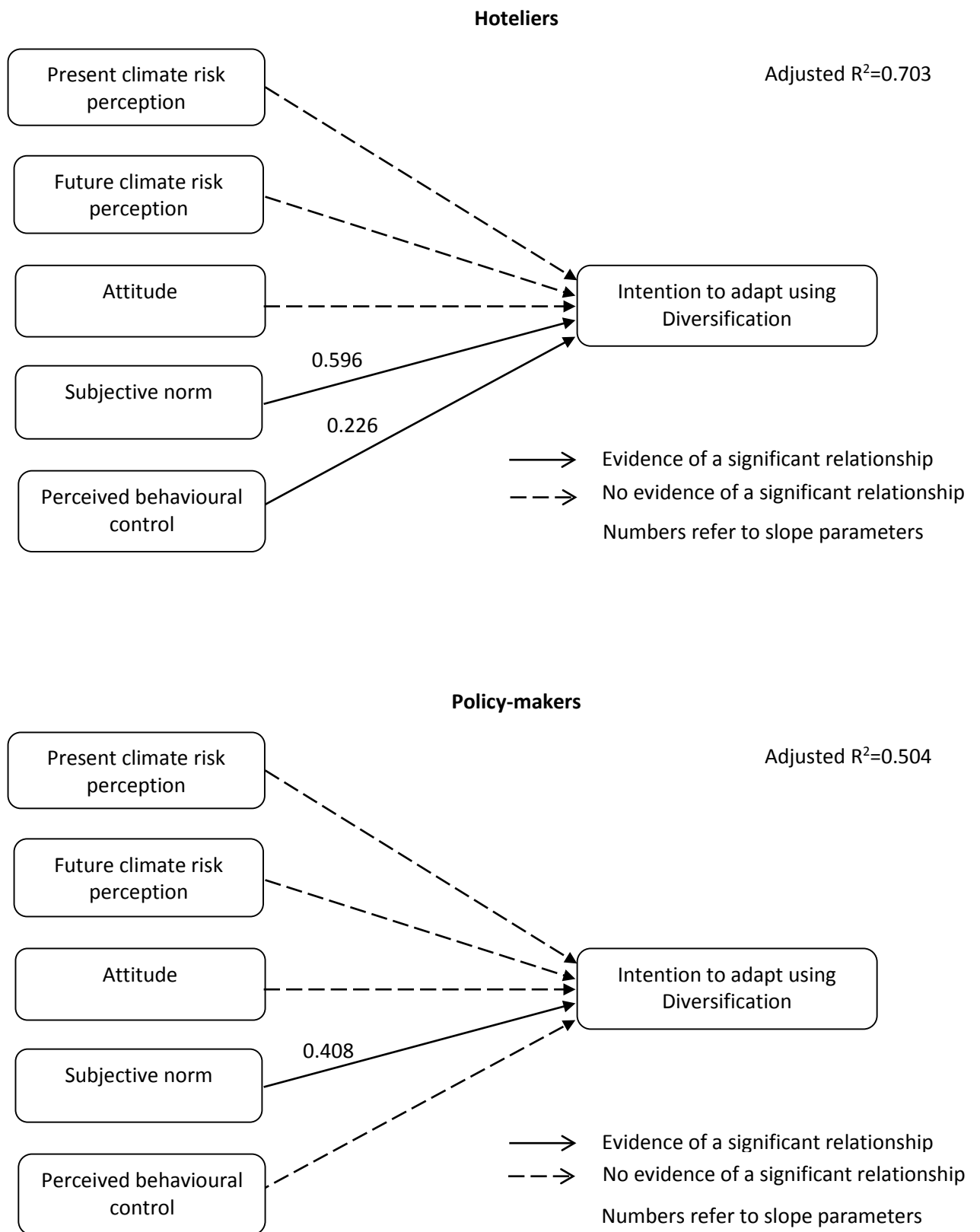


**Figure 4.3 Relative significance of factors contributing to hoteliers' and policy-makers' intention to adapt using the Retreat strategy**





**Figure 4.4 Relative significance of factors contributing to hoteliers' and policy-makers' intention to adapt using the Diversification strategy**



Of the eight regressions, six of these were driven by the subjective norm construct, that is, subjective norm was: 1) the most significant predictor of intention (with the lowest  $p$ -values), and 2) had the largest betas (slope). Subjective norm is an especially good predictor in the case of hoteliers where it is significant in all four multiple regression analyses, whereas it was only significant for two of the four regressions run for policy-makers.

Whilst not as powerful as subjective norm, attitude and perceived behavioural control are also significant predictors for the PARD strategies, especially in the case of hoteliers. All of the significant beta values are positive, indicating that where relevant, an increase in attitude, subjective norm or perceived behavioural control will lead to an increase in intention to adapt using the respective PARD strategies. It is interesting to note that present and future climate risk perception was not a significant predictor of intention to adapt using any of the PARD strategies for hoteliers and policy-makers in any of the eight regression models.

*Hypothesis 1.5: There are significant differences in hoteliers' and policy-makers' perceptions of social pressure (subjective norm) to use the PARD strategies to adapt to climate change.*

Since the multiple regression analysis showed that subjective norm was the most significant predictor of intention, twenty-four follow-up independent samples  $t$  tests (twelve for hoteliers and twelve for policy-makers respectively) were run to test whether there are significant differences in hoteliers' and policy-makers' perceptions of social pressure regarding the use of the PARD strategies. The results confirmed several statistically significant differences between the groups as follows (Table 4.12):

**Table 4.12 Significant independent samples  $t$  test results of group differences in perceptions of the approval of important referents to use the PARD strategies**

Strategy	Variables		$M$	$SD$		$M$	$SD$	Mean difference	$p$ value	Comparison
Protection	<sup>a</sup> Guests	Hot	3.95	1.566	Pol	5.15	1.326	-1.202	<0.0005	Hot<pol
Accommodation	<sup>b</sup> Guests	Hot	4.49	1.550	Pol	5.77	1.073	-1.277	<0.0005	Hot<pol
Retreat	<sup>a</sup> Guests	Hot	2.98	1.810	Pol	4.48	1.682	-1.504	<0.0005	Hot<pol
	<sup>a</sup> Tour operators	Hot	3.15	1.459	Pol	4.17	1.814	-1.022	0.002	Hot<pol
	<sup>a</sup> Pol /hot	Hot	3.71	1.508	Pol	4.83	1.513	-1.122	0.001	Hot<pol
Diversification	<sup>a</sup> Guests	Hot	4.00	1.600	Pol	5.10	1.566	-1.103	0.001	Hot<pol
	<sup>a</sup> Tour operators	Hot	3.80	1.643	Pol	4.83	1.605	-1.030	0.004	Hot<pol

Note: \* Mean differences significant with Bonferroni correction ( $p \leq 0.0042$ ) (2 tailed) <sup>a</sup> Equal variances assumed.

<sup>b</sup> Equal variances not assumed

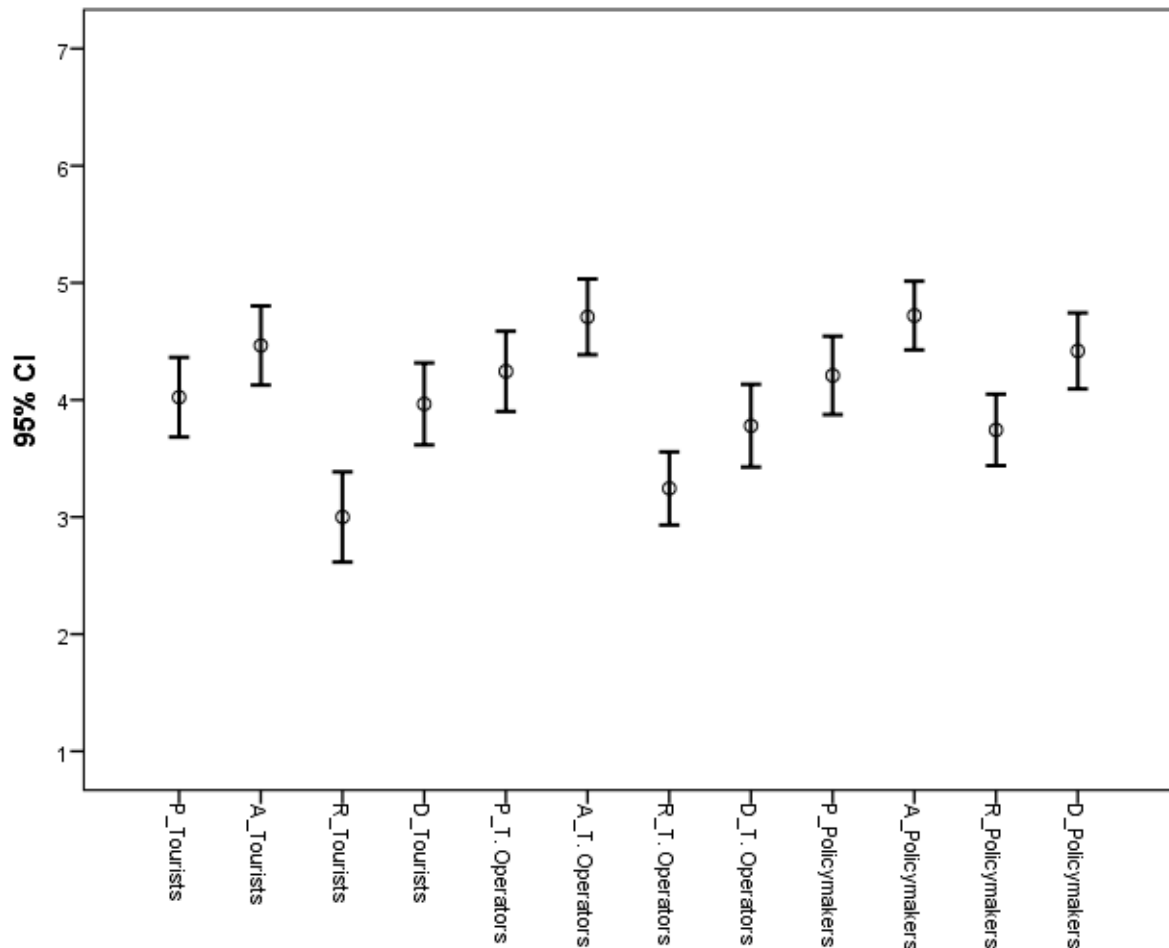
Hoteliers have a significantly lower perception than policy-makers that hotel guests will expect them to use the Protection, Accommodation, Retreat and Diversification strategies to adapt to climate change. Likewise, hoteliers have a significantly lower perception than policy-makers that international tour operators will approve of using the Retreat and Diversification strategies to adapt to climate change. Hoteliers have a significantly lower perception than policy-makers that policy-makers will approve of hoteliers using the Retreat strategy than policy-makers have of hoteliers expecting policy-makers to support hoteliers to use Retreat.

Table 4.13 presents the means and confidence intervals for perceptions of social pressure from important referents for the PARD strategies across hoteliers and policy-makers.

**Table 4.13 Means and confidence intervals of perceptions of social pressure from important referents to use the PARD strategies**

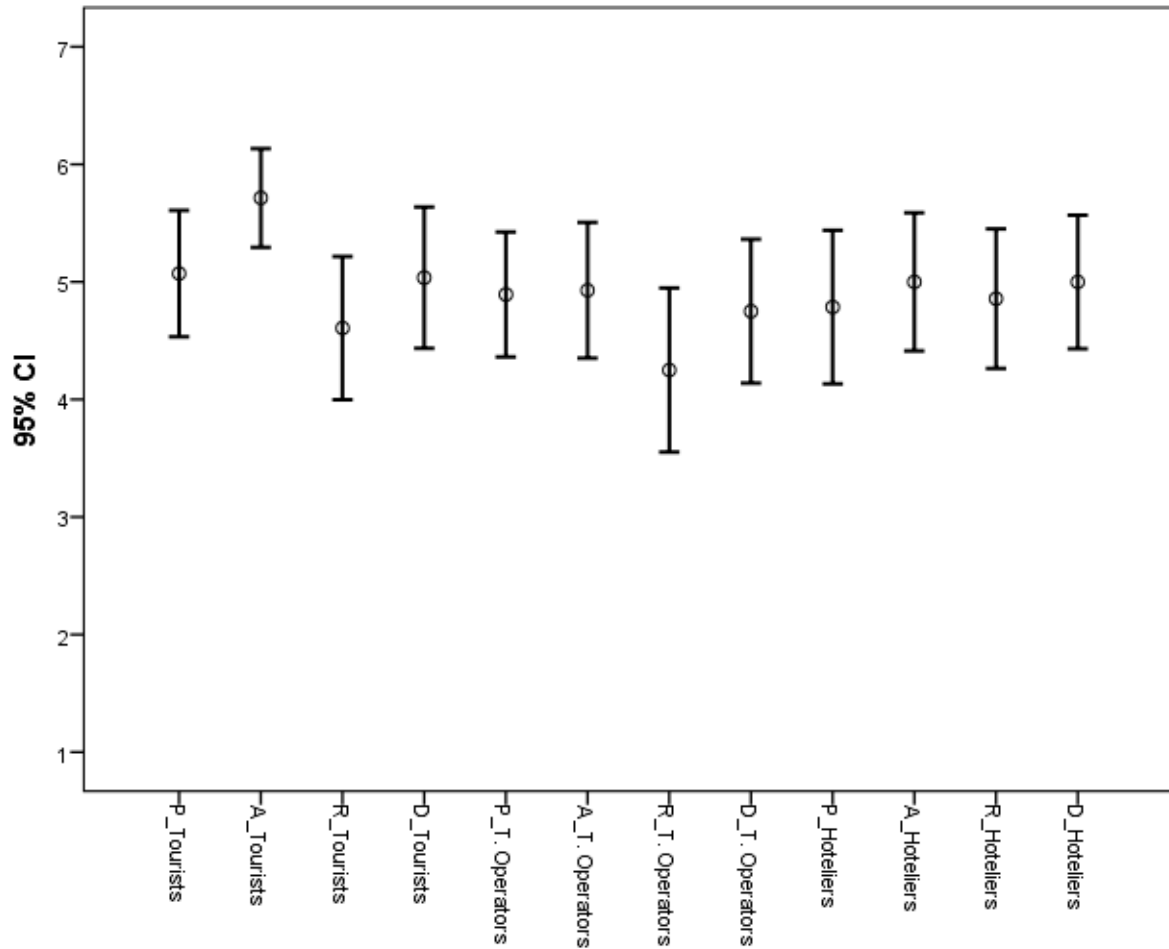
Strategy	Important referent group	Hoteliers			Policy-makers		
		<i>M</i>	95% confidence interval of the difference		<i>M</i>	95% confidence interval of the difference	
			Lower	Upper		Lower	Upper
Protection	<sup>c</sup> Guests	3.95	3.64	4.26	5.15	4.68	5.62
	<sup>c</sup> International tour operators	4.17	3.85	4.48	4.97	4.51	5.43
	<sup>c</sup> Government policy-makers/hoteliers	4.15	3.84	4.46	4.81	4.22	5.40
Accommodation	<sup>c</sup> Hotel guests	4.49	4.17	4.81	5.77	5.37	6.17
	<sup>c</sup> International tour operators	4.72	4.42	5.03	5.00	4.45	5.55
	<sup>c</sup> Government policy-makers/hoteliers	4.75	4.48	5.02	5.10	4.53	5.67
Retreat	<sup>c</sup> Hotel guests	2.98	2.61	3.35	4.48	3.84	5.12
	<sup>c</sup> International tour operators	3.15	2.85	3.45	4.17	3.48	4.86
	<sup>c</sup> Government policy-makers/hoteliers	3.71	3.40	4.01	4.83	4.25	5.40
Diversification	<sup>c</sup> Hotel guests	4.00	3.67	4.33	5.10	4.51	5.70
	<sup>c</sup> International tour operators	3.80	3.46	4.13	4.83	4.22	5.44
	<sup>c</sup> Government policy-makers/hoteliers	4.43	4.13	4.74	5.07	4.50	5.63

Error plots illustrating the above were developed for hoteliers (Figure 4.5) and policy-makers (Figure 4.6). Looking across the three groups in Figure 4.5, hoteliers do not perceive large differences in how tourists, tour operators and policy-makers view the PARD strategies. They think that the three groups view the PARD strategies largely the same. However, as the error plots show, hoteliers do that think tourists and tour operators dislike Retreat.



**Figure 4.5 95% Confidence intervals for hotelier perceptions of social pressure to use the PARD strategies**

As Figure 4.6 shows, for policy-makers, almost all referent groups are above the midpoint of 4. They are generally optimistic about the perceptions of tourists, tour operators and hoteliers. For example, they think that tourists and tour operators are neutral regarding Retreat; that hoteliers are equally positive about all four PARD strategies. However, they also think that tourists think significantly higher of Accommodation than Retreat.



**Figure 4.6 95% Confidence intervals for policy-maker perceptions of social pressure to use the PARD strategies**

*H 1.1.6: There is a significant linear relationship between hoteliers' past adjustment behaviour and 1) present climate risk perception, and 2) future climate risk perception.*

Finally, the surprising non-significant result of CRP's relationship with intentions to engage in CCA was the basis for testing whether CRP is at all related to protective behaviour in the Caribbean coastal tourism context.

To examine whether there is a significant linear relationship between hoteliers' past adjustment behaviour and present and future climate risk perception, two simple linear regressions were performed, each with PAB as the response variable.

The results for Present CRP revealed that it is significantly related to Past Adjustment Behaviour,  $\beta = 0.253$ ,  $t(89) = 2.469$ ,  $p = 0.015$ . Present CRP explains approximately 5.4% of the variance in PAB scores, adjusted  $R^2 = 0.054$ ,  $F(1, 89) = 6.097$ ,  $p = 0.015$ .

Future CRP is also significantly related to Past Adjustment Behaviour,  $\beta = 0.228$ ,  $t(89) = 2.207$ ,  $p = 0.03$ . Future CRP explains approximately 4.1% of the variance in PAB scores, adjusted  $R^2 = 0.041$ ,  $F(1, 89) = 4.87$ ,  $p = 0.03$ .

## Summary of significant associations

The significant associations between variables for suppliers are summarised in Table 4.14.

**Table 4.14 Significant associations between variables for hoteliers and policy-makers**

	Strategy/ measure	Associated variables	Evidence of a relationship	
			Hoteliers	Policy-makers
DRM	Various measures	Present climate risk perception and past adjustment behaviour	Yes	-
		Future climate risk perception and past adjustment behaviour	Yes	-
		Attitude and past adjustment behaviour	-	-
		Subjective norm and past adjustment behaviour	-	-
		Perceived behavioural control and past adjustment behaviour	-	-
CCA	Protection	Present climate risk perception and intention	No	No
		Future climate risk perception and intention	No	No
		Attitude and intention	Yes	No
		Subjective norm and intention	Yes	No
		Perceived behavioural control and intention	Yes	Yes
	Accommodation	Present climate risk perception and intention	No	No
		Future climate risk perception and intention	No	No
		Attitude and intention	Yes	No
		Subjective norm and intention	Yes	Yes
		Perceived behavioural control and intention	Yes	Yes
	Retreat	Present climate risk perception and intention	No	No
		Future climate risk perception and intention	No	No
		Attitude and intention	Yes	Yes
		Subjective norm and intention	Yes	No
		Perceived behavioural control and intention	Yes	No
Diversification	Present climate risk perception and intention	No	No	
	Future climate risk perception and intention	No	No	
	Attitude and intention	No	No	
	Subjective norm and intention	Yes	Yes	
	Perceived behavioural control and intention	Yes	No	

## 4.8 Adjustment search

### 4.8.1 Range of disaster risk management measures

The previous Section made clear that respondents believed that the hazards that affect them most frequently were coastal erosion, severe storms including hurricanes, storm surge and coastal flooding. Section 4.8.1 examines respondents' adjustment choices in response to the range of hazards that affect them. The next Section, Section 4.8.2 examines respondents' adjustment choices in response to climate change.

## **Research question 1.2: What is the size, composition and range of suppliers' DRM and CCA adjustment awareness sets?**

Previous studies (Becken et al., 2014) have found it useful to classify disaster risk management measures implemented by the tourism industry along the International PPRR (Prevention, Preparedness, Response and Recovery) framework. The PPRR approach is in line with Faulkner's Tourism Disaster Management Framework (2001) and has therefore been 'tested' for the tourism context. Although the PPRR has been criticised for the implied clear delineation between the phases in a disaster (Cronstedt, 2002), and its inability to engage with the structural aspects of vulnerability, particularly those related to issues of poverty (Wisner et al., 2004; Wisner et al., 2012), it is nevertheless considered to be a useful heuristic device and framework for structuring the inventory of DRM measures in the sophisticated business context of Caribbean coastal tourism where actors are assumed to have the know-how and resources to address aspects of their vulnerability.

When asked what were the possible things that management can do to prepare for and respond to the hazards that affect the coastline, a large range of DRM measures were reported by respondents. The majority of respondents spoke affirmatively by referring to measures that they have already implemented or are actively implementing. The only exception was a policy-maker in Antigua and Barbuda (PUB\_AB\_3) who indicated: "We're not engineers....so we'd have to seek professional advice ...". For this analysis therefore, it is appropriate to conceptualise the DRM measures identified in Table 4.15 as Past Adjustment Behaviour.

Approximately 77 measures grouped under nine categories were identified. Thirty-two of these measures were readily classified along the four categories traditionally associated with the PPRR Framework, while 45 were classified under categories that do not fall within the PPRR categories:

1. Framework for development,
2. Networks, coordination and stakeholder relations,
3. Research,
4. Awareness raising, education, training, outreach and advocacy, and
5. Environmental management.

In addition, 54 measures were classified as DRR and 23 classified as DM measures (Table 4.15):

**Table 4.15 DRM measures identified by hoteliers and policy-makers in three Caribbean SIDS**

Category	Measures reported by hoteliers	Measures reported by policy-makers
1. Framework for development		<ol style="list-style-type: none"> <li>1. Legislation</li> <li>2. Regulations</li> <li>3. Development control measures and standards (e.g., coastal setbacks)</li> <li>4. Physical planning and environmental management policies</li> <li>5. Environmental monitoring and enforcement</li> </ol>
2. Networks, coordination and stakeholder relations	<ol style="list-style-type: none"> <li>6. Communication with national and local disaster management authorities for advice and guidance</li> <li>7. Communication with national and local environmental management authorities for advice and guidance</li> </ol>	<ol style="list-style-type: none"> <li>8. Partnering with the disaster management, physical planning, public works and environmental management agencies (e.g. participation on National Disaster Committees convened by the National Disaster Office, co-hosting industry training sessions, review of coastal tourism development proposals, collaboration on monitoring sand mining)</li> <li>9. Partnering with regional agencies (e.g., participation in the CDEMA led DRM and CCA in tourism Project)</li> <li>10. Fostering close communication and feedback from hotels</li> <li>11. Fostering close communication and feedback from coastal communities (e.g., adopting a community-based 'bottom up' model/approach to hazard and disaster management in Trinidad and Tobago)</li> <li>12. Training communities in disaster management</li> <li>13. Earmarking resources for use in evacuation scenarios (e.g., buses for transportation)</li> </ol>
3. Research	<ol style="list-style-type: none"> <li>14. Referring to available environmental studies</li> <li>15. Commissioning environmental studies</li> <li>16. Liaising with private consultants and technical experts on coastal issues, disaster management and environmental management</li> </ol>	<ol style="list-style-type: none"> <li>17. GIS mapping</li> <li>18. Coastal studies</li> <li>19. Environmental Impact Assessments</li> <li>20. National damage assessments quantifying damage and loss in the wake of an extreme event or disaster</li> <li>21. Encouraging and fostering strategic partnership arrangements regarding evacuation between small and large hotels</li> <li>22. Implementing projects (e.g., Coastal Zone Management Project in Tobago)</li> </ol>
4. Awareness raising, education, training, outreach and advocacy		<ol style="list-style-type: none"> <li>23. Development and dissemination of best practice manuals (e.g., in disaster management)</li> <li>24. Awareness seminars, symposiums, workshops, conferences (e.g., hurricane and earthquake awareness seminars)</li> <li>25. Information packs (e.g., disaster packs)</li> <li>26. Providing assistance with the development of business continuity plans</li> <li>27. Development and installation of educational signage on beaches for visitors (for the tsunami hazard in Trinidad and Tobago)</li> </ol>



<b>5. Environmental Management</b>	<ul style="list-style-type: none"> <li>32. Industry wide environmental audits</li> <li>33. Property specific environmental programmes (e.g., Green Globe)</li> <li>34. Property specific environmental monitoring</li> <li>35. Building artificial reefs (out of barrels or tyres)</li> <li>36. Property specific beach restoration and/or replenishment</li> </ul>	<ul style="list-style-type: none"> <li>28. Education outreach about alternative tourism development options (e.g., informing potential developers of inland opportunities for development of hotels)</li> <li>29. Public service announcements encouraging citizens to take care of the beaches</li> <li>30. Sensitization of international media personnel of sensationalisation of reporting of natural disasters in the Caribbean</li> <li>31. Working with PR agencies to manage crisis communication in the wake of an extreme event or disaster</li> <li>37. Green Tourism Paper (developed by Antigua and Barbuda Ministry of Tourism)</li> <li>38. Environmental awards</li> <li>39. Coral reef monitoring</li> <li>40. Coral reef restoration</li> <li>41. Seagrass restoration</li> <li>42. Mangrove restoration</li> <li>43. Coastline beach profile monitoring</li> <li>44. Property specific beach restoration and/or replenishment</li> <li>45. Beach clean-up programmes</li> </ul>
<b>6. Prevention/Mitigation</b>	<ul style="list-style-type: none"> <li>46. Investing in a routine building maintenance programme</li> <li>47. Storm sensitive robust building design and construction (e.g. measures such as shutters, hurricane straps, hurricane two ply glass, and UPVC windows)</li> <li>48. Storm drains</li> <li>49. Compliance to the prescribed standards of the national Building Code</li> <li>50. Compliance over and above the national Building Code (e.g., building to the standard of the Miami Dade Code, building 4-6 feet above sea level)</li> <li>51. Building upgrades and alterations to building design ( e.g., reinforced external footings)</li> <li>52. Research (e.g. referring to satellite images to understand coastal changes)</li> <li>53. Hard defence structures such as boulders, groynes, backwalls/bracewalls, breakwalls/breakers, and seawalls</li> </ul>	<ul style="list-style-type: none"> <li>54. Development of an early warning system for coastal sites in Trinidad and Tobago (for the tsunami hazard)</li> </ul>
<b>7. Preparedness</b>	<ul style="list-style-type: none"> <li>55. Preparation and updating of hurricane preparedness plans, manuals and standard operating procedures in time for the hurricane season</li> <li>56. Preparation and updating of common hurricane preparedness plans and associated manuals and standard operating procedures for hotel chains</li> <li>57. Training (e.g., in first aid, in hazard identification) of all levels of staff</li> <li>58. Regular drills</li> <li>59. Replenishment or augmentation of stock of dry goods, water stores, fuel and other emergency supplies for up to 4 days</li> <li>60. Disaster teams comprising various hotel managers</li> </ul>	

- 61. Quarterly disaster team meetings
- 62. Partnerships with the Red Cross
- 63. Electricity generator checks
- 64. Clearing of drains
- 65. Trimming trees and vegetation
- 66. Superstructure and infrastructure checks
- 67. Manuals and publications produced by industry associations
- 68. Securing furniture and equipment ahead of a severe weather system

**8. Response**

- 69. Preparation and updating of hurricane response plans
- 70. Monitoring the track of severe weather systems through media and other channels
- 71. Securing furniture and equipment
- 72. Advising guests to stay in their rooms
- 73. Advising employees to stay at home
- 74. Securing guests through evacuation to the airport to secure flights; from beachfront rooms to safer rooms or areas in the hotel or to a safer location inland
- 75. Installation of sandbags

**9. Recovery**

- 76. Insurance claims
- 77. Business continuity and contingency plans

Note: The numbering of measures is done solely for ease of identification and does not imply hierarchy. Orange shaded areas represent measures that reduce disaster risk (DRR). Green shaded areas represent measures that manage disasters (DM).

The measures itemised in Table 4.15 represent respondents' total DRM awareness set. Although fairly large in absolute terms, the average size of the awareness set in relative terms per supplier is approximately three. The range of DRM measures related to adjusting to severe storms, storm surge and coastal erosion dominate the portfolios of hoteliers. These are the major climate-related hazards that respondents face. It was apparent therefore that experience is associated with the range of hazard specific adjustment responses. Although there was no mention of being affected by earthquakes or tsunamis, respondents do prepare for them (e.g., earthquake and tsunami drills organised by Antigua and Barbuda authorities, tsunami signage on beaches in Trinidad and Tobago, earthquake procedures mentioned by a private-sector respondent in Jamaica). However, many possible adjustments relating to earthquakes and tsunamis or even to the wider hazard context were not mentioned as having been implemented. The composition of the DRM awareness set shows that hoteliers already Protect (e.g., artificial reefs, hard defence structures) and Accommodate (e.g., hurricane preparedness plans, manuals and standard operating procedures). No Diversification or Retreat measures were mentioned.

As Table 4.16 shows, approximately 36 measures were identified to be within the ambit of tourism policy-makers, categorised as: 1) framework for development, 2) networks, coordination and respondent relations, 3) research, 4) awareness raising, education, training, outreach and advocacy and 5) environmental management. Approximately 41 measures were mentioned by hoteliers. The major categories of hotelier action were: 1) networks, coordination and stakeholder relations, 2) research, 3) environmental management, 4) prevention/mitigation, 5) preparedness, 6) response and 7) recovery. These adjustments are currently available, socially sanctioned and their implementation is facilitated by the wider operational environment including the support of and in some cases the co-implementation by tourism policy-makers. For example, the categories where both hoteliers and policy-makers mentioned implementing overlapping measures were: 1) networks, coordination and respondent relations, 2) research, 3) environmental management, and 4) prevention/mitigation.

**Table 4.16 Composition and range of suppliers' DRM awareness set**

<b>Group</b>	<b>DRR</b>	<b>DM</b>	<b>Total</b>
Hoteliers	18	23	<b>41</b>
Policy-makers	36	0	<b>36</b>
<b>Total</b>	<b>54</b>	<b>23</b>	

#### **4.8.2 Range of climate change adaptation measures**

When asked about the possible management options to deal with the impacts of climate change, the majority of respondents were able to offer a response. Four respondents however, thought more research was needed to guide decisions as it was too difficult to say.

Approximately 50 CCA measures grouped into four categories and covering 16 sub-categories were mentioned overall (Table 4.17). While the nine sub-categories identified for DRM remain relevant, seven new sub-categories were identified.

**Table 4.17 Climate change adaptation measures identified by hoteliers and policy-makers in three Caribbean SIDS**

Category	Measures proposed by hoteliers <sup>10</sup>	Measures proposed by policy-makers	Measures proposed by both groups
<b>1. Framework for development</b>	1. Sanctions for non-compliers	2. Stipulation that when buildings are destroyed, they must be built to new standards	3. Stricter environmental and development monitoring for industry and the country as a whole (e.g. increasing the setback for new coastal buildings, monitoring of adherence to the Building Code)
<b>2. Networks, coordination and respondent relations</b>	4. Partnering with government organisations (e.g., national environmental authority)	5. Tourism policy-makers to liaise and partner with Government bodies responsible for climate change portfolio 6. Encourage better communication and partnership between hoteliers and the communities that they operate within so that they can manage coastal resources together 7. Facilitate better inclusion of local level indigenous community knowledge	
<b>3. Research</b>		8. Government to conduct coastal monitoring e.g., monitoring changes in sea level through the installation and maintenance of sea level meters) 9. Making recommendations for alternative options for coastal development to potential investors	10. Government (e.g., coastal management agency) to conduct coastal studies to produce new knowledge of the coastal environment
<b>4. Awareness raising, education, training, outreach and advocacy</b>	11. Seeking training from government organisations 12. Seeking professional advice from coastal experts	13. Providing hoteliers with information about risks associated with sea level rise 14. Encourage and advocate for hoteliers to act (e.g., retrofitting buildings) 15. Educating the general public about the importance of retrofitting structures	
<b>5. Environmental management</b>	16. Better environmental management at hotels (e.g., through monitoring using EMS and audits)	21. Better monitoring of the clearing of hillsides 22. Eco-system restoration (e.g., mangroves, coral reefs, wetlands, sea grass beds)	

<sup>10</sup>

Category	Measures proposed by hoteliers <sup>10</sup>	Measures proposed by policy-makers	Measures proposed by both groups
<b>6. Prevention/ Mitigation</b>	17. Good environmental practice (e.g., no hotel can be taller than the surrounding trees)		
	18. Providing guests with explicit guidance on environmentally friendly practices (e.g., less A/C use, flushing toilets, linen changing through brochures)		
	19. More efficient operations that practices recycling/reusing waste and water		
	20. Planting of trees to provide shade for guests		
	23. Changing and improving building design (e.g., style and type of building, vacant first floor)		24. More artificial shoreline stabilisation (e.g., raising the height of coastal lands and roads, building seawalls, backwalls and breakwaters, placing rocks on the coast)
<b>7. Preparedness</b>	25. Evacuation plans		27. Scenario planning
	26. Safety drills		
<b>8. Response</b>	28. Increased resources for response		
<b>9. Recovery</b>		29. Addressing the issue of increasing insurance premiums	
<b>10. Behavioural change</b>	30. Creating awareness about climate change with employees and guests	33. Trying to influence international negotiations that promote fundamental global behavioural change	
	31. Encouraging lifestyle changes from employees and guests		
	32. Encouraging behavioural change from the local population		
<b>11. Establishing special mechanisms</b>		34. Establishing and participating in National Task Forces (e.g., Hazard Risk Management and Climate Change Adaptation Task Force of Jamaica)	
<b>12. New dedicated adaptation resources</b>		35. Securing funding from international agencies for national industry environmental projects	

Category	Measures proposed by hoteliers <sup>10</sup>	Measures proposed by policy-makers	Measures proposed by both groups
<b>13. Operational innovation</b>	36. Man-made silica beaches	37. Encouraging hotels to buy in bulk so that operational savings can be channelled to climate change adaptation	
<b>14. Diversification</b>		38. Identifying new markets interested in community tourism and inland ecotourism	39. Considering Diversification (e.g., creating new guest activity environments, expanding niche areas such as community tourism and ecotourism inland)
<b>15. Retreat</b>			40. Infrastructure relocation
<b>16. Climate change mitigation</b>	41. Management of GHG emissions at the hotel level	42. Stipulation that all new construction should include solar panels 43. Institutionalised arrangement (MoU) with hotels guaranteeing duty free concessions on the importation or local purchase of solar panels 44. Establish high level committees to address key issues such as alternative energy	

Note: The numbering of measures is done solely for ease of identification and does not imply hierarchy. Orange shaded areas represent measures that reduce disaster risk (DRR). Green shaded areas represent measures that manage disasters (DM). Blue shaded areas represent climate change adaptation measures. Purple shaded areas represent climate change mitigation measures. Some measures were identified by both hoteliers and policy-makers but have been counted once in the table.

Eighteen measures were uniquely mentioned by hoteliers while twenty measures were uniquely mentioned by policy-makers. Six measures were common to hoteliers and tourism policy-makers. The mean number of CCA measures identified per supplier is also smaller at approximately two. Adaptation measures identified by respondents span the spectrum of DRR, DM, CCA (defined here as future adjustment measures that are different from present practice) and CCM (defined here as measures related to the reduction of GHG emissions) as follows (Table 4.18).

**Table 4.18 Composition and range of suppliers' CCA awareness set**

<b>Group</b>	<b>DRR</b>	<b>DM</b>	<b>CCA</b>	<b>CCM</b>	<b>Total</b>
Hoteliers	13	4	6	1	<b>24</b>
Policy-makers	14	2	7	3	<b>26</b>
<b>Sub-total</b>	<b>27</b>	<b>6</b>	<b>13</b>	<b>4</b>	
<b>Total</b>	<b>33</b>		<b>17</b>		

Note: Counts of measures in this table are absolute and include all measures identified by each group, regardless of whether they were identified by the other group.

It is apparent that there is a difference in size, composition (which measures are included), as well as, structure of the DRM and CCA awareness sets (ranking of measures between hotelier and policy-makers). Interestingly, although the number of categories for classification of climate change adaptation measures increased, the absolute number of measures identified (n=50) was less than those identified for DRM (n=77). Although the CCA awareness set is smaller, there is greater diversity reflected in the range of adaptation categories (DRR, DM, CCA, CCM). However, this means that this smaller set is highly segmented. The number, as well as, range of measures identified reveals that for many respondents, adaptation response was complex and conditional. The complexity of the responses varies considerably. The actions themselves range from such relatively complex actions which require considerable technical advice (e.g., providing hotels with information about risks associated with sea level rise and infrastructure relocation) to new measures such as the use of man-made silica sand beaches. It was common, for example, for respondents to offer responses that not only: 1) identified measures that crossed categorical boundaries, but also 2) tied these measures to various contextual conditions (e.g., financial, spatial, environmental and market factors) associated with adaptation. For many respondents, an appropriate strategy was dependent on the individual circumstance of the hotel or destination. It is important to note that Retreat (in context of coastal infrastructure and not coastal hotels) and Diversification were mentioned by hoteliers and policy-makers in relation to CCA. This is in addition to Protection and Accommodation.

#### **4.8.3 The links between the disaster risk management and climate change adaptation awareness sets**

This Section examines the links between DRM and CCA between hoteliers and policy-makers through providing an analysis of the overlap of DRM and CCA measures identified by respondents. Table 4.19 summarises these results, and in doing so, shows the areas of overlap in DRM and CCA measures identified by respondents.

**Table 4.19 Overlap between disaster risk management and climate change adaptation measures identified by hoteliers and policy-makers**

Hoteliers (n=17)		Policy-makers (n=10)	
Category	# of measures mentioned	Category	# of measures mentioned
<b>DRM</b>	• Preparedness	• Environmental management	9
		• Awareness, training, outreach and advocacy	
	• Prevention/Mitigation	• Networks, coordination and stakeholder relations	6
		• Research	
	• Response	• Framework for development	5
	• Environmental management	• Prevention/Mitigation	1
	• Research	• Preparedness	0
		• Response	
	• Networks, coordination and stakeholder relations	• Recovery	
	• Recovery		
• Framework for development			
• Awareness, training, outreach and advocacy			
<b>Total</b>	<b>41</b>		<b>36</b>
<b>CCA</b>	• <b>Environmental management</b>	• <b>Networks, coordination and stakeholder relations</b>	3
		• <b>Awareness, training, outreach and advocacy</b>	
		• Climate change mitigation	
		• <b>Research</b>	
	• Preparedness	• <b>Environmental management</b>	2
	• Behavioural change	• <b>Framework for development</b>	
		• <b>Diversification</b>	
	• <b>Prevention/mitigation</b>	• <b>Prevention/mitigation</b>	1
	• Awareness, training, outreach and advocacy	• Preparedness	
	• Framework for development	• Recovery	
		• Behavioural change	
		• Establishing special mechanisms	
	• Networks, coordination and stakeholder relations	• New dedicated adaptation resources	
	• Response	• Operational innovation	
	• Operational innovation	• Retreat	
• Climate change mitigation	• Response	0	
• Research			
• Diversification			
• Retreat			
• Recovery			
• Establishing special mechanisms			
• New dedicated adaptation resources			
<b>Total</b>	<b>24</b>		<b>26</b>



Notes: Six measures in five categories have been mentioned by both hoteliers and policy-makers. These have been counted once. Categories have been ranked according to the number of measures mentioned in each category. Bolded CCA categories indicate overlap with DRM category.

In the DRM context, hoteliers currently invest in preparedness, prevention/mitigation, and response measures most prevalently. Environmental management, research and participation in networks and recovery are the least prevalent measures. In the relation to CCA, environmental management assumes a more important role, followed by behavioural change, prevention/mitigation, awareness, preparedness and the framework for development.

In contrast, with regard to DRM, policy-makers invest most prevalently in environmental management, awareness, networks, research, as well as, implement the framework for development. In the future, they expect to engage hoteliers through networks, awareness, to support climate change mitigation, research, environmental management, implement the framework for development, prevention/mitigation and to diversify the product.

Environmental management and research are the only similar activities in the top five for hoteliers and policy-makers. Of the remaining three action categories, two of hoteliers' top three categories are not mentioned by policy-makers as part of their awareness set. This suggests distinct but complementary roles.

## **4.9 Adjustment evaluation**

This Section examines how adjustments are evaluated by: 1) explicitly presenting the qualitative views of hoteliers and policy-makers towards the PARD strategies in Section 4.9.1.1 and 2) presenting a summary of the evaluation criteria that emerged as important from the set of perceptions about adjustments in Section 4.9.1.2, and finally, 3) conducting a Choice Set analysis of the PARD strategies.

### **4.9.1.1 Perceptions of the PARD strategies**

#### **Protection**

For some hoteliers, Protection measures are a commonplace feature of their coastal product. For others, such as PRI\_TT\_3, a hotelier in Tobago where the hotel beach is still natural, Protection "...would... be the last resort". For this respondent, there was concern about the negative aesthetic implications associated with Protection: "...we attract a lot of guests from looking at the natural landscape...we don't want to lose them" (PRI\_TT\_3). However, it is an option that would be considered since: "...We wouldn't want to lose it all ..." (PRI\_TT\_3).

Not all Protection strategies are perceived in the same way. For example, while groynes are well accepted:

"...groynes...they have been built throughout this island and I know they are also happening on other islands and...they have been able to build beach, they have been able to increase...land space. It's for sure one of the options..." (PRI\_AB\_9, Hotelier, Antigua and Barbuda), seawalls are considered problematic:

“...a seawall might take away all the beauty we have to offer. Yes, it will...keep your land space available but in the Caribbean, we talk about our white sand beaches and the blue ocean so if you are faced with a seawall... to go into the ocean and climb into the ocean by a ladder or whatever... there are so many other places in the world you can go...” (PRI\_AB\_9, Hotelier, Antigua and Barbuda).

Some respondents were also cautious about the Protection option due to prior experience or knowledge of the adverse effects that hard structures have had or alternatively can have - in some instances, exacerbating the coastal problems that they were installed to alleviate. References to examples of mal-adaptation by respondents in all three destinations made this clear.

Protection comes at a cost, typically “millions of dollars” so for some hoteliers as a first step they “...will have to consider going to the Government...” (PRI\_TT\_3, Hotelier, Trinidad and Tobago). Protection is recognised as limited in the face of sea level rise: “...I don’t think that there would be enough backwalls to keep the ocean out...” (PRI\_AB\_4, Hotelier, Antigua and Barbuda).

### **Accommodation**

Respondents are comfortable with adapting in-situ using an Accommodation strategy. They are happy to “...modify it (buildings) as we go along...” (PUB\_AB\_3, Policy-maker, Antigua and Barbuda). In fact, one hotelier drew reference to the modifications that the hotel was currently undertaking:

“...working on re-doing shutters and securing them. We have a maintenance program in place where the structure is concerned. We do general maintenance on the roof where the ceiling is loose. These are things we can address immediately...” (PRI\_TT\_6, Hotelier, Trinidad and Tobago).

The chance to make incremental changes within perceived acceptable parameters is appealing to many respondents in all destinations:

“...stay and retrofit. I think that that is better because for example, a number of them (hotels)... they have a number of floors so perhaps you want to retrofit, do something with your first floor where you would have the flooding coming in ... and so I think that this perhaps is the better one...” (PUB\_AB\_1, Policy-maker, Antigua and Barbuda).

Thus, Accommodation may offer hoteliers a sense of control in the short-term in the face of the perceived uncertainty regarding the impacts of climate change. Protecting the property to ensure continuity of business seems to be at the heart of the appeal of Accommodation: “...we need to protect the property so that guests will continue wanting to come...” (PRI\_JA\_6, Hotelier, Jamaica).

Adaptation is contextual, as is the use of the Accommodation strategy. A policy-maker in Trinidad and Tobago (PUB\_TT\_5) made clear that “...a lot of them (hotels in Tobago) would have to do some modification...” based on their individual operational contexts on the coast.

Accommodation, like Protection, was recognised to have its limitations. One respondent for example wondered, “How much can you do?” (PRI\_TT\_7, Chief Hotel Engineer, Trinidad and Tobago). Another hotelier extended this perspective indicating that they were happy with staying put with adaptations but they would “...run like hell if we believe the threat is deemed more than we can manage...” (PRI\_TT\_8, Hotelier, Trinidad and Tobago).

### **Retreat**

Very few hoteliers voluntarily identified Retreat as a viable strategy moving forward. Where mentioned, reference was made in relation to coastal infrastructure such as roads and not in relation to superstructure like hotel buildings. When asked to consider this strategy explicitly, responses were largely negative.

At its core, Retreat was perceived as destroying the business model of a coastal hotel:

“...you can’t move a hotel like this...we’re not just going to take the building and you know, build it somewhere else so..that means retreating off the coast...that would mean sort of destroying your business totally and then rebuilding it somewhere else at what...you know, who is going to pay for that? ...You’re speaking about millions of dollars...” (PRI\_AB\_2, Hotelier, Antigua and Barbuda).

Another hotelier commented: “... we offer sun, sea and sand. That’s the product so retreating from this ... we will definitely opt for something else for the time being...” (PRI\_AB\_10, Hotelier, Antigua and Barbuda).

For hoteliers, Retreat has negative implications for the livelihoods of themselves and many other employees: “...I don’t think anyone would just abandon the project completely because too many lives depend on the job here...” (PRI\_AB\_4, Hotelier, Antigua and Barbuda). The perspective of small, independent owners/operators makes this clear. One small owner/operator, for example, opined: “...this is my home. I don’t have anywhere to retreat to...so if I can stay and save it, I’d like to do that...” (PRI\_AB\_11, Hotelier, Antigua and Barbuda).

A few hoteliers regarded Retreat as “quitting” or “running” away from the problem: “... I’m not a quitter so I’m not going to just remove myself from the coast...” (PRI\_JA\_4, Hotelier, Jamaica). Nor is the strategy considered to be practical: “I don’t think it would be practical for most of these hotels to actually demolish what they have and retreat from the coastline...” (PUB\_AB\_7, Policy-maker, Antigua and Barbuda).

While a few, particularly policy-makers, would consider Retreat, there were several caveats identified. One policy-maker in Jamaica, for example, acknowledged the multiple difficulties associated with Retreat saying that it:

“...is politically a difficult choice. It is also economically a difficult choice because you will either have to as Government consider how you are going to compensate persons or alternatively identify land where they can repopulate .. and that is also expensive so that comes with a lot of cost...” (PUB\_JA\_2).

Yet another policy-maker drew attention to the spatial and logistical implications associated with Retreat. Making particular reference to tourists:

“...it is going to be a serious logistics [issue] to move people...People don’t like that. This industry was born on people being able to sleep and roll out their bed and go and lie on beach chairs and enjoy themselves...” (PUB\_AB\_3, Policy-maker, Antigua and Barbuda).

Retreat would only be considered if: “...it (the impact of climate change) is so severe that you can’t help yourself, it might be the only choice...” (PRI\_AB\_9, Hotelier, Antigua and Barbuda). Hoteliers and policy-makers recognised that Retreat would entail a long-term effort and extensive planning: “...I think it’s going to be a long-term... effort and something put in planning before you can you know, Retreat...” (PRI\_AB\_10, Hotelier, Antigua and Barbuda). Retreat was thought to be desirable primarily in the context of new development on the coast.

### **Diversification**

Diversification was mentioned and discussed largely by policy-makers. An exception was PRI\_AB\_6, a hotelier in Antigua and Barbuda who was keen to see increased public resources devoted to the development of the cultural and eco-tourism sub-sectors. This hotelier does not operate directly on the beachfront.

For policy-makers, perceptions of Diversification were reflective of their destination context and differences in perception were apparent. Policy-makers in Antigua and Barbuda noted that the beach tourism image and model was deeply engrained along the tourism value chain:

“...when people come to the island, they ...you know... they already advertise, you know, you looking out of your grand hotel and you seeing the sea and all of these sorts of things. And that would have to require a whole lot of thinking and a whole lot of re-marketing...” (PUB\_AB\_1, Policy-maker, Antigua and Barbuda).

This respondent made clear that the white sand beaches that underpin the sun, sand, sea product were the country’s competitive advantage.

There are structural barriers in the Antigua and Barbuda context that make Diversification unattractive or difficult. A mismatch of natural resources to other tourism models was one barrier identified: “...they can talk about eco-lodges ...but then again we don’t have the kind of resources... the mountainous areas, the free areas for them to develop that. So that would be a bit challenging...” (PUB\_AB\_1, Policy-maker, Antigua and Barbuda). Another hotelier opined: “...We can’t do mountain tours, we can’t do ski resorts” (PRI\_AB\_10, Hotelier, Antigua and Barbuda).

Policy-makers in Trinidad and Tobago, where tourism is of less importance to the national economy and policy-makers are perhaps less attached to the coastal tourism model, readily offered ideas on how Diversification could be implemented: “...I would start with land higher up and more inland for, you know, villas on the hill like more eco-tourism type operations as opposed to coastal type operations...” (PUB\_TT\_2, Policy-maker, Trinidad and Tobago).

One policy-maker in Jamaica noted that cultural tourism and eco-tourism is already developed inland on that island: "...We also have tours and attractions that are more inland... We also have bird watching tours, river safari, river tubing that takes place more inland as well which are also important attributes of Jamaica's tourism product..."(PUB\_JA\_2). While this respondent had no problem envisioning expansion of these "niche areas", maintaining arrival figures and tourism growth were still conceptualised within the present paradigm of the "coastal product":

"...we will have to look at expanding...trying to identify markets that are interested in those areas...because we have to maintain arrivals. Our objective will always have to be to grow arrivals and we cannot expect for there to be a depreciation of the coastal product and expect to see an appreciation of visitors. It doesn't work that way..." (PUB\_JA\_2, Policy-maker, Jamaica).

Another policy-maker in Antigua and Barbuda (PUB\_AB\_1) noted that "...it would be very, very difficult to move from the beach, the sun and the sea....it's very, very difficult for us to change...". When probed whether it would be impossible, the policy-maker continued:

"I think I would say it's next to impossible because ... if you're not doing the sun and the sea and the sand thing and you're going to try the zipline... they (tourists) can go other places and do better ziplines because they're more mountainous....we don't have rivers so we can't offer them the things that you could offer on the river. We couldn't compete with anybody else in anything else really based on ... what we have here..."

Thus, respondents view Diversification as an expansion around the current portfolio of beach tourism. They have a supplementary outlook versus one that involves total replacement.

#### 4.9.1.2 Summary of evaluation criteria

A summary from the qualitative interviews of suppliers' perceptions of the attributes associated with the PARD strategies is presented in Table 4.20:

**Table 4.20 Focus and evaluation criteria associated with supplier perceptions of the PARD strategies**

Strategy	Focus	Evaluation criteria	Respondent perceptions
Protection	Beach preservation	Protective function/Protecting beach	Protects and expands hotel beachfront
		Aesthetics	Changes natural landscape; threat to coastal beauty
		Robustness	Increase in land space; effective response to coastal erosion; less effective response to sea level rise; can exacerbate coastal problems
		Cost	Expensive

Strategy	Focus	Evaluation criteria	Respondent perceptions	
Accommodation	Building and infrastructure strengthening	Logistics/Positioning	In-situ response possible	
	Disaster management capacity	Feasible /familiar	Maintenance programs are on-going, iterative process that hoteliers already engage in	
	Self-preservation	Robustness	Limitations – “how much can you do?”	
		Protective function/Protecting property and guests	Retrofitting first floor is possible	
Retreat	Building removal/destruction	Logistics/Distance	Beach tourism must be near sea and sand; destroys business model	
	Infringing on communities	Feasibility/Rebuilding	Moving buildings off the coast	
	Market loss	Cost	Expensive	
	Self-destruction	Revenue/Livelihoods	Small owners/operators may live on property; Retreat affects livelihoods of hotel managers and employees	
	New development		Inappropriate/Quitting/running away	Incongruent behaviour for self-sufficient, risk taking/accepting hoteliers
			Feasibility/Impractical	Demolishing present hotels; spatial and logistical challenges
Diversification	Market preservation	Feasibility/Supplementary expansion of tourist niches	Eco-tourism and cultural tourism alongside beach tourism	
	Market expansion	Feasibility/Beach as competitive advantage	Destinations are sold on beach image; tourists demand and expect beach experience	
		Revenue/Maintaining and growing arrivals	Lack of or inherently less attractive inland landscape compared to coastal landscape	

From the above, it is clear that the particular manner in which the utility of the PARD strategies are perceived depends in large measure on a matrix of evaluation criteria. Perhaps the overarching criteria on which adaptation strategies are categorised are their attributes that have implications for: 1) building and environmental aesthetics, 2) logistics, 3) amenity/comfort levels of tourists, 4) cost of implementation and maintenance, 5) revenue generation, 6) robustness, 7) protective function, and 8) feasibility. Unlike other industries, for tourism operators especially coastal hoteliers, the aesthetics and function implications of DRM and CCA measures matter. For already established tourism superstructure, retrofitting may have a negative impact not just on aesthetics but also on the core revenue generating

function of the hotel. For example, retrofitting for coastal inundation may mean converting revenue generating ground floor rooms to less intensive, transitory functions such as parking.

#### 4.9.2 Choice Set analysis of the PARD strategies

The majority of hotelier and policy-maker responses were sufficiently divergent to be grouped on the basis of the type of CCA strategies they are willing to consider and/or adopt in determining final choice (Table 4.21):

**Table 4.21 Hotelier and policy-maker differences in perceptions of and likelihood to adopt the PARD strategies**

Strategy	Hoteliers	Policy-makers
Protection and Accommodation	<ul style="list-style-type: none"> <li>• Will consider</li> <li>• Will adopt</li> <li>• The preferred way forward</li> <li>• Field observations confirm that Protection and Accommodation measures are already prevalent</li> </ul>	<ul style="list-style-type: none"> <li>• Will consider</li> <li>• Have assisted hoteliers to adopt Protection and Accommodation measures</li> </ul>
Retreat	<ul style="list-style-type: none"> <li>• Will not consider</li> <li>• Will not prefer to adopt</li> <li>• Viewed as a last resort</li> </ul>	<ul style="list-style-type: none"> <li>• Will consider for new development</li> <li>• Will adopt for existing development but recognise that there is limited scope for adoption in the small island context and the difficult social, economic and environmental implications of this approach</li> </ul>
Diversification	<ul style="list-style-type: none"> <li>• Will consider in the context of maintenance of 'status quo' beach tourism while expanding niches like eco-tourism and cultural tourism</li> </ul>	<ul style="list-style-type: none"> <li>• Will consider</li> <li>• Will adopt but recognise that there is limited scope for Diversification in some small island contexts</li> </ul>

As discussed in Section 2.6.2, before deciding on a preferred measure or strategy, the research suggests that hoteliers and tourism policy-makers place all known/perceived possibilities from the awareness/early consideration set into one of three evaluative sets (Table 4.22):

1. Early consideration set
2. Late consideration set
3. Inept/reject set

**Table 4.22 Choice Set analysis of the PARD strategies**

Group	Early consideration set	Late consideration set	Inept/ reject set
Hoteliers	Protection Accommodation Retreat Diversification	Protection Accommodation Diversification (as supplementation)	Retreat Doing little to nothing
Policy-makers	Protection Accommodation Retreat Diversification	Protection Accommodation Diversification (as supplementation) Retreat	Doing little to nothing

From the above, it is clear that for both groups, doing little to nothing is not an option and so this has been placed in their Inept/Reject set. In contrast, while hoteliers place the Retreat strategy in the Inept/Reject set, policy-makers remain open to this option. It should be noted that the inert set was not a relevant category in this research as there were no overarching strategies towards which suppliers were ambivalent .ie. held neither a positive nor negative evaluation.

#### 4.10 Summary

Chapter 4 presented an analysis of quantitative and qualitative data addressing Research Issue 1, which centred around the observation that the DRM and CCA decision-making processes of suppliers are not well understood. In doing so, it provided empirical evidence related to the DRM and CCA decision-making processes of suppliers, particularly in relation to the nature, structure and function of several hypothesised determinants of DRM and CCA behavioural intention. Through qualitative research, the research propositions have largely been supported, or alternatively, supported in part. Similarly, the quantitative data using survey data and statistical tests supported in part many of the hypotheses, meaning some, but not all of the statistical tests related to each hypothesis were significant. The exception was H 1.1.1 *There is a significant difference between Present and Future CRP for hoteliers and policy-makers* which was not supported by the data. Table 4.23 presents a summary while Chapter 6 discusses these findings in further detail.



**Table 4.23 Summary of results on Research Issue 1**

Research propositions/ Overall hypotheses	Result
RP 1.1.1: A range of climatic and non-climatic decision variables are associated with the DRM and CCA decision-making processes.	Supported in part
RP 1.1.2: The nature, structure and function of the determinants of DRM and CCA have implications for protective behaviour outcomes.	Supported
RP 1.2: The size, composition, and range of measures within hoteliers' and tourism policy-makers' DRM and CCA awareness sets have implications for protective behaviour outcomes.	Supported
RP 1.3.1: Adjustment measures are evaluated on a wide range of criteria.	Supported
RP 1.3.2: The most likely CCA strategies are those that modify existing hotelier practices and tourism policies.	Supported
H 1.1.1: There is a significant difference between Present and Future CRP for hoteliers and policy-makers.	Not supported
H 1.1.2: There is a significant difference in the levels of Present and Future CRP between and hoteliers and policy-makers.	Supported in part
H 1.1.3: There are significant differences in the attitudes, subjective norm, perceived behavioural control and intentions of hoteliers and policy-makers using the PARD strategies to adapt to climate change.	Supported in part
H 1.1.4: There is a significant linear relationship between hoteliers' and policy-makers' attitudes, subjective norm, perceived behavioural control and climate risk perception and their intentions to adapt using the PARD strategies.	Supported in part
H 1.1.5: There are significant differences in hoteliers' and policy-makers' perceptions of social pressure to use the PARD strategies to adapt to climate change.	Supported in part
H 1.1.6: There is a significant linear relationship between hoteliers' past adjustment behaviour and 1) present and 2) future climate risk perception.	Supported

## Chapter 5

# Examining demand and supply-side perceptions of disaster risk management and climate change adaptation

### 5.1 Introduction

Chapter 4 pointed to the central role of the subjective norm construct in driving suppliers' protective behavioural intentions. This result highlights the need to relate and combine the views of suppliers with the perspectives of tourists as an important step in mapping how the interaction of demand and supply DRM and CCA perceptions are likely to affect decision-making processes in destinations. Moreover, assessing the gap between demand and supply-side stakeholder perceptions is critical to determining whether hoteliers and tourism policy-makers have a clear idea of what tourists expect from adjustment measures and their attributes. In answering the research questions and hypotheses related to Research Issue 2 (see Table 2.6), this chapter presents the results of three quantitative surveys namely: 1) a survey of 124 hoteliers, 2) a survey of 39 tourism policy-makers and industry association representatives in 10 English speaking Caribbean destinations, and 3) a survey of 320 international tourists to the Caribbean island of Tobago. The chapter is divided into five sections. This first section introduces the chapter. Section 5.2 presents the research results related to DRM perceptions gaps. Section 5.3 presents the findings around CCA perception gaps while Section 5.4 presents beach perception gaps. Section 5.5 summarises the chapter.

### 5.2 Disaster risk management perception gaps

As a first step to examining the extent to which there are DRM perception gaps across hoteliers, policy-makers and tourists, the means and standard deviations for demand and supply-side perceptions of the importance of DRM considerations in tourist choice of accommodation are presented in Table 5.1.

**Table 5.1 Means and standard deviations of group perceptions of the importance of DRM measures in tourist choice of accommodation**

<sup>a</sup> Items	Hoteliers			Policy-makers			Tourists		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
<sup>b</sup> There is a need to prepare for coastal and hydro-meteorological hazards (e.g., coastal erosion, severe storms)	124	5.98	1.49	39	6.51	1.10	-	-	-
<sup>c</sup> Hotels having disaster plans	123	5.39	1.47	39	5.74	1.59	285	4.33	2.20
<sup>c</sup> Hotels offering guarantees of personal safety from natural disasters	117	4.85	1.77	39	5.79	1.45	282	4.33	2.13
<sup>c</sup> Hotels providing information about disaster response procedures	122	5.47	1.63	39	6.03	1.41	283	4.10	2.13
<sup>d</sup> <b>Total DRM perception</b>	<b>117</b>	<b>15.62</b>	<b>4.40</b>	<b>39</b>	<b>17.56</b>	<b>4.14</b>	<b>267</b>	<b>12.60</b>	<b>6.21</b>
<sup>e</sup> <b>Standardised total DRM perception</b>	<b>117</b>	<b>5.21</b>	<b>1.467</b>	<b>39</b>	<b>5.85</b>	<b>1.378</b>	<b>267</b>	<b>4.20</b>	<b>2.069</b>

Note: <sup>a</sup> Items were worded somewhat differently for each group. See Appendices G, H and M for full copies of the questionnaires. <sup>b</sup> Items measured on a 7-point Likert-type scale where 1 = Strongly disagree and 7 = Strongly agree. <sup>c</sup> Items measured on a 7-point Likert-type scale where 1 = Not important at all and 7 = Extremely important. <sup>d</sup> Composite variable made up of aggregate score of 3 items. Range from 3 = low perception of importance of DRM measures to 21= high perception of importance of DRM measures. Higher scores indicate higher perception of importance of DRM measures. <sup>e</sup> Standardised total DRM perception = Total DRM perception divided by the number of scale items.

The main hypothesis regarding possible DRM perception gaps was framed as follows:

*Hypothesis 2.1: There is a significant difference in the levels of DRM perceptions across hoteliers, policy-makers and tourists.*

An ANOVA showed that there is a statistically significant difference in the levels of DRM perceptions across the three groups of hoteliers, policy-makers and tourists,  $F(2, 420) = 21.171; p < 0.0005$ . Post-hoc Games-Howell tests confirmed statistically significant differences across all three groups. Tourists have significantly lower DRM perceptions ( $M=12.6, SD=6.208$ ) than hoteliers and policy-makers. Policy-makers have significantly higher DRM perceptions ( $M=17.56, SD=4.135$ ) than hoteliers and tourists. Hoteliers have significantly higher DRM perceptions ( $M=15.62, SD=4.402$ ) than tourists but their DRM perception is lower than policy-makers.

Next, the DRM composite variable is examined at the level of its individual items. An omnibus MANOVA was run to test whether there are significant differences in hoteliers', policy-makers' and tourists' perceptions of the importance of: 1) hotels having disaster plans, 2) hotels offering guests guarantees of personal safety from natural disasters, and 3) hotels providing guests with information about disaster response procedures. A significant result was obtained,  $F(6,838) = 13.362, p < 0.0005$ ; Pillai's Trace = 0.175. Follow-up ANOVAs revealed that there are significant differences in group perceptions of hotels having disaster plans,  $F(2,423) = 18.317; p < 0.0005$ , hotels offering guarantees of personal safety from natural disasters,  $F(2,423) = 11.908; p < 0.0005$ , and hotels providing information about disaster response procedures,  $F(2,423) = 29.976; p < 0.0005$ . Post-hoc Games-Howell tests confirmed the following statistically significant differences across all three groups (Table 5.2):

**Table 5.2 Significant independent samples t test results of group differences on the importance of disaster plans, guarantees of personal safety, and information about disaster response**

Items		<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>	Mean difference	<i>p</i> value	Comparison
Hotels having disaster plans	Hot	5.35	1.476	Tour	4.26	2.213	1.09*	<0.0005	Hot > Tour
	Pol	5.74	1.585	Tour	4.26	2.213	1.49*	<0.0005	Pol > Tour
Hotels offering guarantees of personal safety from disasters	Hot	4.85	1.773	Pol	5.79	1.454	-0.94*	0.004	Pol < Hot
	Pol	5.79	1.454	Tour	4.26	2.134	1.54*	<0.0005	Pol > Tour
Hotels providing information about disaster response procedures	Hot	5.42	1.647	Tour	4.08	2.143	1.34*	<0.0005	Hot > Tour
	Pol	6.03	1.405	Tour	4.08	2.143	1.95*	<0.0005	Pol > Tour

Note: \* Mean differences significant with Bonferroni correction ( $p \leq 0.0056$ ) (2 tailed)

Hoteliers have significantly higher perceptions of hotels having disaster plans than tourists. Policy-makers have a significantly higher perception of the importance of disaster plans, offering guarantees of personal safety and providing information about disaster response procedures than tourists, whereas hoteliers only have a significantly higher perception of the importance of disaster plans and providing information about disaster response procedures than tourists.

The only significant difference between hoteliers and tourism policy-makers was on their perceptions of offering guarantees of personal safety, with hoteliers having significantly lower perceptions than policy-makers.

Of the five adjustment measures examined quantitatively with hoteliers, three were examined with hoteliers, policy-makers and tourists to capture perceptions of the importance of these DRM measures to the market. The results revealed that there is a statistically significant difference in perception levels of the importance of DRM across hoteliers, policy-makers and tourists. Policy-makers have significantly higher perceptions of the importance of DRM ( $M=17.56$ ,  $SD=4.135$ ) than hoteliers and tourists, while tourists have significantly lower perceptions of the importance of DRM ( $M=12.60$ ,  $SD=6.208$ ) than hoteliers and policy-makers.

At the level of individual measures, policy-makers have a significantly higher perception of the importance of disaster plans, offering guarantees of personal safety and providing information about disaster response procedures than tourists, whereas hoteliers only have a significantly higher perception of the importance of disaster plans and providing information about disaster response procedures than tourists. The only significant difference between hoteliers and tourism policy-makers was on their perceptions of offering guarantees of personal safety, with hoteliers having significantly lower perceptions than policy-makers.

### **5.3 Climate change adaptation perception gaps**

As a precursor to examining RQ 2.2 which asked to what extent there are CCA perception gaps across hoteliers, policy-makers and tourists, the means and standard deviations for demand and supply-side perceptions of CCA and the PARD strategies were calculated and are presented in Table 5.3.

**Table 5.3 Means and standard deviations of group perceptions of CCA**

	<sup>a</sup> Items	Hoteliers					Policy-makers					Tourists				
		<i>N</i>	<i>M</i>	<i>SD</i>	Mean of Mean	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	Mean of Mean	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	Mean of Mean	<i>SD</i>
	<sup>b</sup> There is a need to adapt to climate change	119	5.85	1.48	-	-	39	6.62	0.67	-	-	300	1.85	0.36	-	-
Protection	<sup>c</sup> Building more concrete walls than are generally present now on beaches	111	2.76	1.57	-	-	36	2.72	1.26	-	-	315	2.68	1.41	-	-
	<sup>c</sup> Building more rock structures than are generally present now on beaches	112	3.73	1.77	-	-	37	3.81	1.58	-	-	315	3.98	1.46	-	-
	<sup>c</sup> Raising the height of existing walls and structures	111	3.22	1.63	-	-	37	3.46	1.35	-	-	313	3.04	1.39	-	-
	<sup>c</sup> Beaches that increasingly have an appearance that is not 100% natural	109	2.74	1.55	-	-	35	2.80	1.62	-	-	311	2.96	1.57	-	-
Accommodation	<sup>c</sup> Investing in the resistance of hotel buildings and infrastructure	102	5.42	1.44	-	-	32	5.97	0.78	-	-	312	5.41	1.27	-	-
	<sup>c</sup> Investing in disaster management systems	102	5.70	1.31	-	-	32	6.47	0.62	-	-	-	-	-	-	-
	<sup>c</sup> Lifting hotel buildings up on piles	100	3.50	1.86	-	-	31	3.74	1.39	-	-	311	4.37	1.46	-	-
	<sup>c</sup> No longer offering rooms on the ground floor	102	2.59	1.64	-	-	32	3.41	1.56	-	-	315	4.22	1.47	-	-
Retreat	<sup>c</sup> Not having hotel rooms that are right on the beach	101	3.02	1.73	-	-	30	4.00	1.78	-	-	313	3.93	1.44	-	-
	<sup>c</sup> Asking guests to take a 100 m walk to get to the beach	101	3.57	1.61	-	-	30	4.10	1.30	-	-	314	4.52	1.50	-	-
	<sup>c</sup> Asking guests to take a 500 m walk to get to the beach	100	2.76	1.58	-	-	30	3.03	1.59	-	-	312	3.64	1.72	-	-
	<sup>c</sup> Asking guests to take a free shuttle bus to get to the beach	100	2.45	1.47	-	-	30	4.30	1.82	-	-	314	4.04	1.94	-	-
Diversification	<sup>c</sup> Having less beach hotels in operation	102	2.75	1.66	-	-	30	3.83	1.86	-	-	312	3.64	1.73	-	-
	<sup>c</sup> Offering more ecotourism activities	102	5.73	1.25	-	-	30	6.40	0.81	-	-	315	5.42	1.43	-	-

<sup>a</sup> Items		Hoteliers					Policy-makers					Tourists				
		<i>N</i>	<i>M</i>	<i>SD</i>	Mean of Mean	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	Mean of Mean	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	Mean of Mean	<i>SD</i>
	<sup>c</sup> Offering more cultural tourism activities	101	5.81	1.23	-	-	30	6.67	0.55	-	-	316	5.37	1.45	-	-
Overall perceptions of strategies	<sup>d</sup> Protection	107	12.50	4.98	3.12	1.24	34	12.68	3.39	3.17	0.85	309	12.63	4.72	3.16	1.79
	<sup>d</sup> Accommodation	100	17.14	3.97	4.29	0.99	31	19.58	2.81	4.90	0.70	305	13.98	3.36	4.66	1.12
	<sup>d</sup> Retreat	100	11.75	5.26	2.94	1.32	30	15.43	5.02	3.86	1.25	306	16.02	5.25	4.01	1.31
	<sup>e</sup> Diversification	101	14.28	3.14	4.76	1.05	30	16.90	2.34	5.63	0.78	309	14.42	3.64	4.81	1.21
Likelihood of using or choosing a Caribbean destination that has used a particular strategy	<sup>f</sup> Protection	101	3.90	1.62	-	-	32	4.91	1.49	-	-	301	3.67	1.80	-	-
	<sup>f</sup> Accommodation	96	4.24	1.63	-	-	30	4.63	1.50	-	-	303	4.16	1.56	-	-
	<sup>f</sup> Retreat	94	2.80	1.75	-	-	29	4.38	1.68	-	-	299	4.07	1.66	-	-
	<sup>f</sup> Diversification	93	3.76	1.62	-	-	25	5.12	1.24	-	-	301	4.25	1.82	-	-

Note: <sup>a</sup> Items were worded somewhat differently for each group. See Appendices G, H and M for full copies of the questionnaires. <sup>b</sup> Items measured on a 7-point Likert-type scale where 1 = Strongly disagree and 7 = Strongly agree for hoteliers and policy-makers and 1= No and 2 = Yes for tourists. <sup>c</sup> Items measured on a 7-point Likert-type scale where 1 = Extremely undesirable and 7 = Extremely desirable. <sup>d</sup> Composite variable made up of aggregate score of items for each strategy. Range from 4 = low positive perception of CCA strategy to 28 = high positive perception of CCA strategy. Higher scores indicate higher positive perception. <sup>e</sup> Composite variable made up of aggregate score of 3 items. Range from 3=low positive perception of CCA Strategy to 21 = high positive perception of CCA Strategy. Higher scores indicate higher positive perception. <sup>f</sup> Items measured on a 7-point Likert-type scale where 1 = Extremely unlikely and 7 = Extremely likely.

The main hypothesis here was:

*Hypothesis 2.2: There are significant differences in the way hoteliers, policy-makers and tourists perceive the PARD strategies.*

An omnibus MANOVA was run to test whether there are significant differences in hoteliers', policy-makers' and tourists' perceptions of: 1) the attributes associated with the PARD strategies, and 2) their likelihood to choose/support adaptation to climate change using the PARD strategies. A significant result was obtained,  $F(16,720) = 6.746, p < 0.0005$ ; Pillai's Trace = 0.261. Follow-up ANOVAs revealed that there are significant differences in group perceptions of the attributes associated with the Accommodation,  $F(2,366) = 20.027; p < 0.0005$ , Retreat,  $F(2,366) = 22.874; p < 0.0005$  and Diversification strategies,  $F(2,366) = 3.716; p = 0.025$ . Significant differences were also found for group perceptions of the likelihood of supporting adaptation to climate change using the Protection,  $F(2,366) = 5.073; p = 0.007$ , Retreat,  $F(2,366) = 1.702; p < 0.0005$  and Diversification strategies,  $F(2,366) = 4.439; p = 0.012$ . There was no significant difference for group perceptions of the attributes associated with the Protection strategy,  $F(2,366) = 0.002; p = 0.998$ , as well as, for group perceptions of the likelihood of supporting adaptation to climate change using the Accommodation strategy,  $F(2,366) = 0.748; p = 0.474$ . Post-hoc Scheffé and Games-Howell tests confirmed the following statistically significant differences across all three groups (Table 5.4):

**Table 5.4 Significant independent samples t test results of group differences on perceptions of PARD attributes and likelihood to choose/support adaptation to climate change using the PARD strategies**

Items		<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>	Mean difference	<i>p</i> value	Comparison
<sup>a, c</sup> Accommodation attributes	Hot	3.79	1.208	Tour	4.71	1.162	-0.91*	<0.0005	Hot < Tour
<sup>a, c</sup> Retreat attributes	Hot	2.95	1.338	Tour	4.01	1.310	-1.10*	<0.0005	Hot < Tour
<sup>b, c</sup> Diversification attributes	Hot	4.74	1.076	Pol	5.50	0.859	<b>-0.76</b>	<b>0.028</b>	<b>Hot &lt; Pol</b>
	Pol	5.50	0.859	Tour	4.84	1.231	<b>0.66</b>	<b>0.041</b>	<b>Pol &gt; Tour</b>
Likelihood to choose/support Protection	Pol	4.82	1.651	Tour	3.65	1.771	<b>1.17</b>	<b>0.010</b>	<b>Pol &gt; Tour</b>
<sup>a</sup> Likelihood to choose/support Retreat	Hot	2.88	1.725	Pol	4.23	1.716	-1.34*	0.004	Hot < Pol
	Hot	2.88	1.725	Tour	4.00	1.653	-1.17*	<0.0005	Hot < Tour
<sup>b</sup> Likelihood to choose/support Diversification	Hot	3.77	1.643	Pol	4.95	1.214	-1.19*	0.001	Hot < Pol

Note: \* Mean differences significant with Bonferroni correction ( $p \leq 0.00625$ ) (2 tailed) <sup>a</sup> Equal variances assumed. <sup>b</sup> Equal variances not assumed. <sup>c</sup> Mean of mean values used. Results in bold are significant at the ANOVA level ( $p \leq 0.05$ ) but do not show significance at the t test level ( $p \leq 0.00625$ ).

Hoteliers have significantly lower perceptions of the attributes or features associated with the Accommodation and Retreat strategies than tourists. Hoteliers are also significantly less likely to adapt or support adaptation using Retreat than policy-makers and tourists. Hoteliers have significantly lower perceptions of using Diversification than policy-makers. Hoteliers have lower perceptions than policy-makers of Diversification attributes while policy-makers have higher perceptions than tourists of Diversification attributes and likelihood to choose Protection to adapt to climate change.

Next, perceptions of CCA is further examined at the level of the individual attributes associated with the PARD strategies to identify whether there are any significant differences in hoteliers', policy-makers' and tourists' perceptions of the individual attributes associated with the PARD strategies by running four omnibus MANOVAs. A significant result was obtained for the Accommodation,  $F(6,864) = 16.798, p < 0.0005$ ; Pillai's Trace = 0.209, Retreat,  $F(6,862) = 9.479, p < 0.0005$ ; Pillai's Trace = 0.162, and Diversification strategies,  $F(6,872) = 10.249, p < 0.0005$ ; Pillai's Trace = 0.132. There was no evidence of significant differences in hoteliers', policy-makers' and tourists' perceptions of the individual attributes associated with the Protection strategy,  $F(8,888) = 1.851, p = 0.064$ ; Pillai's Trace = 0.033.

Regarding the Accommodation strategy, follow-up ANOVAs revealed that there are significant differences across group perceptions of lifting hotel buildings up on piles,  $F(2,436) = 12.562; p < 0.0005$ , and no longer offering rooms on the ground floor,  $F(2,436) = 47.399; p < 0.0005$ .

Follow-up ANOVAs showed that for the Retreat strategy, there are significant differences across groups regarding their perceptions of not having hotel rooms that are right on the beach,  $F(2,436) = 13.989; p < 0.0005$ , asking guests to take a 100 m walk to get to the beach,  $F(2,436) = 14.439; p < 0.0005$ , asking guests to take a 500 m walk to get to the beach,  $F(2,436) = 10.706; p < 0.0005$ , and asking guests to take a free shuttle bus to get to the beach,  $F(2,436) = 29.604; p < 0.0005$ .

The follow-up ANOVAs for the three attributes associated with the Diversification strategy were likewise all significant showing that there are differences across groups regarding their perceptions of having less beach hotels in operation,  $F(2,440) = 11.371; p < 0.0005$ , offering more eco-tourism activities,  $F(2,440) = 8.347; p < 0.0005$ , and offering more cultural tourism activities,  $F(2,440) = 15.126; p < 0.0005$ .

Post-hoc Scheffé and Games-Howell tests confirmed the following statistically significant differences in tourists' and tourism suppliers' perceptions of the attributes associated with the Accommodation, Retreat and Diversification strategies (Table 5.5):



**Table 5.5 Significant independent samples *t* test results of group differences in perceptions of the individual attributes of the Accommodation, Retreat and Diversification strategies**

Items		<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>	Mean difference	<i>p</i> value	Comparison
<sup>a</sup> Lifting hotel buildings up on piles	Hot	3.50	1.856	Tour	4.36	1.456	-0.86*	<0.0005	Hot < Tour
<sup>b</sup> No rooms on the ground floor	Hot	2.54	1.611	Tour	4.21	1.466	-1.67*	<0.0005	Hot < Tour
<sup>b</sup> No hotel rooms right on the beach	Hot	2.99	1.714	Tour	3.89	1.418	-0.90*	<0.0005	Hot < Tour
<sup>b</sup> Guests taking 100 m walk	Hot	3.55	1.598	Tour	4.48	1.500	-0.93*	<0.0005	Hot < Tour
<sup>b</sup> Guests taking 500 m walk	Hot	2.76	1.584	Tour	3.62	1.716	-0.86*	<0.0005	Hot < Tour
<sup>a</sup> Guests taking free shuttle bus	Hot	2.45	1.466	Pol	4.30	1.822	-1.85*	<0.0005	Hot < Pol
	Hot	2.45	1.466	Tour	4.03	1.942	-1.58*	<0.0005	Hot < Tour
<sup>b</sup> Having fewer beach hotels	Hot	2.73	1.661	Tour	3.64	1.738	-0.91*	<0.0005	Hot < Tour
<sup>a</sup> More ecotourism	Hot	5.73	1.256	Pol	6.40	0.814	-0.67*	0.003	Hot < Pol
	Pol	6.40	0.814	Tour	5.41	1.436	0.99*	<0.0005	Hot < Tour
<sup>a</sup> More cultural tourism	Hot	5.81	1.231	Pol	6.67	0.547	-0.85*	<0.0005	Hot < Pol
	Pol	6.67	0.547	Tour	5.37	1.432	1.30*	<0.0005	Pol > Tour

Note: \* Mean differences significant with Bonferroni correction ( $p \leq 0.00333$ ) (2 tailed) <sup>a</sup> Equal variances not assumed. <sup>b</sup> Equal variances assumed

Hoteliers have significantly lower perceptions than tourists of: 1) lifting hotel buildings up on piles, 2) not having rooms on the ground floor, 3) not having hotel rooms that are right on the beach, 4) asking guests to take a 100 m walk, 5) asking guests to take a 500 m walk, 6) asking guests to take a free shuttle bus to get to the beach, and 7) having fewer beach hotels. Hoteliers have significantly lower perceptions than policy-makers of: 1) offering more ecotourism activities, and 2) offering more cultural tourism activities. Policy-makers have significantly higher perceptions than tourists of: 1) offering more eco-tourism, and 2) offering more cultural tourism activities.

## Ranking of the PARD strategies

Next, by examining the means and confidence intervals for the PARD strategies across hoteliers, policy-makers and tourists (Table 5.6), each PARD strategy is ranked according to their attributes, as well as, likelihood to adapt using the PARD strategies or to visit a destination that has used the PARD strategies.

**Table 5.6 Means and confidence intervals of group perceptions of PARD strategy attributes and likelihood**

	Hoteliers			Policy-makers			Tourists		
	<i>M</i>	95% confidence interval of the difference		<i>M</i>	95% confidence interval of the difference		<i>M</i>	95% confidence interval of the difference	
		Lower	Upper		Lower	Upper		Lower	Upper
Protection attributes	3.12	2.89	3.36	3.17	2.87	3.46	3.16	3.03	3.29
Accommodation attributes	3.77	3.54	4.01	4.42	4.09	4.74	4.66	4.53	4.79
Retreat attributes	2.94	2.68	3.20	3.86	3.39	4.33	4.01	3.86	4.15
Diversification attributes	4.76	4.55	4.97	5.63	5.34	5.92	4.81	4.67	4.94
Protection likelihood	3.9	3.58	4.22	4.91	4.37	5.44	3.67	3.46	3.87
Accommodation likelihood	4.24	3.91	4.57	4.63	4.07	5.19	4.16	3.98	4.34
Retreat likelihood	2.80	2.44	3.16	4.38	3.74	5.02	4.07	3.88	4.26
Diversification likelihood	3.76	3.43	4.10	5.12	4.61	5.63	4.25	4.04	4.45

From the above, the following rankings are clear (Table 5.7):

**Table 5.7 Ranking of PARD attributes, likelihood to adapt using the PARD strategies or to visit a destination that has used the PARD strategies across groups**

	Hoteliers	Policy-makers	Tourists
<b>PARD attributes</b>	1. Diversification 2. Accommodation 3=Protection 3=Retreat	1. Diversification 2. Accommodation 3= Protection 3= Retreat	1= Diversification 1=Accommodation 3. Retreat 4. Protection
<b>Likelihood</b>	1= Diversification 1= Accommodation 1= Protection 4. Retreat	1= Diversification 1= Accommodation 1= Protection 1= Retreat	1= Diversification 1= Accommodation 1= Retreat 4. Protection

### *PARD composite attributes*

There are similarities and differences in respondents' choice of strategies. For example, hoteliers, policy-makers and tourists all rate Diversification and Accommodation highly in terms of overall attractiveness and Protection and Retreat as the least attractive strategies. Hoteliers and policy-makers have high positive perceptions of the attributes associated with the Diversification strategy. These perceptions surpass all other strategies with Accommodation, Protection and Retreat consistently ranking second, third and fourth. Tourists have equally high perceptions of the attributes associated with the Diversification and Accommodation strategies. Perceptions of Retreat rank third while Protection is viewed the most negatively of the four PARD strategies. Although Diversification is attractive for all groups, it is only attractive within the present paradigm of the existence of beach hotels. This is apparent from the fact that an increase in eco-tourism and cultural tourism were highly rated by hoteliers, policy-makers and tourists but the prospect of less beach hotels as a key attribute of Diversification was consistently rated negatively by all three groups.

### *Likelihood*

The data suggests that hoteliers are likely to equally prioritise Accommodation, Protection, and Diversification to adapt to climate change. Retreat is their least likely strategy option. On the other hand, policy-makers are equally likely to adopt any of the four PARD strategies. Tourists' are equally likely to choose a destination that has adapted using the Accommodation, Retreat and Diversification strategies, while they are least likely to go to a destination that has implemented increased Protection.

### **Rating of PARD attributes**

Finally, the ratings given by hoteliers, policy-makers and tourists for the individual attributes based on their response to 7-point Likert scales were analysed. Table 5.8 presents the means and confidence intervals for the individual attributes of the PARD strategies across hoteliers, policy-makers and tourists.

**Table 5.8 Means and confidence intervals of group perceptions of the PARD attributes**

Strategy	Code	Attribute	Hoteliers			Policy-makers			Tourists		
			<i>M</i>	95% confidence interval of the difference		<i>M</i>	95% confidence interval of the difference		<i>M</i>	95% confidence interval of the difference	
				Lower	Upper		Lower	Upper		Lower	Upper
Protection	P1	Building more concrete walls than are generally present now on beaches	2.76	2.46	3.05	2.72	2.30	3.15	2.68	2.52	2.83
	P2	Building more rock structures than are generally present now on beaches	3.73	3.40	4.06	3.81	3.28	4.34	3.98	3.82	4.14
	P3	Raising the height of existing walls and structures	3.22	2.91	3.52	3.46	3.01	3.91	3.04	2.89	3.20
	P4	Beaches that increasingly have an appearance that is not 100% natural	2.74	2.45	3.04	2.80	2.24	3.36	2.96	2.79	3.14
Accommodation	A1	Investing in the resistance of hotel buildings and infrastructure	5.42	5.14	5.70	5.97	5.69	6.25	5.41	5.27	5.55
	A2	Investing in disaster management systems	5.70	5.44	5.95	6.47	6.24	6.69	-	-	-
	A3	Lifting hotel buildings up on piles	3.50	3.13	3.87	3.74	3.23	4.25	4.37	4.20	4.53
	A4	No longer offering rooms on the ground floor	2.59	2.27	2.91	3.41	2.84	3.97	4.22	4.05	4.38
Retreat	R1	Not having hotel rooms that are right on the beach	3.02	2.68	3.36	4.00	3.33	4.67	3.93	3.77	4.09
	R2	Asking guests to take a 100 m walk to get to the beach	3.57	3.26	3.89	4.10	3.62	4.58	4.52	4.35	4.68
	R3	Asking guests to take a 500 m walk to get to the beach	2.76	2.45	3.07	3.03	2.44	3.63	3.64	3.45	3.83
	R4	Asking guests to take a free shuttle bus to get to the beach	2.45	2.16	2.74	4.30	3.62	4.98	4.04	3.83	4.26

Strategy	Code	Attribute	Hoteliers			Policy-makers			Tourists		
			<i>M</i>	95% confidence interval of the difference		<i>M</i>	95% confidence interval of the difference		<i>M</i>	95% confidence interval of the difference	
				Lower	Upper		Lower	Upper		Lower	Upper
Diversification	D1	Having less beach hotels in operation	2.75	2.42	3.07	3.83	3.14	4.53	3.64	3.45	3.84
	D2	Offering more ecotourism activities	5.73	5.48	5.97	6.40	6.10	6.70	5.42	5.26	5.57
	D3	Offering more cultural tourism activities	5.81	5.57	6.05	6.67	6.46	6.87	5.37	5.21	5.53

Note: A2 was examined with hoteliers and policy-makers only.

From Table 5.8, the following ratings are clear for: 1) hoteliers and tourism policy-makers (Table 5.9), 2) hoteliers and tourists (Table 5.10), and 3) policy-makers and tourists (Table 5.11).

**Table 5.9 Perception rating of PARD attributes between policy-makers and hoteliers**

Strategy		Attribute	Policy-makers	Hoteliers	Comparison
Protection	p1	Building more concrete walls than are generally present now on beaches	Negative	Negative	Match
	p2	Building more rock structures than are generally present now on beaches	Ambivalent	Ambivalent	Match
	p3	Raising the height of existing walls and structures	Negative	Negative	Match
	p4	Beaches that increasingly have an appearance that is not 100% natural	Negative	Negative	Match
Accommodation	A1	Investing in the resistance of hotel buildings and infrastructure	Positive	Positive	Match
	A2	Investing in disaster management systems	Positive	Positive	Match
	A3	Lifting hotel buildings up on piles	Ambivalent	Negative	Mismatch
	A4	No longer offering rooms on the ground floor	Negative	Negative	Match
Retreat	R1	Not having hotel rooms that are right on the beach	Ambivalent	Negative	Mismatch
	R2	Asking guests to take a 100 m walk to get to the beach	Ambivalent	Ambivalent	Match
	R3	Asking guests to take a 500 m walk to get to the beach	Negative	Negative	Match
	R4	Asking guests to take a free shuttle bus to get to the beach	Ambivalent	Negative	Mismatch
Product diversification	D1	Having less beach hotels in operation	Ambivalent	Negative	Mismatch
	D2	Offering more ecotourism activities	Positive	Positive	Match
	D3	Offering more cultural tourism activities	Positive	Positive	Match

Notes: Scores for measures classified as “Positive” are 1) larger than 4 on 7-point Likert scale, and 2) are larger than every other measure.

**Table 5.10 Perception rating of PARD attributes between hoteliers and tourists**

Strategy		Attribute	Hoteliers	Tourists	Comparison
Protection	P1	Building more concrete walls than are generally present now on beaches	Negative	Negative	Match
	P2	Building more rock structures than are generally present now on beaches	Ambivalent	Ambivalent	Match
	P3	Raising the height of existing walls and structures	Negative	Negative	Match
	P4	Beaches that increasingly have an appearance that is not 100% natural	Negative	Negative	Match
Accommodation	A1	Investing in the resistance of hotel buildings and infrastructure	Positive	Positive	Match
	A2	Investing in disaster management systems	Positive	-	-
	A3	Lifting hotel buildings up on piles	Negative	Positive	Mismatch
	A4	No longer offering rooms on the ground floor	Negative	Positive	Mismatch
Retreat	R1	Not having hotel rooms that are right on the beach	Negative	Ambivalent	Mismatch
	R2	Asking guests to take a 100 m walk to get to the beach	Ambivalent	Positive	Mismatch
	R3	Asking guests to take a 500 m walk to get to the beach	Negative	Negative	Match
	R4	Asking guests to take a free shuttle bus to get to the beach	Negative	Ambivalent	Mismatch
Product diversification	D1	Having less beach hotels in operation	Negative	Negative	Match
	D2	Offering more ecotourism activities	Positive	Positive	Match
	D3	Offering more cultural tourism activities	Positive	Positive	Match

Notes: Scores for measures classified as "Positive" are 1) larger than 4 on 7-point Likert scale, and 2) are larger than every other measure.

**Table 5.11 Perception rating of PARD attributes between policy-makers and tourists**

Strategy		Attribute	Policy-makers	Tourists	Comparison
Protection	P1	Building more concrete walls than are generally present now on beaches	Negative	Negative	Match
	P2	Building more rock structures than are generally present now on beaches	Ambivalent	Ambivalent	Match
	P3	Raising the height of existing walls and structures	Negative	Negative	Match
	P4	Beaches that increasingly have an appearance that is not 100% natural	Negative	Negative	Match
Accommodation	A1	Investing in the resistance of hotel buildings and infrastructure	Positive	Positive	Match
	A2	Investing in disaster management systems	Positive	-	-
	A3	Lifting hotel buildings up on piles	Ambivalent	Positive	Mismatch
	A4	No longer offering rooms on the ground floor	Negative	Positive	Mismatch
Retreat	R1	Not having hotel rooms that are right on the beach	Ambivalent	Ambivalent	Match
	R2	Asking guests to take a 100 m walk to get to the beach	Ambivalent	Positive	Mismatch
	R3	Asking guests to take a 500 m walk to get to the beach	Negative	Negative	Match
	R4	Asking guests to take a free shuttle bus to get to the beach	Ambivalent	Ambivalent	Match
Product diversification	D1	Having less beach hotels in operation	Ambivalent	Negative	Mismatch
	D2	Offering more ecotourism activities	Positive	Positive	Match
	D3	Offering more cultural tourism activities	Positive	Positive	Match

Notes: Scores for measures classified as "Positive" are 1) larger than 4 on 7-point Likert scale, and 2) are larger than every other measure.

### *Matches*

Between hoteliers and policy-makers, there were eleven good matches. Between hoteliers and tourists, there were nine good matches. Finally, while between policy-makers and tourists, there were nine good matches.

### *Mismatches*

Mismatches were in two forms: 1) an under-perception, or 2) an over-perception. Using supplier views as the anchor viewpoint in comparisons between suppliers and tourists, and policy-maker views as the anchor viewpoint in comparisons between hoteliers and policy-makers, it is apparent that between hoteliers and policy-makers, there were no measures on



which there was a mismatch in the form of an under-perception; between hoteliers and tourists, there were five instances of under-perceptions and between policy-makers and tourists, there were three. Between hoteliers and policy-makers, there were four over-perceptions; between hoteliers and tourists, there were no over-perceptions and between policy-makers and tourists, there were two instances where policy-makers perceived that the perceptions of tourists were higher than reality.

The groups with the most prevalent mismatches was between suppliers and tourists with five mismatches each between hoteliers and tourists and policy-makers and tourists respectively. Mismatches between hoteliers and policy-makers was close in number, with a total of four.

### Attributes and decision-making

An interesting question to answer was whether attribute perceptions (and by extension differences in attribute perceptions) were significant to decision-making. Separate simple linear regressions were performed to investigate this.

*H 2.3: PARD perceptions are significantly associated with hoteliers' and tourism policy-makers' likelihood to adapt using a specific PARD strategy, as well as, tourists' likelihood to choose a destination that has used a specific PARD strategy.*

Twelve simple linear regressions were performed to examine the relationship between PARD perceptions and hoteliers', policy-makers' and tourists' likelihood to support using a specific PARD strategy. The significant results are summarised in Table 5.12:

**Table 5.12 Simple linear regression results of hoteliers', policy-makers' and tourists' perceptions of PARD attributes and likelihood to support the PARD strategies**

Group	Predictors	Outcomes	$\beta$	Adjusted $R^2$	$F (df_N, df_D)$
Hoteliers	Protection attributes	Protection likely	0.375*	0.131	15.379 (1,94)
	Accommodation attributes	Accommodation likely	0.428*	0.175	21.122 (1,94)
	Retreat attributes	Retreat likely	0.374*	0.130	14.794 (1,91)
	Diversification attributes	Diversification likely	0.334*	0.101	11.160 (1,89)
Tourists	Protection attributes	Protection likely	0.552*	0.303	127.748 (1,291)
	Accommodation attributes	Accommodation likely	0.427*	0.180	64.530 (1,289)
	Retreat attributes	Retreat likely	0.503*	0.250	98.056 (1,290)
	Diversification attributes	Diversification likely	0.594*	0.351	159.873 (1,293)

Note:  $\beta$  = standardised coefficient \* $\beta$  significant at  $p \leq 0.05$  level.

For policy-makers, there is no evidence of a significant relationship between PARD likelihood and perceptions of the PARD strategies and that analysis is therefore excluded from presentation in Table 5.12. By contrast, PARD likelihood is significantly associated with perceptions of the PARD strategies for hoteliers and tourists. The results show that the PARD strategy attributes have a significant association for hoteliers' and tourists' likelihood to support all four adaptation strategies. Attribute perception explained fair amounts of variance in likelihood to support Protection (30.3%), Accommodation (18%), Retreat (25%) and Diversification (35.1%).

## 5.4 Beach perception gaps

As a first step to examining to what extent there are beach perception gaps amongst hoteliers, policy-makers and tourists; the means and standard deviations for beach perceptions of hoteliers, policy-makers and tourists were calculated (Table 5.13).

**Table 5.13 Means and standard deviations of group perceptions of the importance of the beach**

Items	Hoteliers			Policy-makers			Tourists		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
<sup>a</sup> Natural appearance of coastal hotel beaches	122	6.30	0.88	39	6.21	0.86	308	5.69	1.45
<sup>a</sup> Closeness of the beach to coastal hotels	122	6.14	1.12	39	6.13	0.92	310	5.64	1.49
<sup>b</sup> <b>Total beach perception</b>	<b>121</b>	<b>12.45</b>	<b>1.71</b>	<b>39</b>	<b>12.33</b>	<b>1.42</b>	<b>306</b>	<b>11.36</b>	<b>2.36</b>
<sup>c</sup> <b>Standardised total beach perception</b>	<b>121</b>	<b>6.22</b>	<b>0.854</b>	<b>39</b>	<b>6.17</b>	<b>0.710</b>	<b>306</b>	<b>5.68</b>	<b>1.182</b>

Note: <sup>a</sup> Natural appearance of coastal hotel beaches = Importance of natural appearance of coastal hotel beaches; single item measured on a 7-point Likert-type scale of 1 = Not important at all, 7 = Extremely important. <sup>b</sup> Closeness of the beach to coastal hotels = Importance of closeness of coastal hotel beaches; single item measured on a 7-point Likert-type scale of 1 = Not important at all, 7 = Extremely important. <sup>c</sup> Total Perception of the Beach = Total perception of the importance of natural appearance and closeness of beach. Higher scores indicate higher perception of the importance of natural appearance and closeness of beach. Range from 2 = low perception of beach importance to 14 = high perception of beach importance. <sup>c</sup> Standardised Total Beach Perception = Total Beach Perception divided by the number of scale items.

The first hypothesis investigated with regards to beach perception gaps was:

*Hypothesis 2.4: There are significant differences in the way hoteliers, policy-makers and tourists perceive the importance of the appearance and proximity of the beach.*

An omnibus MANOVA was run to test whether there are significant differences in hoteliers', policy-makers' and tourists' perceptions of the importance of the appearance and the closeness of the beach. A significant result was obtained,  $F(4, 926) = 6.519, p < 0.0005$ ; Pillai's Trace = 0.055. Follow-up ANOVAs revealed that there are significant differences in group perceptions of the importance of the appearance,  $F(2, 466) = 10.856; p < 0.0005$ , and the closeness of the beach,  $F(2, 466) = 24.255; p = 0.001$ . Post-hoc Games-Howell tests confirmed the following statistically significant differences across all three groups (Table 5.14):

**Table 5.14 Significant independent samples *t* test results of group differences on the importance of the appearance and closeness of the beach in the choice of tourist accommodation**

Item		<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>	Mean difference	<i>p</i> value	Comparison
Natural appearance of the beach	Hot	6.30	0.882	Tour	5.69	1.452	0.60*	<0.0005	Hot > Tour
	Pol	6.21	0.864	Tour	5.69	1.452	0.51*	0.006	Pol > Tour
Closeness of the beach	Hot	6.15	1.116	Tour	5.66	1.474	0.49*	0.001	Hot > Tour
	Pol	6.13	0.923	Tour	5.66	1.474	0.46*	0.022	Pol > Tour

Note: \* Mean differences significant with Bonferroni correction ( $p \leq 0.025$ ) (2 tailed)

The above results make clear that hoteliers and policy-makers have a significantly higher perception of the importance of the appearance of the beach than tourists. Similarly, hoteliers and policy-makers have a significantly higher perception of the importance of the proximity of the beach than tourists. In contrast, there was no significant difference of the importance of the appearance and closeness of the beach between hoteliers and policy-makers. The above is an interesting result that yielded partial support for the hypothesis. Given the qualitative result in Section 4.2.1.2 that suggested that hoteliers and tourism policy-makers perceive DRM to be a lower business priority than hotel proximity to the beach, a test was performed to see whether there are differences between the levels of perceived importance of the beach and the perceived importance of DRM considerations in the choice of tourist accommodation.

The second hypothesis investigated was:

*Hypothesis 2.5: There is a significant difference between the levels of beach and DRM perceptions across hoteliers, policy-makers, and tourists.*

An omnibus MANOVA was run to test whether there are significant differences in hoteliers', policy-makers' and tourists' perceptions of the importance of 1) the beach, and 2) the importance of DRM. A significant result was obtained,  $F(4,830) = 13.877, p < 0.0005$ ; Pillai's Trace = 0.125. Follow-up ANOVAs revealed that there are significant differences in group perceptions of the beach,  $F(2,415) = 13.791; p < 0.0005$ , and DRM,  $F(2,415) = 20.859; p < 0.0005$ . Post-hoc Games-Howell tests confirmed the following statistically significant differences across all three groups (Table 5.15):

**Table 5.15 Significant independent samples t test results of group differences in beach and DRM perception**

Strategy		<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>	Mean difference	<i>p</i> value	Comparison
Beach perception	Hot	6.23	0.844	Tour	5.65	1.178	0.58*	<0.0005	Hot>tour
	Pol	6.17	0.710	Tour	5.65	1.178	0.52*	0.001	Pol>tour
DRM perception	Hot	5.19	1.470	Tour	4.19	2.077	1.00*	<0.0005	Hot>tour
	Pol	5.85	1.378	Tour	4.19	2.077	1.67*	<0.0005	Pol>tour

Note: Standardised versions of the composite beach and DRM perceptions used in this analysis. Mean differences significant with Bonferroni correction at  $p < 0.008$  level (2 tailed).

While there are no significant differences in how hoteliers and policy-makers view the importance of the beach or the importance of DRM, there are significant differences between suppliers (hoteliers and policy-makers) and tourists. Hoteliers and policy-makers both have significantly higher perceptions of the importance of the beach and of DRM than tourists.

#### Beach perception and decision-making

The significant results obtained above led to the investigation of the role played by beach perception in demand and supply-side decision-making. The following hypothesis was formulated for testing:

*Hypothesis 2.6: Beach perception is significantly related to hoteliers' and tourism policy-makers' likelihood to adapt using a specific PARD strategy, as well as tourists' likelihood to choose a destination that has used a specific PARD strategy.*

Twelve simple linear regressions were performed to examine the relationship between beach perception and hoteliers', policy-makers' and tourists' likelihood to support a specific PARD strategy. The significant results are summarised in Table 5.16:

**Table 5.16 Simple linear regression results of beach perception and likelihood to support the PARD strategies**

Group	Strategy Likelihood	$\beta$	Adjusted $R^2$	$F (df_N, df_D)$
Tourists	Protection	0.143*	0.017	6.020 <sub>(1,287)</sub>
	Accommodation	0.145*	0.018	6.243 <sub>(1,289)</sub>
	Retreat	-0.141*	0.016	5.791 <sub>(1,285)</sub>
	Diversification	-0.228*	0.049	15.712 <sub>(1,286)</sub>

Note:  $\beta$  = standardised coefficient \* $\beta$  significant at  $p \leq 0.05$  level.

Significant associations were only found for tourists. Beach perception was significantly positively related to the likelihood to choose a destination using the Protection and Accommodation strategies. In contrast, beach perception was significantly negatively related to tourists' likelihood to choose a destination that uses the Retreat and Diversification strategies. The significant associations between variables for suppliers and tourists are summarised in Table 5.17.

**Table 5.17 Significant associations between variables for hoteliers, policy-makers and tourists**

	Strategy/ measure	Associated variables	Evidence of a relationship		
			Hoteliers	Policy-makers	Tourists
CCA	Protection	Beach perception and likelihood	No	No	Yes
		Attributes and likelihood	Yes	No	Yes
	Accommodation	Beach perception and likelihood	No	No	Yes
		Attributes and likelihood	Yes	No	Yes
	Retreat	Beach perception and likelihood	No	No	Yes
		Attributes and likelihood	Yes	No	Yes
	Diversification	Beach perception and likelihood	No	No	Yes
		Attributes and likelihood	Yes	No	Yes

## 5.5 Summary

This chapter investigated Research Issue 2 of this research programme, namely, how perception gaps between demand and supply-side stakeholders may inhibit coherent action on managing disaster risk to advance climate change adaptation. Statistical tests were performed on three sets of quantitative data to examine six hypotheses which were supported in part, meaning that some but not all of the statistical tests related to each hypothesis were significant. The only exception was H 2.4.2 which was fully supported. These results are summarised in Table 5.18:

**Table 5.18 Summary of results for Research Issue 2**

Overall hypotheses	Result
H 2.1: There is a significant difference in the levels of DRM perceptions across hoteliers, policy-makers and tourists.	Supported in part
H 2.2: There are significant differences in the way hoteliers, policy-makers and tourists perceive the PARD strategies.	Supported in full
H 2.3: PARD perceptions are significantly associated with hoteliers' and tourism policy-makers' likelihood to adapt using a specific PARD strategy, as well as tourists' likelihood to choose a destination that has used a specific PARD strategy.	Supported in part
H 2.4: There are significant differences in the way hoteliers, policy-makers and tourists perceive the importance of the appearance and proximity of the beach.	Supported in part
H 2.6: Beach perception is significantly related to hoteliers' and tourism policy-makers' likelihood to adapt using a specific PARD strategy, as well as tourists' likelihood to choose a destination that has used a specific PARD strategy.	Supported in part
H 2.5: There is a significant difference between the levels of beach and DRM perceptions across hoteliers, policy-makers, and tourists.	Supported in part

## Chapter 6

### Discussion

#### 6.1 Introduction

The knowledge gaps identified in Chapter 2 that drive this research investigation centre around two Research Issues: 1) our coarse understanding of the links and limits of the supplier protective behaviour decision-making process in the DRM and CCA contexts, and 2) a lack of theoretical and empirical research on how perception gaps between demand and supply-side stakeholders may inhibit coherent action on managing disaster risk to advance climate change adaptation. The results presented in Chapters 4 and 5 suggested that there are behavioural links and limits between: 1) supplier DRM and CCA decision-making, and 2) demand and supply-side interaction that facilitates the management of DRM to advance CCA in the Caribbean coastal tourism context. This chapter sets out to discuss this in two Sections. Section 6.2 addresses behavioural links and limits in relation to Research Issue 1. This discussion is structured within the frame of a new generalised model of supplier protective decision-making. Section 6.3 deals with behavioural links and limits in relation to Research Issue 2. The final Section concludes the Chapter.

#### 6.2 Research Issue 1: The supplier disaster risk management and climate change adaptation decision-making processes are not well understood

Research Issue 1 seeks to address the dearth of knowledge on the behavioural links and limits of the DRM and CCA decision-making processes of Caribbean coastal tourism suppliers. It is proposed that a better understanding of the decision-making process and its main determinants may be key to predicting DRM and CCA behavioural intention. The results generated in response to this Research Issue will now be discussed in two parts. First, a revised generalised model of supplier protective decision-making is presented, and then the research findings are discussed within the frame of the new, generalised model and its main components, namely, the stages, factors and outcomes that influence the protective decision-making process.

##### 6.2.1 A new, generalised model of supplier protective decision-making

Chapter 2 concluded with an initial descriptive and explanatory graphic representation of the supplier protective decision-making process (Figure 2.6). This Section presents and discusses a revised generalised model of supplier protective decision-making (Figure 6.1) developed as a result of a testing and refinement process using empirical data from four studies (qualitative interviews ( $n=27$ ) and quantitative surveys ( $n=124$ ,  $n=39$ ,  $n=320$ )). Ultimately, this research rejected or confirmed research propositions and hypotheses, leading to the elimination, modification, or acceptance of the proposed elements within the model. This enhanced model draws on, extends and synthesises well-used theories and approaches in the literature, namely, the Adjustment Process Control model, the Theory of Planned Behaviour and the Choice Set approach.

The new generalised model for supplier protective decision-making descriptively illustrates the stages of protective decision-making process. It is comprised of stages, influencing factors and outcomes. There are four decision stages (problem recognition, adjustment search, adjustment evaluation and intention evaluation) that result in seven decision outcomes (risk set, awareness set, inert set, reject set, late consideration set, behavioural intention and final choice). Climatic and non-climatic factors (climate risk perception, experience with impact, experience with/knowledge of adjustments, perceptions of adjustment attributes, attitude, subjective norm and perceived behavioural control) influence the protective decision-making process.

The endpoint of each decision stage is a decision outcome whose formation is influenced by a matrix of key climatic and non-climatic factors. These factors play a role at each decision stage in the decision-making process. Decision outcomes progress sequentially towards final choice(s). The sequential structure of the protective decision-making process is significant, as a number of process related implications emerge from recognition of this staged model. The recognition of different decision stages is important in conceptualising decision-making as each stage has different influencing factors that result in different outcomes and hence, implications for final choice.

In line with Paton (2003), the model has implications for conceptualising and implementing DRM and CCA. For example, the model implies that DRM and CCA interventions should consider the implications of 'how' decisions are made and the underlying components of the decision-making process ('what' and 'why') in order to design interventions with the greatest impact. The overarching characteristic of the protective decision-making process is that of a boundedly rational decision-maker utilising emotion and reason in the context of imperfect information, cognitive abilities, and time. Protective decisions necessarily satisfice rather than maximise. Although the model demonstrates the complex interaction of variables within the mental processes of aggregate decision-makers, it should be noted that the process for each individual will have their own unique combinations. Finally, the generalised model is only suggestive in its description of relationships. Only association and not causality can be assumed. The influencing factors, stages and outcomes of the new, generalised model of supplier protective decision-making will now be discussed.



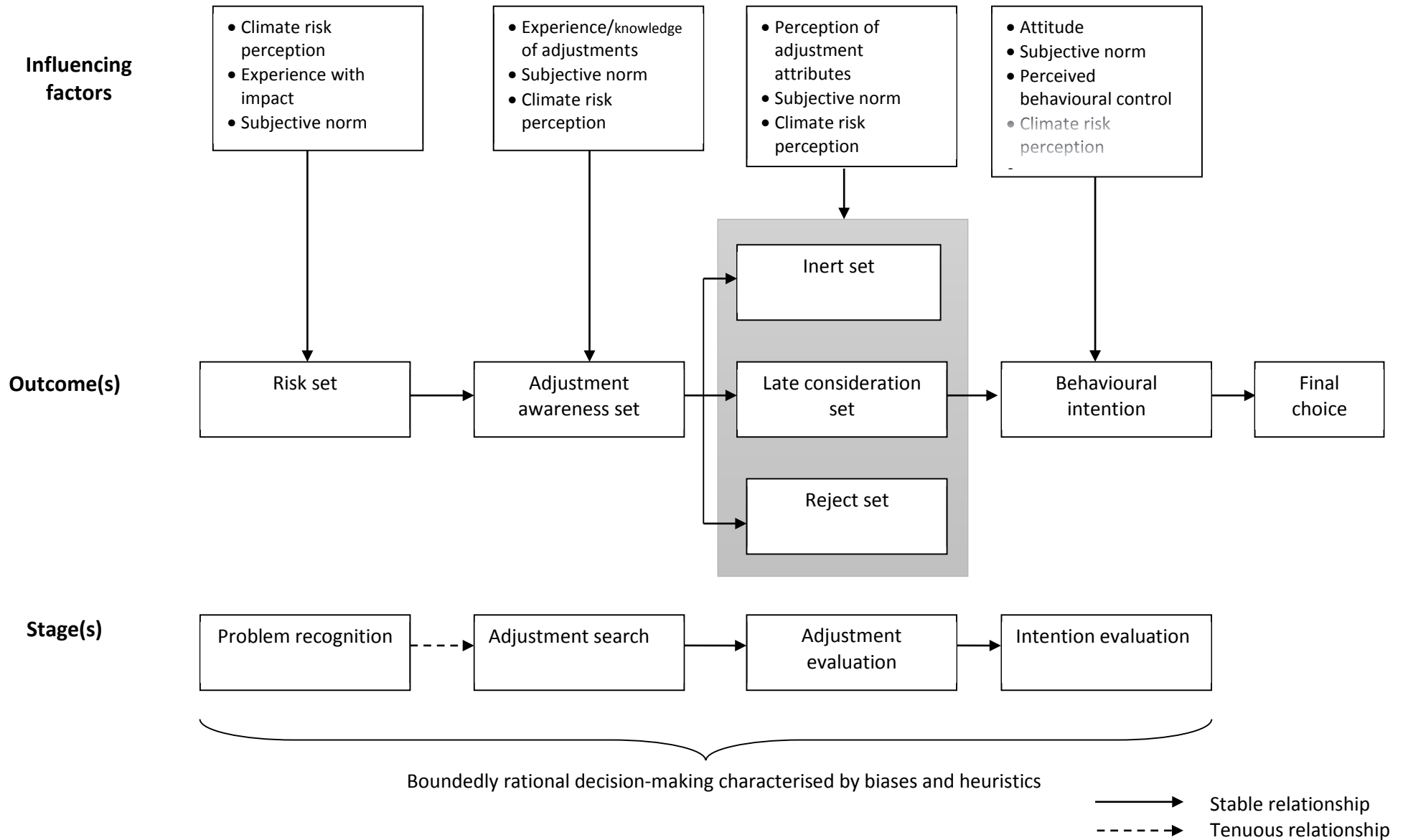


Figure 6.1 Schematic of a new generalised model of tourism supplier protective decision-making

## 6.2.2 Problem recognition, the risk set and influencing factors

### 6.2.2.1 *Problem recognition versus hazard perception threshold*

Kates' (1971) model (see Section 2.3.3) purports that there are three main sequential components of the decision-making process leading to the adoption (or rejection) of a DRM or CCA measure. First, there is a hazard perception threshold, that is, decision-makers must be sufficiently aware of the problem and worried by it before they can act. According to Kates (1971), a breach of the hazard perception threshold plays a central role in triggering the entire supplier adjustment choice process.

It was apparent that the new, generalised model of supplier protective decision-making should have as its starting point a stage referred to as 'problem recognition'. This is based on research results which showed that various factors (climatic and non-climatic) play a role in influencing problem recognition. Recognition may or may not trigger adjustment search. In the DRM context, some suppliers act once the problem is recognised. Others recognise the problem, but do little to nothing. This reality is represented by the dotted line in the model which indicates a tenuous relationship between problem recognition advancing into the next stage of protective decision-making.

### 6.2.2.2 *The concept of risk sets*

There are different types of risks that are pertinent to supplier decision-making of which climate risk is just one. The concept of a risk set provides a space or 'set' for different risk types to be accommodated. For example, two broad risk sub-categories can be identified from this research: 1) environmental risks under which climate risk would fall, and 2) business risks that would encompass concern about safety risks to guests and employees. For environmental risk, the stimulus is climatic in nature and may be tied to negative experiences with climate-related events, whereas for business risks, subjective norm plays a much more significant role. For example, regulation stimulates adjustment adoption as part of the annual hotel licence renewal process. Alternatively, international tour operators make demands on hoteliers to satisfy safety requirements. A standard example reported by PRI\_JA\_4, a manager of a large hotel in Jamaica, was the requirement to have a hurricane plan. Thus, both these factors are accounted for in the model as influencing the risk set and its contents.

### 6.2.2.3 *Climate risk perception*

#### *Climate risk perception as the trigger of protective decision-making*

This research provides qualitative evidence for CRP triggering the search for adjustments, as well as, quantitative evidence of its association with past adjustment behaviour - but the results are inconclusive concerning whether it is the only trigger, or even whether it is the main trigger. The research results suggest that CRP may not always trigger the adjustment adoption process. Evidence for this lies in the observation that although hoteliers and tourism policy-makers were both aware of and worried by future changes in climate-related disasters, extremes and change (reflected in high mean Future CRP measure results), and so recognised

that this is a problem, they have done little to date to adapt to climate change. There is also variable performance related to present-day climate variability and extremes. CRP's role in influencing intention is even less clear, as there is no quantitative evidence of CRP contributing to behavioural intention to adapt to climate change using a particular PARD strategy.

Importantly, this research provides evidence that there are factors other than climate risk perception that trigger adjustment search. It was found that experience with hazard or disaster impact, social pressure from policy-makers, tour operators, and even tourists, may trigger the adjustment search process. In some instances, environmental cues, including climate-related cues are sufficient triggers. In others, it may require normative cues from policy-makers, the market or business intermediaries. Alternatively, experience with loss or damage have motivated hoteliers. There was qualitative evidence to support this conclusion. For example, PRI\_JA\_4, a hotelier in Jamaica, reported the possibility of sanctions against hotels imposed by international tour operators in the case of guest dissatisfaction with the quality of the beach. It is entirely possible that triggers interact in a complex way and may be a combination of all of the above. The specific nature of motivators and the nature of their influence will be contextual and is a matter for future empirical investigation.

#### *Sextet structure of climate risk perception*

Studies have investigated the influence of hazard awareness and/or knowledge on protective behaviour. However, these conceptions are incomplete primarily because they only address one dimension of the triad structure of disaster risk which encompasses hazard, vulnerability and exposure. Moreover, the qualitative research results have shown that perceptions have a dual structure related to cognition (awareness and/or knowledge) and affect (emotions primarily in the form of worry). The result is a basic core structure of risk perception as a sextet cluster of cognition and affect related to perceptions of hazards, vulnerability and exposure. Recognition of these dimensions is important because if suppliers are worried about the hazard, but they are hardly worried about their vulnerability or exposure, this will have implications for their protective decision-making.

The qualitative interviews showed that in the present-day DRM context, hoteliers are particularly prone to underestimate disaster risk factors namely: 1) the likelihood of hazard events, 2) their vulnerability, and 3) exposure. Hoteliers in particular viewed being within 100 m of the high water mark (their exposure) as a competitive advantage. In the Caribbean coastal tourism context, hoteliers are confident and comfortable operating on the hazardous coast, as past positive experiences dealing with hazards have reinforced a reassurance of their coping and adaptive capacities. Exposure is conceptualised by hoteliers as a means of capturing a business opportunity that continues to be profitable, while vulnerability in the present-day context is viewed as manageable. One major implication is, that if hoteliers underestimate their risk factors (hazard, exposure and exposure), the theoretical role that risk perceptions ought to play in triggering adjustment behaviour may be diminished.

For example, an important finding is that for hoteliers, perceptions of the opportunity of operating on the hazard prone coast outweighs perceptions of the disaster risk, with this group actively perceiving their location (and inherent vulnerability to hazard exposure) as a

competitive advantage. Although intuitive, this dynamic has never been empirically examined and measured before. However, it is useful because this can help to partially explain why: 1) hoteliers continue to invade the coast despite its high exposure, and 2) why compliance with DRM implementation is variably moderate among hoteliers.

#### *Temporal dimension of climate risk perception*

This research provides evidence that there is a temporal component of CRP that must be considered especially in light of projected increases in hazard frequency or intensity, vulnerability and exposure (IPCC, 2012). Statistical differences between Present and Future CRP were tested. Logically, it would be expected that there would be a difference in how suppliers perceive present and future climate risk. The result that there is no difference in how hoteliers and tourism policy-makers think about present and future climate risk was surprising, especially since the qualitative interviews suggested that there was a difference. Recognition of the difference between present and future risk should be apparent among hoteliers and tourism policy-makers that have a solid understanding of the temporal component of climate risk. However, in the Caribbean coastal tourism context, both hoteliers and policy-makers do not display a statistically significant distinction in how they view present and future risk.

A possible explanation, supported by the qualitative interviews with suppliers may be that there is uncertainty regarding the timing and dynamics of climate change. For a few hoteliers, there may be 'low salience of CC', that is, the degree to which CC is uppermost in their minds is quite low, because it appears uncertain, ambiguous, and off in the future. . When climate risk is salient because suppliers perceive the problem as well-defined and serious, the likelihood of adoption of adjustments should increase. Since salience determines the significance and prioritisation of an issue (Lockwood, 2013), the relationship between how climate risk is perceived and the saliency of CC on the adoption of adjustments becomes important. Another explanation is offered by Burton and Kates (1964) assertion that managers (in this case, hoteliers and policy-makers) may be strongly conditioned by their immediate past and limit their extrapolation of the future to simplified constructs, seeing the future as a mirror of that past. Kunreuther et al. (2002) demonstrated that sometimes decision-makers are subject to 'recency bias' or a tendency to assume that the future will be much like the recent past, as the source of forecasting errors. Relevant too are the concepts of 'environmental stability bias' and 'climatic stability bias' which assume that nature and its climate are stable and constant (Morrisette, 1988). If any of the above are the case, it would be a classic example of the interplay of heuristics and biases within a larger frame of bounded rationality at work. Burton (1997) demonstrated that bounded rationality may underlie a simplification in extrapolating present conditions into the future. The lack of a statistical difference between Present and Future CRP for both hoteliers and policy-makers is interesting because it is indicative of a faulty subjective perception of climate risk. Suppliers' limited experience responding to extreme events that have been clearly attributed to a changing climate compounds this error. Objectively, according to IPCC and other projections (IPCC, 2012; Scott, Simpson, et al., 2012), future risk due to projected changes in some climatic hazards, exposure and vulnerability in the Caribbean will be higher, specifically in relation to more intense severe weather systems and an increase in sea level. The results support the distinction between subjective awareness, which is largely superficial and not based on

actuarial estimates of risk, versus objective knowledge. The research results suggest that hoteliers and tourism policy-makers largely possess and are guided by subjective perceptions.

The fact that both hoteliers and tourism policy-makers are prone to underestimating future climate risk is surprising. It would be expected that policy-makers as technocrats have more information and a more objective and accurate outlook on this issue. The absence of a statistically significant difference in how tourism policy-makers think about present and future risk, may reflect that while they are experts in tourism, they are not experts in the science behind DRM or CCA and so are prone to the same biases as hoteliers. Alternatively, both groups may be prone to climatic stability bias, recency bias or even low salience of CC because it appears ambiguous and far off into the future. The results lend support to simplified heuristics and biases being used in making decisions under uncertainty (Burton & Kates, 1964; Kunreuther et al., 2009; Kunreuther et al., 2002). Kunreuther et al. (2002) alluded to experts such as policy-makers being prone to making the same errors as non-experts. The present research result supports this observation.

Herein lies the first significant link and limit to making the connection between DRM and CCA. The absence of a temporal distinction of risk has implications for decision-making. Kunreuther et al. (2002), for example, posit that when making climate-related decisions, a tendency to assume that the future will be much like the recent past is a “poor heuristic for forecasting, and the cost of misapplication can be large” (Kunreuther et al., 2002, p. 264). If hoteliers expect that the issues they currently deal with will largely be similar in nature and scale in future, this may lead to inefficient, ineffective and inappropriate choices about adaptation strategies.

#### *Significant and non-significant associations of climate risk perception*

The theoretical position supported by the tourism literature (Bird et al., 2010; Drabek, 1994b; Meheux & Parker, 2006), and others in the wider literature (Botzen et al., 2009; Miceli et al., 2008; Mileti, 1980; Peacock et al., 2005; Smit & Skinner, 2002) is that an increase in risk perception is often associated with an increase in protective behaviour. However, this relationship is not always stable, with some studies such as Paton et al. (2000), reporting a failure to find a direct link between risk perception and protective behaviour, and others such as Johnston et al. (1999), Lindell and Whitney (2000), and Duval and Mulilis (1999) noting a generally tenuous relationship between risk perceptions and protective behaviour. This has been explained by the diversity in decision-makers’ interpretations of risk or alternatively by the influence of additional mediating factors on the risk perception-protective behaviour relationship.

The quantitative results of the present research found a significant association between Present and Future CRP and Past Adjustment Behaviour. In contrast, it finds no evidence of a similar association in the CCA context for hoteliers and policy-makers. This suggests that the theoretical direct positive association between risk perception and protective action is stable in the present-day DRM context, but unstable in the future CCA context. The larger implication is that CRP may act in indirect or direct ways at different stages of decision-making. Thus, while CRP is important at the problem recognition stage of suppliers’ protective

decision-making, it does not contribute significantly to their intention to adapt using a specific PARD strategy.

#### 6.2.2.4 *Experience with impact*

Most tourism suppliers in the Caribbean expect to be affected by climate-related hazards in the present-day context and have invested in DRM to address these threats. Thus, generally suppliers' engagement in DRM reflected responses to commonly experienced hazards. The interviews revealed that many respondents have actual experience responding to the effects of climate-related hazards, as well as, recovering from damage and losses associated with at least 8 climate-related disasters and extreme events over a 60 year timeline. The role of hoteliers' experience in influencing protective decision-making was echoed by some policy-makers: "...if no disasters occur over a period they [hoteliers] might become lax...." (PUB\_AB\_1, Policy-maker, Antigua and Barbuda).

### **6.2.3 Adjustment search, the DRM and CCA awareness set and influencing factors**

According to Kates (1971), the second component of protective decision-making involves a search for adjustments to solve the problem. In the new generalised model, adjustment search is theorised to follow problem recognition. A tangible outcome of the search process is the adjustment awareness set which can, and should be qualitatively examined and quantitatively measured by researchers as such an exercise is revealing regarding the links (e.g., overlap of measures) and limits (e.g., lack of knowledge on a wide range of existing and/or new measures) of supplier protective decision-making.

As discussed earlier, in the new generalised model, this search begins when the problem is recognised and the influencing factors on the environmental or business risks in the risk set have motivated the decision-maker to begin a search for adjustments. As posited by Kates (1971), the search for adjustments is not likely to include the full theoretical range of adjustments possible, implying that a measure has to be included in the awareness set for it to ever have a chance of being chosen. Thus, it becomes clear that the size, composition and range of the DRM or CCA choice set matters. In this research, adjustment search was examined through a measure of the number and nature of DRM and CCA measures mentioned. Prior research in tourist destination choice studies have reported that awareness sets are usually no larger than three to five recalled items (Sirakaya & Woodside, 2005). This research found that the average size of the DRM awareness set is three, while the average size of the CCA awareness set is two. Besides the CCA awareness set being smaller and more segmented than the DRM awareness set, DRM and CCA measures overlap and completely new CCA measures were limited. Thus, the DRM and CCA awareness sets, although not the same, are very similar. Herein lies another significant link and limit to making the connection between DRM and CCA. In identifying mainly currently implemented DRM measures, suppliers reveal that what they do now is what they perceive will help them to adapt in the future. This was corroborated by the quantitative survey results that showed the popularity of an increase in measures associated with the Protection and Accommodation strategies.

The past adjustment behaviour measure showed moderate implementation of measures associated with Protection and Accommodation already taking place. Moreover, the qualitative interviews revealed hoteliers' affinity particularly for the Protection and Accommodation strategies, as well as, the Diversification as supplementation strategy for policy-makers. Bounded rationality may again be at play in hoteliers' and tourism policy-makers' use of heuristics or mental shortcuts and simplified reasoning to deal with uncertainty. Hoteliers, for example, may assume that since they have knowledge and experience with Protection and Accommodation and these strategies have worked in the present-day context, they will work in the future. However, this is also very clearly a limit to CCA, as future response to a changing climate will probably require new ways of responding to changes in climatic stimuli and other coastal conditions.

From the above, similar to Kates' (1971), experience and/or knowledge or alternatively a combination of both experience and knowledge has been shown to influence the size of the awareness set. For example, respondents typically reported prevalent and increasingly sophisticated measures where there was more experience with specific hazards. This was evident in the responses from hoteliers in Antigua and Barbuda and Jamaica versus hoteliers in Trinidad and Tobago. This suggests experience is associated with the size of the adjustment awareness set. However, this research also adds weight to the importance of subjective norm as a key influencing factor. Hoteliers often work closely with engineers on the upgrade of their plant and infrastructure. For example, PRI\_JA\_4, a manager at a large hotel in Jamaica worked with coastal engineers to incorporate sea level rise considerations in the design of their hotel. Other hotels have beach monitoring and maintenance programs where they work with coastal engineers on protecting the beach. PRI\_AB\_9, the General Manager of a large hotel in Antigua and Barbuda reported conducting research on beach erosion and specifically looking at coastal maps with coastal engineers to map temporal coastal changes. Even in instances where this is not actively happening, there is a desire for collaboration. PRI\_AB\_11, for example, manages a small hotel with a beachfront experiencing change in Antigua and Barbuda. This hotelier would like to consult with an experienced team of engineers but did not have the financial resources to do so. Thus, overall, it can be said that hoteliers are influenced by environmental professionals to undertake adjustments that are in the best interest of the hotel. Moreover, in the context of climate change, hoteliers were keen to assign technical leadership on the identification and co-implementation of adjustment measures to tourism and other policy-makers. PRI\_JA\_3, a hotelier in Jamaica, explicitly stated that his hotel would do anything recommended by policy-makers to protect the beach product.

#### **6.2.4 Adjustment evaluation, the inert, reject and late consideration adjustment sets and influencing factors**

According to Kates (1971), the third stage of the process is adjustment evaluation. In this stage, the decision criteria used for evaluating identified adjustments in the adjustment awareness set become important. Specifically, in line with Choice Set Theory, this research adds that the search and evaluation phases of the DRM and CCA decision-making process in tourism should be conceptualised as a categorisation process in which hoteliers and tourism policy-makers place all known/perceived possibilities into one of three awareness sub-sets: 1) inert set, 2) inept/reject set, and 3) the late consideration set. Interestingly, in the context

of this research, only two of the three awareness sub-sets were relevant, namely the inept/reject set and the late consideration set. However, since this may not be so in different research contexts, the model is depicted with the inert set.

Conceptualising the process in this way expands understanding not only of why some measures are more popular than others (in terms of evaluation on specific criteria), but also how these measures are treated when evaluation criteria are applied. Thus, if Retreat is not popular with hoteliers, the application of the Choice Set approach helps us to understand that this strategy has likely been placed in hoteliers' reject set and that efforts to reframe it with the aim of moving it from the reject set to the late consideration set would be more difficult than perhaps reframing a measure that has been placed in the inert set. Thus, consideration of evaluation criteria alone in adjustment evaluation is simplistic. An understanding of how adjustments are categorised in terms of choice sets (inert, inept/reject, late consideration) adds more dimension not only to our understanding, but as has just been discussed, this also has implications for practice.

Turning attention now to evaluation criteria, consistent with previous studies (Lindell & Whitney, 2000; Paton, 2003; Smit & Skinner, 2002), this research found that in evaluating the relative merit of alternative adaptation options, suppliers use a matrix of criteria. The qualitative data helps us to understand suppliers' perceptions of the PARD strategies more fully. Protection was associated with concerns about cost and aesthetics as much as with concerns regarding its protective function. Perceptions of Accommodation revolved around its feasibility in allowing in-situ adaptation, as well as, its strong disaster management component that protected guests and property. Hoteliers expressed an aversion for Retreat, particularly the threat that they perceived to their identity and survival. In a sense, Retreat presents its own unique problems (e.g., cost, logistical and political difficulties) that may be perceived to be on par with those brought about by a more extreme, changing climate. Finally, a 'Diversification as supplementation' approach was seen as attractive and there was little indication that suppliers were willing to conceptualise a 'Diversification as exchange' approach. Thus, the PARD strategies were evaluated on the implications associated with each strategy's attributes (see Table 4.2).

While many of the criteria reported in previous wider studies apply here (Section 2.4.1), three especially important criteria emerged from the Caribbean coastal tourism case study context: 1) aesthetics/logistics, 2) livelihood preservation, and 3) cost. Hoteliers' sensitivity to making adjustments that have aesthetic, spatial/logistical and financial/business implications was reflected in the quantitative results which showed that hoteliers have significantly lower perceptions than tourists of: 1) lifting hotel buildings up on piles, 2) not having rooms on the ground floor, 3) not having hotel rooms that are right on the beach, 4) asking guests to take a 100 m walk, 5) asking guests to take a 500 m walk, 6) asking guests to take a free shuttle bus to get to the beach, and 7) having fewer beach hotels. This reinforces the results of Strannegård and Strannegård (2012) which found that suppliers are deeply concerned about livelihood, image, landscape and aesthetic factors associated with their business. Such an approach seems warranted in light of evidence that aesthetic factors exert an influence on tourist hotel selection decisions (Saleh & Ryan, 1992). There is also evidence to suggest that this is true at the destination level (Uyarra et al., 2005). The characteristics of adaptation options in relation to these concerns assume especially high priority in the tourism context



and have implications for their acceptance. In fact, to make it to the late consideration set, a measure had to satisfy criteria related to aesthetics and livelihood preservation. Hoteliers' treatment of the Retreat strategy offers confirmation of this relationship. Their overall evaluation of the attributes associated with the Retreat strategy, as well as, likelihood to use it was the lowest of all four strategies. Since it did not satisfy aesthetics/logistics and livelihood preservation requirements, Retreat was relegated to the reject set. The research results highlight the central role of aesthetics, livelihood preservation and cost in hotelier decision-making. These factors must therefore be considered in any assessment of future interventions in the Caribbean.

### 6.2.5 Intention evaluation, behavioural intention and influencing factors

Once an adjustment has been evaluated and placed in the late consideration set, it becomes necessary to evaluate a supplier's intention to adopt it. This is because an adjustment's presence in the late consideration set does not guarantee its adoption. Indeed, in this 'set' context, it may have to compete with other equally suitable adjustment measures. The research design in which the four PARD strategies, each with unique, individual attributes were measured in terms of suppliers' behavioural intention allowed for insights in such a situation. The results have shown that the PARD strategies do not enjoy equal levels of behavioural intention. For instance, a ranking of PARD strategies based on an examination of their confidence intervals (see Table 6.1), shows that hoteliers' behavioural intention to adapt using the Accommodation, Protection and Diversification strategies are within the same range, making them all first equal choices, whereas Retreat, is the last of the four strategies that they intend to use to adapt to climate change. In the case of policy-makers, the PARD strategies do enjoy similar levels of behavioural intention indicating that this group is open to adopting any of these four strategies to adapt to climate change.

**Table 6.1 Ranking of PARD behavioural intention for hoteliers and policy-makers**

	Hoteliers	Policy-makers
<b>Intention</b>	1=Accommodation 1=Protection 1= Diversification 4. Retreat	1= Diversification 1= Accommodation 1= Protection 1= Retreat

It is likely that when faced with competing choices, levels of behavioural intention will make a difference in the final decision outcome. More than this, the factors that significantly contribute to behavioural intention may also make a difference in the final decision outcome. Thus, the application of the Theory of Planned Behaviour in this research deepens the simplistic ranking analysis by predicting behavioural intention for the PARD strategies within the larger context in which protective decisions are made. The theoretical premise of the TPB that matches reality, is that, decisions are never made in a vacuum but are instead made within the context of the perceived advantages and disadvantages associated with the behaviour (ATT), the social pressure from important referents to engage in the behaviour (SN) and perceived self-efficacy to engage in action (PBC). For this research, the theoretical contribution of CRP to BI was also examined. The TPB allows for prediction of behavioural

intention with these influencing factors theorised as antecedents. The contribution of relevant factors to BI, namely, climate risk perception, attitude, subjective norm and perceived behavioural control to PARD behavioural intention will now be discussed.

#### *Climate risk perception and behavioural intention*

Present and Future CRP were regressed onto behavioural intention to adapt using the PARD strategies. Although significant positive associations with behavioural intention were expected for Present and Future CRP in all models (four policy-maker models and four hotelier models), the results showed seven betas that were all not associated with behavioural intention. The lack of association of PCRCP and FCRP with behavioural intention for any PARD strategy for all eight models is interesting but not surprising as the non-significant association between risk perception and protective behaviour has been reported before in the wider literature (Lindell & Perry, 2000). It is usually explained by the presence of other mediating variables or by the diversity of decision-makers' interpretations of risk. In this case, suppliers' confusion and uncertainty about the nature, pace and impact of environmental change may be confounding the association between CRP and BI to adapt using the PARD strategies. Alternatively, the underestimation of components of vulnerability and exposure related to PCRCP may explain the lack of association between PCRCP and BI. The implication for theory is that temporal considerations are a worthy area of future research in conceptualisations of the measurement of climate risk perception.

#### *Attitude and behavioural intention*

The positive association of attitude with behavioural intention supports the findings of other researchers (Wang & Ritchie, 2012, 2013) that attitudes are positively linked with protective behaviour. In four cases, perceptions of the advantages and disadvantages of using the PARD strategies did not significantly contribute to behavioural intention. It was observed that three of the four cases of significance were associated with hoteliers and only one was associated with tourism policy-makers. Moreover, of the traditional TPB constructs (ATT, SN and PBC), attitude was the least significant predictor of behavioural intention. By inference, this implies that interventions to increase protective behaviour in general, and CCA in particular, cannot rely solely on information or incentives that target increasing knowledge or changing perceptions of the advantages and disadvantages of using a CCA measure. Since SN and PBC were more prevalent and reliable predictors of behavioural intention, in the face of scarce resources to devote to interventions, tourism policy-makers may consider targeting perceptions of social pressure or perceptions of perceived behavioural control ahead of attitudinal perceptions.

#### *Subjective norm and behavioural intention*

In six of eight cases, perceptions of social pressure from important referents significantly contribute to behavioural intention. Moreover, it is especially interesting that SN is a significant predictor in all four regression models of hotelier BI. Past TPB studies have generally found a weak, positive association between subjective norm and intention (Armitage & Conner, 2001). Contrary to most studies, this study found that SN is not only the most prevalent predictor of BI, but it was also the most significant of five hypothesised

predictors. What is surprising here is the prevalence, as well as, degree of significance of the contribution of SN to BI. SN is the most dominant predictor of BI (followed closely only by PBC). The dominance of the SN construct may be explained by the highly inter-connected nature of the tourism business operating context. The role of significant others exerts a powerful influence in a service industry driven by perceptions of client needs, and mediated by intermediaries such as international tour operators and tourism policy-makers that facilitate the business of hoteliers.

Evidence from the qualitative interviews affirm that hoteliers' perceptions of international tourist demand for a coastal tourism product, regulation from policy-makers and incentives from tour operators are forms of social pressure that have an impact on suppliers' protective behaviour in the present-day DRM context. These results confirm the validity and reliability of the SN construct to predict BI to adapt to climate change in the Caribbean coastal tourism context. The theoretical role of SN should therefore not be underestimated in tourism. For policy analysts, this means that in the case of hoteliers, interventions that use important referents to put social pressure on hoteliers to adjust are likely to meet with some success. Ultimately, interventions would be best designed using a multiple lever approach of which SN would be just one lever.

#### *Perceived behavioural control and behavioural intention*

Six of eight PBC betas were positively associated with behavioural intention to adapt to climate change using the PARD strategies. In terms of the degree of significance of the contribution of PBC to behavioural intention, PBC was the second dominant predictor of BI. Like SN, for hoteliers, this is an important antecedent to behavioural intention. This is not surprising as PBC has generally been reported in the CCA literature as the most significant predictor of behaviour (Grothmann & Patt, 2005). It suggests that interventions targeting hoteliers should strive to remove perceived barriers to suppliers' ability to adjust or alternatively enhance perceptions of their ability to adjust.

#### *Climate risk perception, attitude, subjective norm, perceived behavioural control and behavioural intention*

Behavioural intention's association with CRP, ATT, SN and PBC was tested. Studies in the wider literature report that ATT, SN and PBC explain between 39-50% in behavioural intention generally (Armitage & Conner, 2001; Godin & Kok, 1996). The eight extended TPB models accounted for between 50-82% of variation in suppliers' behavioural intention. It is surprising that the extended TPB models account for such large amounts of variance in BI. It suggests that the traditional TPB constructs are good indicators of behavioural intention to adapt to CC using the PARD strategies.

### **6.2.6 Behavioural links and limits of supplier disaster risk management and climate change adaptation decision-making**

In summary, for Research question 1 which examines the DRM and CCA decision-making processes of supply-side stakeholders, the research has shown that there are links in thinking

and action between DRM and CCA in three major ways. First, as the qualitative interviews showed the determinants associated with present DRM processes are similar in nature to those associated with CCA. Second, suppliers are prone to using the same heuristics and decision-making biases in DRM and CCA. A prime example lies in the discovery that there was no significant difference in the measures of Present and Future CRP for hoteliers and tourism policy-makers. Future CRP may be predicated on perceptions (reinforced by present experiences) of present risk for both groups, showing that they think alike about climate-related risk. More importantly, this result suggests that policy-makers think that future climate risk is the same as risk at the present time. In a sense, this reveals a recency bias (a tendency to assume that the future will be much like the recent past) or alternatively a climatic stability bias (effectively a false perception of temporally stable climatic risk) or even low salience of climate change, to which both groups are prone. Third, from the Choice Set analysis, a comparison of DRM and CCA measures shows that DRM and CCA measures largely overlap with hoteliers and policy-makers identifying the same subset of measures they currently use to deal with hazards as the measures they expect to use in the future to deal with the impacts of CC. For example, eight categories of action overlap for hoteliers, while seven overlap for policy-makers. It was apparent from field observations, as well as from the PAB measure, that the CCA strategies of Protection and Accommodation are already widely practiced. Hoteliers implement these measures and policy-makers support them in doing so. In the context of CC, hoteliers and policy-makers expect to continue to Protect and Accommodate.

Notwithstanding the above, there are five behavioural limits of DRM and CCA highlighted here. First, the fact that the CCA awareness set is smaller and more segmented than the DRM awareness set with limited CCA measures that are completely new, represents a perceptual limitation in hoteliers' and tourism policy-makers' vision of CCA possibilities. Second, there was some evidence of divergent hotelier and policy-maker views on the form that CCA should take, specifically regarding the Retreat strategy. A third indicator of the psychological limits to linking DRM and CCA was the clear shift downwards in hoteliers' perceptions of self-efficacy when thinking about engaging in CCA versus engaging in DRM. Whilst there is quasi-independent facilitation of DRM adjustments in the present context, there is an expectation of collaboration, co-production and public sector leadership on CC action. This may clash with the lack of leadership confidence noted with some tourism policy-makers (for example, a policy-maker in Trinidad and Tobago, PUB\_TT\_5, lamented about the lack of studies available to give specific direction to industry stakeholders). Fourth, the fact that hoteliers display consistently lower DRM perceptions, attitudes, perceptions of social pressure, self-efficacy and intentions towards engaging in CCA than tourism policy-makers may be problematic. Overall, these low level perceptions which have largely been shown to have a statistically significant contribution to BI may retard CCA.

More broadly, like Tucker, Eakin, & Castellanos (2010), this research found that although climatic and non-climatic factors influence the protective decision-making process to varying extents and at various stages, social pressure plays a dominant role in determining not just behavioural intention to adapt using the PARD strategies, but plays an important role in all stages of protective decision-making. In light of this, the fifth limit relates to the results that suggest that hoteliers' perceptions of SN could be a significant motivating factor (in as much

as tourists demand safe vacations), as well as, a perceived barrier to DRM and CCA (in as much as tourists fail to value DRM in favour of the proximity and appearance of the beach).

### **6.3 Research Issue 2: Perception gaps across hoteliers, policy-makers and tourists may inhibit coherent disaster risk management and climate change adaptation**

Previous work in tourism does not adequately address how perception gaps between demand and supply-side stakeholders may inhibit coherent action on managing disaster risk to advance climate change adaptation. Moreover, available studies are largely qualitative in nature (Belle & Bramwell, 2005; Buzinde, Manuel-Navarrete, Yoo, et al., 2010). By empirically measuring the existence and extent of perception gaps, the present research advances our understanding of the behavioural links and limits between demand and supply-side perceptions of DRM and CCA.

#### **6.3.1 Disaster risk management perception gaps**

Three adjustment measures were examined with hoteliers, policy-makers and tourists as a proxy to determining perceptions of the importance of DRM measures in the choice of tourist accommodation. The results revealed that there is a statistically significant difference in perception levels of the importance of DRM across these three groups. Policy-makers have significantly higher perceptions of the importance of DRM than hoteliers and tourists, while tourists have significantly lower perceptions of the importance of DRM than hoteliers and policy-makers. This may explain the qualitative finding that while DRM is important, it is not a key business priority in a strong normative context in which tourists' bias for a close, natural looking beach is more than the importance of DRM at their choice of accommodation.

There are few previous studies available with which to compare these results. Regarding perception gaps between demand and supply-side stakeholders, Bird et al. (2010) reported that tourists were interested in having more information than was being provided by suppliers about the hazards that are likely to affect them. Differences in tourists' and suppliers' views on aspects of DRM are also characteristic of research done by Drabek. Interestingly, unlike Bird's and Drabek's results where tourists were more sensitive than tourism managers to the need for DRM measures (such as more hazard information or greater evacuation measures), this research found that tourists seem to place less importance on DRM in their choice of a hotel than is perceived by hoteliers and policy-makers. Thus, this finding appears to conflict with the two previous studies. However, this could be the result of a methodological artefact in that what tourists say are important to them and what they actually believe to be important to them are different. Tourist perception of the importance of DRM is a worthy area of future, mixed methods research to help us to better understand and clarify this dichotomy. Finally, in sum, these results confirm the existence of a DRM perception gap across hoteliers, policy-makers and tourists.

### 6.3.2 Climate change adaptation perception gaps

The possibility of the existence of a CCA perception gap was tested in relation to the attribute and likelihood ratings of the PARD strategies across hoteliers, policy-makers and tourists. This data confirmed perception differences about the PARD strategies not only between hoteliers and tourism policy-makers, but also between these two groups and tourists. The statistical difference in levels of the perceptions of the PARD strategies across hoteliers, policy-makers and tourists is revealing, and is an addition to the literature since no comparative studies exist. The closest proxy studies in the literature are Belle and Bramwell's (2005) study which found that there were differences in how policy-makers and tourism managers view CCA interventions and Buzinde et al. (2010) which compared views of hoteliers and tourists. However, these studies are both qualitative in nature and each deal with two stakeholder groups, not three.

The data suggests that hoteliers are likely to equally prioritise Protection, Accommodation, and Diversification to adapt to climate change. Retreat is their least likely strategy option. Policy-makers are equally likely to adopt any of the four PARD strategies. Tourists are equally likely to choose a destination that has adapted using the Accommodation, Retreat and Diversification strategies, while they are least likely to visit a destination that has implemented Protection.

Hoteliers have significantly lower perceptions than tourists of: 1) lifting hotel buildings up on piles, 2) no longer having rooms on the ground floor, 3) not having hotel rooms that are right on the beach, 4) asking guests to take a 100 m walk, 5) asking guests to take a 500 m walk, 6) asking guests to take a free shuttle bus to get to the beach, and 7) having fewer beach hotels. This suggests that hoteliers underestimate tourists' perceptions of the acceptability of these individual measures to the market.

Policy-makers have significantly higher perceptions of offering more eco-tourism and cultural tourism activities than hoteliers and tourists. This finding suggests that eco-tourism and cultural tourism have their limitations in terms of tourist demand and coastal hotelier support.

Looking at confidence intervals of perceptions of the PARD strategies, there were five mismatches between suppliers and tourists. The results show that hoteliers and tourism policy-makers cannot rely on their own perceptions of adjustment/s as reliable guides for the choice of adjustment measures as mismatches will inevitably result. The practical implication is that hoteliers and tourism policy-makers will do well to empirically evaluate (through qualitative and quantitative techniques) tourist perceptions of any major adjustment measures under consideration. In sum, these results suggest that there is a CCA perception gap across these three groups. CCA perception gaps have implications for decision-making and behaviour. Regarding the relationship between PARD attributes and likelihood to support the use of PARD strategies, results were expected to be in line with other adjustment adoption studies that found a positive association between positive perceptions of attribute desirability and likelihood of adjustment adoption. Significant positive associations between attributes and likelihood for all four PARD strategies were found for hoteliers and tourists only. The fact that there was no significant association with PARD attributes and PARD

likelihood for policy-makers was surprising. However, the small policymaker sample size may not have been large enough to detect significant effects.

PARD perceptions explain sizeable amounts of variance in likelihood providing strong evidence for the inclusion of perceptions of adjustment attributes in future models of supply and demand-side adjustment. The amount of variance accounted for by attribute perceptions – a sizable 10 -18% variance for hoteliers and a much higher % of variance for tourists, typically 18-35% of variance in PARD likelihood. Empirical testing and evaluation of the desirability of presently implemented, increments of presently implemented and new adjustment measures is recommended going forward.

### **6.3.3 Beach perception gaps**

Statistical differences in levels of perceptions of the importance of beach proximity and appearance across hoteliers, policy-makers and tourists were found. Hoteliers and policy-makers have a statistically higher perception of the importance of the proximity and appearance of the beach than tourists. This is interesting because it implies that suppliers have an erroneously high perception of the importance of the proximity and appearance of the beach to tourists' accommodation choice than reality. It is surprising that there is no difference between hoteliers and tourism policy-makers in how they view this issue. Even more surprising is the fact that policy-makers are just as prone to committing this perceptual error as hoteliers. This result implies that suppliers may have to re-orient their thinking around the importance of the proximity and appearance of the beach to the market. Such a re-orientation may help to reduce the bias apparent in the siting of coastal hotel plant and infrastructure within 30 m of the high water mark which is the current standard largely practiced today in some Caribbean SIDS. This research found that the mean distance from the high water mark for the hotels in the sample of 124 hoteliers is 72 m. However, these siting standards will be largely unsustainable in the future (UNDP, 2010).

Beach perception gaps have implications for decision-making and behaviour especially among tourists. For example, significant associations were found between beach perceptions and all four PARD strategies for tourists only. The importance of the beach explained small amounts of variation (between 2-5%). Negative betas are associated with Retreat and Diversification while positive betas are associated with Protection and Accommodation. This implies that tourists that favour a nearby, natural looking beach are not likely to visit a destination that uses Retreat and Diversification to adapt to climate change. This result provides evidence of the theoretical meaningfulness of this new variable in tourist accommodation choice. Theorists modelling tourist choice behaviour will likely explain a greater amount of variance in choice outcomes if this variable were to be included in models. Regarding policy and practice, hoteliers and tourism policy-makers will likewise have to account for, and rationalise, the trade-offs involved in catering to tourist demand for a nearby, natural looking beach, with operating a safe distance away from the high water mark, and 2) maintaining natural-looking beaches under likely future scenarios of increased coastal erosion.

### **6.3.4 The interplay between gaps in disaster risk management and beach perception**

The perceived importance of DRM in tourist accommodation choice was tested with perceptions of the importance of beach proximity and appearance in tourists' choice of accommodation across hoteliers, policy-makers and tourists. The perception of the importance of DRM considerations in the choice of tourist accommodation is a new variable not previously tested in the wider or tourism literature. A test of its association with the importance of beach proximity and appearance is also new. The results showed that hoteliers and policy-makers have significantly higher perceptions of the importance of the proximity and appearance of the beach, as well as, of the importance of DRM to tourists' accommodation choice than tourists. This is interesting because it suggests: 1) tourists are likely to under-demand DRM measures at hotels, and 2) hoteliers and policy-makers are likely to overestimate the importance of having hotels located close to natural looking beaches in the choice of tourist accommodation. Specifically, while tourists' perceptions of the importance of the proximity and appearance of the beach is higher than perceptions of the importance of DRM, on its own merit, the importance of tourist perceptions of the proximity and appearance of the beach is not as high as hoteliers think.

Given the dominant role that social pressure from important referents plays in the Caribbean coastal tourism context, closer theoretical attention needs to be paid to the types of behaviours that are concurrently being rewarded or alternatively discouraged through policy incentives, regulation or market demand, and whether these behaviours conflict with or complement protective behaviour. More specifically, it suggests that it is useful to theoretically identify not just who are the important referents and the decision-maker's motivation to comply with them (as is suggested by the TPB) on one behaviour, but there is a need to go a step further and also unpack the nuanced social attributes of that behaviour, whether the social pressure is direct or indirect, and whether within a larger social context where many actions and behaviours are taking place simultaneously, the social signals around a particular protective behaviour is being undermined by or conflicts with the social signals associated with another behaviour (such as behaviours that satisfy business imperatives). For example, in the research context, there are conflicting social signals around two behaviours that may occur concurrently: 1) continuing operations very close to a beach, and 2) investing in DRM. In each case, hoteliers and tourism policy-makers hold significantly higher perceptions than tourists but with regard to these two behaviours, tourists seem to be demanding and therefore rewarding a focus on beach proximity and appearance more than a focus on DRM. In the face of sub-optimal market demand for DRM, compared to market demand for a nearby natural-looking beach, there may be a greater role for policy-makers to use exhortation, policy incentives and regulation or a mix of these to ensure appropriate behavioural outcomes. Although no firm conclusions can be drawn, this is a meaningful result as it could begin to explain why tourists seem more interested in being close to the beach than being interested in DRM concerns, and in turn why hoteliers seem to respond to this dynamic.



### **6.3.1 Behavioural links and limits in managing disaster risk to advance climate change adaptation between demand and supply-side stakeholders**

The results revealed links and limits in how hoteliers, policy-makers and tourists perceive, rate and rank DRM and CCA strategies and associated measures. For example, there were nine matches of fourteen possible matches between hoteliers and tourists. The same number of matches was observed between policy-makers and tourists. There were a smaller number of mismatches, with five mismatches between hoteliers and tourists and policy-makers respectively. These perception gaps have implications for current and future protective behaviour.

In addition, there were eleven good matches out of fifteen possible matches between hoteliers and policy-makers. There were four instances in which hoteliers and policy-makers do not align. One key area of contention relates to the fact that while policy-makers are willing to consider and support the implementation of all four PARD strategies, hoteliers will not consider Retreat. These perception gaps across hoteliers, policy-makers and tourists may inhibit coherent DRM and CCA responses now and in the future.

In sum, this research finds that a DRM perception gap still exists since Drabek's first findings of a disaster perception gap over 20 years ago. Interestingly, the dynamic driving this gap is much different, with tourists having lower perceptions of the importance of disaster risk management considerations in their choice of accommodation than their hosts.

Importantly, the research also finds that there is also a CCA perception gap between suppliers and tourists in general, and hoteliers and tourists in particular. The largest areas of difference relate to how hoteliers and tourists view Protection and Retreat. More than this, gaps between hoteliers and policy-makers on DRM and CCA were also noted.

## **6.4 Summary**

This chapter discussed the research results related to Research Issues 1 and 2 in the broader context of the literature. The next chapter makes two main conclusions about the research problem, and summarises the implications of research findings for theory, methodology, policy and practice. It presents the limitations of the research and make recommendations for future work.

## Chapter 7

### Conclusion

#### 7.1 Introduction

The behavioural links and limits between DRM and CCA in tourism has received limited research attention. The present research programme addressed this research problem in relation to two key research issues. Research Issue 1 centred around the observation that the DRM and CCA decision-making processes of supply-side stakeholders are not well understood; while Research Issue 2 focused on improving our understanding of how perception gaps between demand and supply-side stakeholders may inhibit coherent action on managing disaster risk to advance climate change adaptation. To accomplish its goal, the research employed an overarching multi-stage, mixed methods strategy using interview and survey data to facilitate exploratory, descriptive and explanatory research that was anchored within an inter-linked, multi-disciplinary theoretical framework. Evidence from four primary studies involving over 500 respondents in ten Caribbean destinations supports the conclusions and research implications that are presented in this final Chapter. To begin, Section 7.2 presents a summary of conclusions about the research problem. Next, the implications of the research findings for theory (Section 7.3), methodology (Section 7.4), policy and practice (Section 7.5) are discussed. In addition, the limitations of the research are presented (Section 7.6), and finally, an outlook for future work is provided in Section 7.7.

#### 7.2 Conclusions

In light of the empirical evidence presented in Chapters 4-6, two main conclusions can be made about the research problem. The first conclusion is that:

**Conclusion 1: Present-day DRM processes are likely to limit future CCA prospects to incremental versus transformational forms of adaptation.**

The results made clear that tourism planning and practice in the Caribbean coastal tourism context is currently based on responding to experienced changes as opposed to predicted change. The qualitative data for hoteliers has shown that they rely on personal experiences and observations as guides to their response. Some adjustment is occurring now, to experienced and/or observed change. For example, the PAB measure which reflects action in the realm of Protection and Accommodation, is just above the midpoint. However, very limited adaptation is presently occurring to projected future climate change. In the sample of 17 hoteliers in 3 Caribbean destinations in Study 1, only one coastal hotel built in 2010 was found to have proactively built with future sea level rise in mind. There were for example, elevation and hard protection structure considerations implemented. Even so, spatial positioning was still an issue as this hotel was sited within 30 metres of the HWM. Importantly, the CCA measures that were implemented were incremental forms of Protection.

Behavioural manifestations of DRM and CCA in Caribbean coastal tourism is generally not tied to projections and thresholds. In some cases, having experienced loss from repeated hazard episodes, hoteliers have evolved a satisfactory series of DRM adjustments to reduce such losses. As the Choice Set analysis and the PAB measure showed, *incremental* adjustment to present-day climate-related hazards is the norm and this trend is likely to continue in the future. One of the reasons for this assertion is the evidence of perceptual barriers that reinforce variable protective behaviour in the present-day context and/or nurture adaptation inertia. For example, suppliers' perceptions of present-day risk are no different from perceptions of future risk. Spatially too, hoteliers view exposure and vulnerability as a competitive advantage and are likely to choose strategies that allow continued in-situ adaptation. Going forward, both hoteliers and tourism policy-makers may rely on their perceptions and experiences, as well as, broader inherent decision-making biases and heuristics in making decisions. Yet, the traditional response characterised by incremental fixes based on faulty subjective assessments of future risk which leads to addressing impact as it arises, might not work as incremental responses are likely to be piecemeal and sub-optimal rather than integrated and foresightful. In addition, as the Caribbean case study has shown, past disaster experience has largely not led to creative adaptation that eases the way for future transformational adaptations.

Although the concept of 'transformational adaptation' has not been covered in body of the thesis, the analysis in this thesis strongly suggests that the most likely CCA strategies are those that incrementally modify current policy and practice. Although adapting to current climate is an essential step towards adapting to future climates, it is increasingly becoming clear that climate change presents a new and unique challenge to social systems. The transformational impact of climate change requires preparing for a future of sea level rise, droughts, extreme weather events, and other consequences. In such a context, traditional response mechanisms might not work because CC will bring new experiences outside of past or present experience.

The PARD strategies represent three different/nuanced development pathways under a changing climate. Each adaptation strategy context can be conceptualised as being situated at different points along a spatial continuum. For example, Protection along with Accommodation are at one end and Retreat would appear on the other, while Diversification as supplementation, depending on how it is implemented may be in between. Protection and Accommodation assume adaptation in-situ, Retreat moves away from the coast while Diversification can be conceived as somewhere in the middle (with the possibility of having beach hotels operating on the coast and the development of eco-hotels and other forms of tourist accommodation focusing on cultural attractions operating inland). Diversification as exchange is a more radical approach involving the shift from tourism on the coast altogether.

The Protection and Accommodation strategies are simultaneously coping responses with the potential of being examples of incremental adaptation. They are measures that hoteliers have already implemented and expect to continue to implement in increasing scale or complexity (for example, groynes and breakwalls can be built to higher specifications; building codes can be increased to withstand a Category 5 versus a Category 3 hurricane as is presently practiced in the Caribbean; alternatively hotel ground floors can be altered to less intensive uses such as parking) going forward.

Retreat and Diversification as exchange can be conceptualised as examples of transformational adaptation strategies. Both are largely new (in the case of Retreat) or under-developed (in the case of Diversification) activities in the Caribbean SIDS context. While it is true that destinations already have a diversified tourism portfolio to some extent, it is not unusual that the beach tourism component dominates. In practice, most effort and emphasis in the development and marketing of the destination is focused on the beach and the accommodation sector that operates there. In the case of Retreat, it will involve a dramatic change in land use by the permanent evacuation of beach resorts from the coastal plain. An increase in practice (whether in terms of scale or prevalence) of the Retreat and Diversification strategies as exchange would have a transformational effect on the nature and scope of the tourism product offered by Caribbean SIDS.

This research has demonstrated the opportunity that exists for transformational adaptation specifically in the greater implementation of some attributes associated with the Retreat strategy. However, this possibility is barred due to the negative perceptions of this strategy by hoteliers. For example, as the quantitative results show, the large majority of hoteliers reject Retreat, while all three groups rejected the prospect of having less beach hotels.

Demand and supply-side stakeholders' evaluation of the PARD strategies made clear that the most likely strategies are those that modify current policy and practice. An example of this was demand and supply-side preference for Diversification. However, this can be understood in two ways: 1) diversification as supplementation, or 2) diversification as exchange. Although Diversification is attractive for all groups, it is only attractive within the present paradigm of the existence of beach hotels. This is apparent from the observation that an increase in eco-tourism and cultural tourism were highly rated by hoteliers, policy-makers and tourists but the prospect of less beach hotels (as a key attribute of Diversification as exchange) was consistently rated negatively by all three groups (see Table 5.3). While this research did not test whether respondents had different interpretations of the term, scores on individual items (particularly the high rating of eco-tourism and cultural tourism versus the low rating of less beach hotels) suggest that respondents understood Diversification as sitting within what is normatively comfortable for them at the moment and not as diversification outside of current practice.

Although it is difficult to assign a universally acceptable a priori definition of a successful adaptation outcome, for hoteliers, it is apparent that successful adaptation equates to maintenance of the status quo, highlighting that it is difficult for the human system to fundamentally change in the face of a changing natural system. The Retreat and 'Diversification as exchange' strategies are actions that entail physical and even existential transformation. However, it is clear that there will also be a need to undertake a psychological transformation, particularly among hoteliers and tourists (Grothmann & Patt, 2005; Marshall, Fenton, Marshall, & Sutton, 2007), and thereafter desired alignment across the three major groups. This leads to the second main conclusion about the research problem, namely that:

**Conclusion 2: Social pressure to adopt particular DRM and CCA measures will play a central role in suppliers' present and future protective decision-making. In this context, miscalculations across groups are likely.**

Findings related to tourist demand for DRM have implications for supply-side adaptation to CC. Tourists have the lowest perceptions of the importance of DRM measures in their choice of present-day accommodation across hoteliers, policy-makers and tourists. Moreover, going forward tourists with high beach perception can be expected to choose hotels and destinations that protect and accommodate over hotels and destinations that retreat and diversify. Given the large influence that social pressure from tourists has particularly on hotelier behaviour (subjective norm was significant in all four regression models), if this trend continues, it is likely that coastal hoteliers may continue to either under-respond to the risks that they will increasingly face as a result of climate change impacts (if they subscribe to the thinking that DRM is not very important to tourists anyway) or invest in adaptation models that allow them to adapt in-situ (reducing perceived market flight risk if there is no nearby natural-looking beach) such as the Protection and Accommodation strategies.

The research found evidence suggesting that hoteliers and tourism policy-makers held exaggerated beliefs and inflated subjective norm perceptions of the preferences of tourists. It provided empirical insight on how important closeness and appearance of the beach are in the choice of tourist accommodation and how inflated perceptions of the importance of a hotel's beach proximity may drive suppliers' siting decisions. For example, both hoteliers and policy-makers have significantly higher perceptions of the importance of the appearance and proximity of the beach in tourists' choice of accommodation than tourists. This error is compounded in the future context of climate change adaptation, for example, with the quantitative results showing that hoteliers have significantly lower perceptions than tourists of asking guests to take a 100 m walk, asking guests to take a 500 m walk, asking guests to take a free shuttle bus to get to the beach and having fewer beach hotels. The implication of this is that hoteliers acting on erroneous perceptions of tourist preferences may make inappropriate plans to adapt too conservatively, being less likely to adopt Retreat measures because they think that tourists will not approve. However, this is not the case and this is one clear example of a miscalculation between accommodation suppliers and tourists.

A second major example of a miscalculation exists. The results show that tourists currently consume Protection and Accommodation and hoteliers erroneously think that they will continue to be willing to consume an increase in measures associated with these strategies in the future. In fact, while hoteliers' perceptions of tourists' preferences regarding Accommodation may be legitimate, tourists appear to at least favour increases in the Protection approach. The disparity between tourists' and hoteliers' perceptions of the Protection and Retreat strategies is of concern in light of the suggestion by this research that going forward, the role of important referents in suppliers' DRM and CCA decision-making is likely to be significant.

### **7.3 Implications for theory**

As a full discussion was presented in earlier sections (Sections 6.2.1-6.2.5) of this thesis, the summary of implications for theory presented here is not exhaustive. However, five key research findings and their theoretical implications deserve to be highlighted.

The finding that hoteliers underestimate disaster risk factors: 1) namely the likelihood of hazard events, 2) their vulnerability, and 3) exposure has implications for conceptualisations

of risk perception that do not account for a sextet structure of cognition and affect related to perceptions of hazard probability, vulnerability and exposure as it suggests that these are incomplete. If stakeholders underestimate any of the components of their risk factors, the theoretical role that risk perceptions ought to play in triggering adjustment behaviour may be diminished. Similarly, if researchers neglect to conceptualise and measure risk perception as a sextet construct, this may result in an incomplete picture of CRP.

Secondly, the fact that suppliers do not display a statistically significant distinction in how they view present and future risk implies that temporal conceptualisations of climate risk perception are important in examinations of the links and limits between DRM and CCA. While the research pointed firmly to the possibility that biases and heuristics (for example, climatic stability bias or even low salience of climate change) may underlie suppliers' limited action in response to a changing climate, it is recency bias that becomes significant in explaining the confounding of suppliers' temporal perceptions of risk. Kunreuther et al. (2002) demonstrated that sometimes decision-makers are subject to a tendency to assume that the future will be much like the recent past. This simplification in extrapolating present conditions into the future is a source of potentially large forecasting errors (Kunreuther et al., 2002) since it may favour the adoption of short-term adjustments that are similar to past responses, rather than more flexible long-term strategies.

Third, the research indicated that the concept of a risk set that accommodates climatic and non-climatic stimuli at the problem recognition stage is theoretically useful. In fact, it appears that climatic and non-climatic factors have varying levels of influence at various stages of the protective decision-making process. It is important to empirically identify which climatic and non-climatic factors exert an influence, and to what extent they do so at each stage of the protective decision-making process.

Fourth, the research showed that suppliers place evaluated adjustments in choice sets. This finding provided strong evidence that the search and evaluation phases of the DRM and CCA decision-making process in tourism should be conceptualised as a categorisation process in which suppliers place all known/perceived possibilities into one of three awareness sub-sets: 1) inert set, 2) inept/reject set, and 3) late consideration set.

Finally, the research showed that adjustments do not enjoy equal levels of behavioural intention, nor is behavioural intention influenced by the same climatic and non-climatic factors in the same way. It is likely that when faced with competing choices, levels of behavioural intention will make a difference in the final decision outcome. More than this, the factors that significantly contribute to behavioural intention will make a difference in the final decision outcome. We should be interested both in levels of behavioural intention as well as the factors that contribute to it. It becomes necessary to evaluate a supplier's intention to adopt an adjustment within a psychosocial theoretical framework such as the TPB.

#### **7.4 Implications for methodology**

The research methodology demonstrated that the use of inter-linking, multi-disciplinary models is an effective approach to understanding the complex nature of DRM and CCA

decision-making. For example, in this research, the scope, prevalence and categorisation of DRM and CCA measures were analysed through the application of a new conceptualisation of the Destination Choice Set approach. The Adjustment Choice Set approach was used as an analytical tool to conceptualise and describe the dynamic underpinning the adjustment search and adjustment evaluation stages of Kates' (1971) APC model. Application of the Adjustment Choice Set approach gives us a better understanding of the size, structure and range of DRM and CCA awareness sets, as well as, the role of perceptions of the attributes associated with the PARD strategies in suppliers' choice process. Without using a Choice Set analysis, for example, researchers may erroneously assume that Retreat will progress forward into the late consideration set when in fact, it is likely to reach only as far as the hoteliers' reject/inept set. The Choice Set structure has methodological and theoretical implications for those concerned with better understanding supply-side behaviour and forecasting supply of adaptation measures.

In addition, the new generalised model uses an extended TPB framework to bridge the gap between examining perceptions of the PARD strategies and identifying significant predictors of behavioural intention related to the use of the PARD strategies. In doing so, the research highlights the value of social-psychological constructs, particularly, normative psychological constructs in significantly predicting DRM and CCA behaviour. Support is therefore demonstrated for the use of extensions to the Choice Set approach, and the TPB in the study of supply-side DRM and CCA decision-making.

## **7.5 Implications for policy and practice**

Several policy implications for disaster risk management and climate change adaptation interventions in the coastal tourism sector of Caribbean Small Island Developing States arise.

A change in climate will bring with it changes in competitiveness and sustainability. Destinations are likely to be transformed with some emerging as winners and others as losers. Climate change-induced impacts have the potential to negatively affect a destination's image, but as this research has shown, so do the adaptation strategies taken to reverse or compensate for climate change impacts. In the case of the Caribbean, there is the risk that it is likely to experience a double loss of environmental amenity – first due to negative environmental outcomes associated with sea level rise and increased coastal erosion, and second, due to diminished amenity related to the implementation of CCA measures. For example, the results suggest that island states may still experience a reduction or loss in tourist demand even if the PARD strategies were implemented to address loss of environmental amenity associated with a changing climate. Of particular concern is the finding that tourists who favour a nearby, natural-looking beach are not likely to visit if Retreat and 'Product Diversification as exchange' are used to adapt to climate change. Destinations will therefore have to carefully consider the marketing implications of adaptation on destination image.

The research also found that there is relatively lower tourist perceptions of the importance of DRM measures than the importance of the beach in a context of increasing operational risk. Such perverse market signals indicate a larger role for public sector regulation, incentives

and exhortation. In general, however, care should be taken when basing policy decisions on market preferences. For example, tourists' low demand for DRM as a key component of their vacation choices should not be the basis for destinations' under-investment in DRM. The gap analyses reported here are insightful in identifying measures that may be of benefit to destinations in the long-term and are perceived well by tourists. However, biases and heuristics in policy decision-making and practice may unduly limit consideration of choices at later stages of decision-making by hoteliers and policy-makers as they focus on the preferences of tourists. An example of this is the idea of asking tourists to take a 100 m walk to get to the beach or no longer offering hotel rooms on the ground floor – two measures with possibly great potential for DRM and CCA that are likely to make it to tourists' final choice set but are relegated to the inept/reject or inert set among hoteliers and policy-makers. In the face of decision-making biases (e.g., recency bias) and heuristics, it may be necessary to develop policies to stimulate desired behaviour. In this way, the results of this research enable hoteliers and policy-makers to move away from 'blanket adaptation strategies' to more specific measures that are 'win-win-win' across hoteliers, policy-makers and tourists.

Knowledge of the determinants to adapt using the PARD strategies is particularly useful for policy-makers to provide favourable conditions in support of supplier adaptation measures. By influencing these 'predictors', policy-makers can increase the chance that a hotelier will engage in a desired action. For example, the statistical results showed that perceptions of protective strategies and measures matter for hoteliers whether in a DRM context or CCA context. By contrast, climate risk perception is not significantly associated with hoteliers' behavioural intention. For tourism policy-makers, the implications are that more than risk perception is necessary to stimulate hoteliers' adaptation using the PARD strategies. Given the key role of intermediaries such as international tour operators as an important referent group to hoteliers, tourism policy-makers would do well to expand their tool box and use partnerships with this group of stakeholders to influence hoteliers' behaviour now and in the future.

Tourism policy-makers should recognise that they themselves are prone to the same decision-making biases as hoteliers in many ways. For example, like hoteliers, they have an inflated view of the importance of the appearance and closeness of the beach to tourists' accommodation choice decisions. In the case of hoteliers, this view may contribute towards a bias of adopting in-situ Accommodation and Protection strategies versus Retreat. In the case of policy-makers, due to their own similar biases, they may support hoteliers in doing this. Moreover, both hoteliers and policy-makers do not recognise a difference between present and future risk and in doing so may be operating or making decisions that reflect climatic stability bias, recency bias or even low salience of climate change.

The size, segmentation, categorisation and overlap of DRM and CCA awareness sets signal that hoteliers and policy-makers share limited knowledge of CCA options. More work between groups in a participatory partnership encouraging mutual learning and evaluation of measures may be necessary. Moreover, there is an opportunity for other groups such as environmentally-based professionals, as well as, DRM and CCA professionals and researchers to engage with these practitioners in helping to expand their knowledge and expertise in DRM and CCA adjustments.



The accuracy of perceptions relating to the dynamics of climate change remains an issue, particularly for hoteliers. For example, hoteliers' admittedly lack knowledge about: 1) the nature of climate change, 2) the dynamics of the phenomenon associated with a change in climate, 3) the pace of change, 4) whether climate change can be avoided, and 5) how climatic changes will affect the tourism industry. There was also an issue with suppliers' incomplete understanding of: 1) probabilities associated with climate-related hazards and extreme events, and 2) the direct and indirect economic and financial costs of climate-related events versus the benefits of investment in DRM. Suppliers' incomplete understanding is problematic and is an example of a perceptual barrier to adaptation. These beliefs may contribute to different mental models that may affect suppliers' perceptions of: 1) the need to respond to climate change impacts, 2) the nature/form of appropriate response to climate change impacts, as well as, 3) the timing of responses. Given the above, there is a great need for enhanced climate literacy among hoteliers and tourism policy-makers alike. Moreover, the need for accessible decision-support systems (materials and tools) based on objective risk assessments, as well as, dialogue and sharing across the tourism, DRM and climate science communities is apparent.

## **7.6 Research limitations**

This research has methodological limits which affects the generalisability of its results. The first limitation is that the research adopts a case study approach in the Caribbean coastal tourism context.

The second limitation is that the study is representative of only a sample of sub-sectors in the tourism value chain. For example, it was not possible to conduct an exhaustive analysis of all tourism or even development planning stakeholders. Nevertheless, it is felt that the three main stakeholder groups represented in this research are very important stakeholder groups in the tourism system of SIDS.

Thirdly, due to resource limitations identified during the course of the research, certain components of sub-studies were curtailed impacting the nature of the results originally envisaged. For example, 1) a direct measure versus indirect measure TPB questionnaire was used, and 2) regression versus structural equation modelling techniques were used for modelling TPB construct relationships.

Fourthly, this is a cross-sectional field study with constraints. Since the data for the research programme was collected at various phases in 2011, 2012 and 2013, the measures only capture perceptions at the time of measurement. A longitudinal research design that captures change in perceptions over time would be superior.

Fifth, this research uses theoretical frameworks such as the APC and TPB that make sequential, uni-directional assumptions about relationships. The models are linear and deterministic and situational factors are assumed to be constant. Moreover, the regression techniques used are limited in only being able to establish association between variables, but not the path of the relationship between the variables (Weinstein, 1993). The correlational nature of the data, therefore, restrains any causal interpretation of the results (Cook, Moore,

& Steel, 2005). Since experimental conditions were not used, the study is only indicative and no firm conclusions regarding causal relationships should be drawn from the results. Even though the findings from these samples may not be generalised, they have improved our understanding of the role of climatic and non-climatic perceptions as significant predictors of behavioural intention, as well as, at various other stages in the supplier protective decision-making process.

Sixth, the research focused on a test primarily of the PARD strategies, which do not provide an holistic representation of all possible adaptation strategies. In fact, it is entirely possible that although this research has conceptualised the PARD strategies and associated measures as monolithic, the PARD strategies are not likely to be adopted 'wholesale'. Rather specific measures from each strategy may be more popular than others, with stakeholders likely to incorporate one or more measures from each strategy set to form a hybrid CCA portfolio. This limitation was mitigated by examining individual measures in the analysis.

Finally, participation in the hotelier, policy-maker and tourist surveys was voluntary, and there is no guarantee that responses are representative. Although the descriptive statistics relating to the demographic profiles of each sample indicates that the sample was varied, the hotelier, policy-maker and tourist samples may not be perfectly reflective of these populations. In addition, the use of purposive and convenience samples have implications for the generalisation of the results to the larger tourist, hotelier and policy-maker populations. Therefore, care is needed in the interpretation of the results.

## **7.7 Future research**

In sum, this research points to several new avenues for future work.

Firstly, further testing of the new generalised model of supplier protective decision-making is necessary. Future research should examine supplier protective decision-making across different SIDS contexts, for example, in the Pacific and AIMS regions, thereby validating the usefulness of the model to broader settings.

Secondly, given the key role of the normative construct to supplier intention to adapt to climate change, new work could target key tourism intermediaries such as tour operators, financial institutions, and insurance companies.

Thirdly, the extent to which recency bias influences maladaptation through enabling a decision-maker's tendency to utilise an adjustment process (and the individual adjustments and policies that emerge from it) that is underpinned by a dominant reliance on recent past experience to address long-run climatic change is an important and interesting area of future research.

Fourthly, the contribution of tourists' behavioural beliefs to intention to choose a destination that has implemented a particular CCA strategy was not tested in a traditional or extended TPB framework in this research programme. Nor is such a study present in the literature. Additional theoretical work is therefore needed to help us to understand the significant predictors of tourist intention to visit a destination using the PARD strategies.

Finally, the antecedents to suppliers' intention to adjust to present-day climate-related hazards in a DRM context while qualitatively examined were not quantitatively tested in this research. Future studies could use the TPB to measure the critical factors influencing intention to adjust using DRM strategies. The results of the present research could form the basis for an examination of the difference between the antecedents that significantly contribute to suppliers' behavioural intention to use specific DRM measures to adjust versus their intention to adapt using specific CCA strategies. This nuance is a research area that remains open for testing.

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## Appendices

### Appendix A Study 1: Hotelier interview protocol

#### Introductory statement:

Good morning/afternoon (insert name). Thank you for agreeing to take part in this research study. I'm going to record this so that I can recall all the information that you tell me. None of the information you give me will be linked to you. You will be anonymous and you will not be identified as a respondent without your consent. During the rest of the session, I'll be working from a script to ensure that all of my questions to everyone who participates in this study are the same. Now, here is the research information sheet that tells you a bit more about this study. Please take a few minutes to look through it. I would also be happy to explain it to you. The study will require you to answer about 15 questions. The whole session is expected to take no more than 30 minutes. Do you have any questions before we begin? I do have one question before we begin. Can you please give me an overview of what the coastal tourism product looks like at your hotel?

#### Interview questions:

Ref.	Question
1	Can you tell me which coastal hazards affect your coastline (e.g., Severe storms, hurricanes, coastal erosion, storm surge, coastal flooding)? And of these coastal hazards, which two do you think are most likely to affect your hotel?
2	Has your hotel ever experienced or suffered any loss or damage as a result of any of these hazards? And if you have, can you tell me about it?
3	Can you think of the possible things your management team might be able to do to prepare for and respond to the natural hazards that affect your coastline?
4	How confident do you feel about your organisation's ability to deal with any of these hazards?
5	Are there any individuals or groups who would encourage or approve of your hotel preparing for and responding to the hazards that affect your coast? Who are they?
6	Are there any individuals or groups who would discourage or disapprove of your hotel preparing for and responding to the hazards that affect your coast? Who are they?
7	What about the hotels in other beach tourism destinations in the Caribbean? Do you know whether the hazards you mentioned earlier have impacted hotels in these other beach destinations and what they have done about it?
8	Moving on now to climate change. Have you heard about climate change/global warming? If yes, how serious a problem do you think climate change is for your hotel?
9	What do you think are some of the biggest challenges your hotel would face?
10	Climate change is expected to bring a rise in temperatures; an increase in rainfall, increased hurricane activity, storm surge and coastal erosion in the Caribbean. It is also expected to bring a rise in sea level. How are these challenges different from the challenges that are faced with natural hazards now?
11	Can you tell me what you think are the possible management options to deal with the impacts of climate change on your coast? (3 choices: staying put, staying put but adapting by building seawalls or rockwalls, retreating)
12	What do you think would make it easier for your hotel to prepare for and respond to climate change impacts that may affect your coastline?

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<b>Ref.</b>	<b>Question</b>
13	Are there any individuals or groups who would encourage or approve of your hotel preparing for and responding to impacts due to climate change? Who are they?
14	Are there any individuals or groups who would discourage or disapprove of your hotel preparing for and responding to impacts due to climate change? Who are they?
15	Do you believe that visitors would be willing to return to experience a coastal tourism product that has been purposefully adjusted by coastal hoteliers to deal with the impacts of climate change?

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## Appendix B Study 1: Policy-maker and industry association interview protocol

### Introductory statement:

Good morning/afternoon (insert name). Thank you for agreeing to take part in this research study. I'm going to record this so that I can recall all the information that you tell me. None of the information you give me will be linked to you. You will be anonymous and you will not be identified as a respondent without your consent. During the rest of the session, I'll be working from a script to ensure that all of my questions to everyone who participates in this study are the same. Now, here is the research information sheet that tells you a bit more about this study. Please take a few minutes to look through it. I would also be happy to explain it to you. The study will require you to answer about 15 questions. The whole session is expected to take no more than 30 minutes. Do you have any questions before we begin? I do have one question before we begin. Can you please give me an overview of what the coastal tourism product looks like in your country?

### Interview questions:

Ref.	Question
1	Can you tell me which coastal hazards affect your destination coastline (e.g., Severe storms, hurricanes, coastal erosion, storm surge, coastal flooding)? And of these coastal hazards, which two do you think are most likely to affect the hotels that operate on your coast?
2	Has your destination ever experienced or suffered any loss or damage as a result of any of these hazards? And if you have, can you tell me about it?
3	Can you think of the possible things your management team might be able to do to help the tourism industry prepare for and respond to the natural hazards that affect your coastline?
4	How confident do you feel about your organisation's ability to help the tourism industry to deal with any of these hazards?
5	Are there any individuals or groups who would encourage or approve of your tourism industry preparing for and responding to the hazards that affect your coast? Who are they?
6	Are there any individuals or groups who would discourage or disapprove of your tourism industry preparing for and responding to the hazards that affect your coast? Who are they?
7	What about the tourism industry on other beach tourism destinations in the Caribbean? Do you know whether the hazards you mentioned earlier have impacted hotels in these other beach destinations and what they have done about it?
8	Moving on now to climate change. Have you heard about climate change/global warming? And how serious a problem do you think climate change is for your coastal tourism industry?
9	What do you think are some of the biggest challenges coastal hotels would face?
10	How are these challenges different from the challenges that are faced with natural hazards now?
11	Can you tell me what you think are the possible management options to deal with the impacts of climate change on your coast? (3 choices: staying put, staying put but adapting by building seawalls or rockwalls, retreating)
12	What do you think would make it easier for your organisation to help hoteliers to prepare for and respond to climate change impacts that may affect your destination?
13	Are there any individuals or groups who would encourage or approve of you preparing for and responding to impacts due to climate change? Who are they?

---

<b>Ref.</b>	<b>Question</b>
14	Are there any individuals or groups who would discourage or disapprove of you preparing for and responding to impacts due to climate change? Who are they?
15	Do you believe that visitors would be willing to return to experience a coastal tourism product that has been purposefully adjusted by coastal hoteliers to deal with the impacts of climate change?

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## Appendix C Study 1: Theoretical coding scheme for interview questions

Ref.	Question	Code
1	Can you tell me which physical hazards affect your destination coastline (if a prompt is needed e.g., severe storms, hurricanes, coastal erosion, storm surge, coastal flooding)?	HP_Cog_Aware
2	And of these physical hazards, which two do you think are most likely to affect the hotels that operate on your coast?	HP_Cog_Aware
3	Has your destination ever experienced or suffered any loss or damage as a result of any of these hazards?	HP_Haz_Affect HP_Past_Haz
4	And if you have, can you tell me about it?	HP_Past_Haz
5	Can you think of the possible things your management team might be able to do to help the tourism industry prepare for and respond to the physical hazards that affect your coastline?	AB_Pos_Neg AS_Theo_Adjust AS_Av_Adjust
6	How confident do you feel about your organisation's ability to help the tourism industry to deal with any of these hazards?	PBC_Control PBC_Self_Eff
7	Are there any individuals or groups who would encourage or approve of your tourism industry preparing for and responding to the hazards that affect your coast?	SN_In_Norm
8	Who are they?	SN_In_Norm
9	Are there any individuals or groups who would discourage or disapprove of your tourism industry preparing for and responding to the hazards that affect your coast?	SN_In_Norm
10	Who are they?	SN_In_Norm
11	What about the tourism industry on other beach tourism destinations in the Caribbean? Do you know whether the hazards you mentioned have impacted hotels in these destinations?	SN_Des_Norm
12	What they have done about it?	SN_Des_Norm
13	Moving on now to climate change. Have you heard about climate change/global warming?	HP_Cog_Aware
14	How serious a problem do you think climate change is for your coastal tourism industry?	HP_Cog_Aware
15	What do you think are some of the biggest challenges coastal hotels would face?	AE_Adopt_Con HP_Cog_Aware HP_Haz_Affect HP_Fut_Expect
16	How are these challenges different from the challenges that are faced with physical hazards now?	AE_Adopt_Con HP_Cog_Aware HP_Fut_Expect
17	Can you tell me what you think are the possible management options to deal with the impacts of climate change on your coast?	AS_Theo_Adjust AS_Av_Adjust
18	Can you tell me which of these 3 options you are most comfortable with (1. do nothing, 2. staying put but adapting by protecting and accommodating, 3. retreat)	AS_Theo_Adjust
19	What do you think would make it easier for your organisation to help hoteliers to prepare for and respond to climate change impacts that may affect your destination?	AE_Adopt_Fac PBC_Sit_Fac
20	Are there any individuals or groups who would encourage or approve of you preparing for and responding to impacts due to climate change?	SN_In_Norm
21	Who are they?	SN_In_Norm
22	Are there any individuals or groups who would discourage or disapprove of you preparing for and responding to impacts due to climate change?	SN_In_Norm
23	Who are they?	SN_In_Norm
24	Do you believe that visitors would be willing to return to experience a coastal tourism product that has been purposefully adjusted by coastal hoteliers to deal with the impacts of climate change?	HP_Cog_Aware HP_Haz_Affect HP_Fut_Expect

Note: Policy-maker interview schedule used here.

# Appendix D Study 1: NVivo codes for Study 1

## Node Structure

### Climate Change and Caribbean Coastal Tourism

#### Hierarchical Name

#### Node

##### Nodes

Nodes\\Accommodation  
Nodes\\Already there  
Nodes\\Awareness\_Knowledge\_Education  
Nodes\\Barriers for action  
Nodes\\Belief that CC is already happening  
Nodes\\Case for national and or regional action  
Nodes\\Climate Change Confidence  
Nodes\\Climate Change Cost  
Nodes\\Demand and Supply Development Dynamics  
Nodes\\Disconnect  
Nodes\\Dread\_Worry  
Nodes\\Exarcerbation  
Nodes\\Implications of Loss of Enviro Amenity  
Nodes\\Importance of Beach  
Nodes\\Importance of Tourism  
Nodes\\Interview Impact  
Nodes\\Mindsets  
Nodes\\Mitigation  
Nodes\\Motivators of Action  
Nodes\\Other Adaptation Options  
Nodes\\Partnership and Leadership  
Nodes\\Preparedness  
Nodes\\Prevention\_Mitigation  
Nodes\\ Diversification  
Nodes\\Profile

Nodes\\Protection  
Nodes\\Proximity to the Beach  
Nodes\\Q 10 -SN\_In\_Norm  
Nodes\\Q 11 - SN\_Des\_Norm  
Nodes\\Q 12 - SN\_Des\_Norm  
Nodes\\Q 13 - HP\_Cog\_Aware  
Nodes\\Q 14 - HP\_Cog\_Aware  
  
Nodes\\Q 15 - HP\_Cog\_Aware & HP\_Fut\_Expect  
Nodes\\Q 16 - HP\_Cog\_Aware & HP\_Fut\_Expect  
Nodes\\Q 17 – Awareness & AS\_Theo\_Adjust & AS\_Av\_Adjust  
Nodes\\Q 18 – Attitude & Intention & Preference & Choice  
Nodes\\Q 19 -AE\_Adopt\_Fac & PBC\_Sit\_Fac  
  
Nodes\\Q 2 - HP\_Cog\_Aware  
Nodes\\Q 20 - SN\_In\_Norm  
Nodes\\Q 21 -SN\_In\_Norm  
Nodes\\Q 22 -SN\_In\_Norm  
Nodes\\Q 23 -SN\_In\_Norm  
Nodes\\Q 24 - HP\_Cog\_Aware & HP\_Haz\_Affect & HP\_Fut\_Expect  
  
Nodes\\Q 3- HP\_Past\_Haz\_Exp  
Nodes\\Q 4 - HP\_Past\_Haz\_Exp  
Nodes\\Q 5 - AWARENESS & AS\_Theo\_Adjus & AS\_Av\_Adjus  
Nodes\\Q 6 - PBC\_Control & PBC\_Self\_Eff  
Nodes\\Q 7 - SN\_In\_Norm  
Nodes\\Q 8- SN\_In\_Norm  
Nodes\\Q 9 -SN\_In\_Norm  
Nodes\\Q1-HP\_Cog\_Aware  
Nodes\\Resources to adapt  
Nodes\\Retreat  
Nodes\\Roles and Responsibilities  
Nodes\\Staying put and doing little to nothing  
Nodes\\Tourist perception of climate hazards and change

## Appendix E Studies 2 and 3: HEC approval letter for hotelier and policy-maker pre-tests



New Zealand's specialist land-based university

Research and Commercialisation Office

T 64 3 325 2811

Extn 7682

F 64 3 325 3630

PO Box 84, Lincoln University

Lincoln 7647, Christchurch

New Zealand

**Application No:** P-2013-03

27 March 2012

**Title:** Caribbean tourism supply-side perception of climate change adaption strategies survey.

**Applicant:** Roche Mahon

---

*The Lincoln University Human Ethics Committee has reviewed the above noted application*

Thank you for your notification of the proposed pilot study. This project is approved.

On behalf of the Human Ethics Committee I wish you all the best in this initial stage of your research project.

Yours sincerely

Professor Grant Cushman  
Chair, Human Ethics Committee

cc: Hamish Rennie  
Gary Steel

**PLEASE NOTE:** The Human Ethics Committee has an audit process in place for applications. Please see 7.3 of the Human Ethics Committee Operating Procedures (ACHE) in the Lincoln University Policies and Procedures Manual for more information.

## Appendix F Studies 2 and 3: HEC approval letter for hotelier and policy-maker main surveys

Research and Commercialisation Office

T 64 3 325 3838  
F 64 3 325 3630  
PO Box 84, Lincoln University  
Lincoln 7647, Christchurch  
New Zealand

[www.lincoln.ac.nz](http://www.lincoln.ac.nz)

**Application No:** 2013-19

15 April 2013

**Title:** Caribbean Tourism Supply-Side Perception of Climate Change Adaptation Strategies Survey

**Applicant:** Roche Mahon

---

*The Lincoln University Human Ethics Committee has reviewed the above noted application.*

Thank you for your detailed response to the questions which were forwarded to you on the Committee's behalf.

I am satisfied on the Committee's behalf that the issues of concern have been satisfactorily addressed. I am pleased to give final approval to your project. Please advise Alison Hind when you have completed your research and confirming that you have complied with the terms of the ethical approval.

May I, on behalf of the Committee, wish you success in your research.

Yours sincerely



Professor Grant Cushman  
Chair, Human Ethics Committee

cc Dr Hamish Rennie

**PLEASE NOTE:** The Human Ethics Committee has an audit process in place for applications. Please see 7.3 of the Human Ethics Committee Operating Procedures (ACHE) in the Lincoln University Policies and Procedures Manual for more information.

## Appendix G Study 2:Hotelier questionnaire

ID #: \_\_\_\_\_

Completed on: \_\_\_\_\_

### COASTAL HOTELIER PERCEPTION OF CLIMATE CHANGE ADAPTATION STRATEGIES SURVEY

#### TELL US WHAT YOU THINK

You are invited to participate in a study of coastal hoteliers being carried out in ten Caribbean destinations as part of my Ph.D. research to understand coastal hotelier views on ways that their businesses might adapt to climate change. Your response is appreciated and will help to ensure that a wide range of stakeholder views are represented. As a token of my appreciation for participating in this survey, you will receive:

1. The preliminary results of a similar survey done with a sample of 286 tourists to the Caribbean island of Tobago in January – March 2012. The results can be downloaded at: <http://hdl.handle.net/10182/5297> on June 1<sup>st</sup>, 2013.
2. A summary of the results of the present survey is expected to be available for download on September 1<sup>st</sup>, 2013 at: <http://hdl.handle.net/10182/5298>.

#### YOUR PARTICIPATION

**Your participation in this study is voluntary** and will involve taking **15 minutes to complete** the questionnaire that follows. You do not have to answer any questions that you would prefer not to answer. Any answers you provide will be anonymous. The questions ask for general information and opinions only. There are no right or wrong answers.

#### YOUR RIGHTS

The data collected for this study may be used as a baseline against which similar research in the future may be compared. If you tick the consent box located at the top of the next page, this is accepted as your consent to participate in this study. Your name and other information that would identify you or your hotel are **not** collected. This ensures that you remain anonymous. However, at the start of the survey you will be given a unique identifying number that will enable you to withdraw any or all information that you provide. If you wish to withdraw any or all information, you can do so no later than **Friday May 31st, 2013** by contacting one of the researchers mentioned below, quoting the unique identifying number and we will be able to remove and destroy information that you have provided.

#### CONTACT US

This research is being undertaken in partial fulfilment of the requirements for the degree of Doctor of Philosophy at Lincoln University in Christchurch, New Zealand and has been reviewed and approved by the Lincoln University Human Ethics Committee. If you require any further information about this project, or have any concerns about your participation, please feel free to contact the researchers involved as follows:

Study conducted by:	Study supervised by:	
Roché Mahon (Ph.D. Candidate)	Hamish Rennie (Senior Lecturer)	Gary Steel (Senior Lecturer)
Faculty of Environment, Society and Design	Faculty of Environment, Society and Design	Faculty of Environment, Society and Design
Lincoln University	Lincoln University	Lincoln University
PO Box 84, Lincoln 7647, Christchurch, New Zealand	PO Box 84, Lincoln 7647, Christchurch, New Zealand	PO Box 84, Lincoln 7647, Christchurch, New Zealand
Phone: 64 3 325 3838 ext. 8768 (o)	Phone: 64 3 325 3838 ext. 8002 (o)	Phone: 64 3 325 3838 ext. 8784 (o)
E-mail: roche.mahon@lincolnuni.ac.nz	E-mail: hamish.rennie@lincoln.ac.nz	E-mail: gary.steel@lincoln.ac.nz

Thank you for your time and cooperation.

**Please retain this sheet for your reference**

ID #: \_\_\_\_\_

Completed on: \_\_\_\_\_

- I have read and understood the information sheet about this research project;
- I understand that if I have any additional questions, I can contact the research team;
- I understand that my participation is voluntary and that I am free to withdraw any information I have provided no later than **Friday May 31<sup>st</sup>, 2013**.

- I agree to participate in the project

## START HERE

### 1. Where in the Caribbean is your hotel located?

- |   |  |
|---|--|
| <input type="checkbox"/> Antigua & Barbuda            | <input type="checkbox"/> Barbados          |
| <input type="checkbox"/> Bahamas                      | <input type="checkbox"/> Belize            |
| <input type="checkbox"/> Grenada                      | <input type="checkbox"/> Jamaica           |
| <input type="checkbox"/> Saint Lucia                  | <input type="checkbox"/> St. Kitts & Nevis |
| <input type="checkbox"/> St. Vincent & the Grenadines | <input type="checkbox"/> Trinidad & Tobago |
| <input type="checkbox"/> Other _____                  |  |

### 2. Please tick the box(es) that best describe(s) your hotel investment and ownership structure (please tick as many that apply).

- |   |  |
|---|--|
| <input type="checkbox"/> Sole ownership     | <input type="checkbox"/> Joint venture       |
| <input type="checkbox"/> Franchise          | <input type="checkbox"/> Management contract |
| <input type="checkbox"/> Strategic alliance | <input type="checkbox"/> Consortia           |
| <input type="checkbox"/> Foreign owned      | <input type="checkbox"/> Locally owned       |
| <input type="checkbox"/> Publicly operated  | <input type="checkbox"/> Privately operated  |
| <input type="checkbox"/> Other _____        |  |

### 3. Please provide us with some information about your coastal hotel. For this study, a 'coastal hotel' in the Caribbean is defined as a hotel that is located no more than 800 metres from the high water mark.

Total number of rooms at your hotel: \_\_\_\_\_rooms

Total number of employees at your hotel: \_\_\_\_\_employees

Estimated distance of the nearest hotel building to the high water mark (in metres): \_\_\_\_\_ metres

### 4. Please provide us with some general information about yourself.

Number of years of industry experience: \_\_\_\_\_ years

Length of time employed at your current hotel: \_\_\_\_\_ years

Age (in full years) : \_\_\_\_\_years

Sex:

- |                               |                                 |
|-------------------------------|---------------------------------|
| <input type="checkbox"/> Male | <input type="checkbox"/> Female |
|-------------------------------|---------------------------------|

Please tick the box that best describes your position in relation to the hotel management team.

- |  |   |
|--|---|
| <input type="checkbox"/> Owner                                   | <input type="checkbox"/> General Manager            |
| <input type="checkbox"/> CEO/Managing Director                   | <input type="checkbox"/> Executive Committee Member |
| <input type="checkbox"/> Department Head (Operations/Rooms/ F&B) | <input type="checkbox"/> Other _____                |

**5. As far as you are aware, how often has your hotel implemented the following measures at any time since the start of its operations? (Please tick the box or boxes to indicate which, if any, of the following apply).**

	Never			All of the Time		
Used artificial defence structures (e.g., concrete walls, rock structures)	1	2	3	4	5	
Invested in the resistance of hotel buildings and infrastructure	1	2	3	4	5	
Prepared or revised disaster plans	1	2	3	4	5	
Offered guests guarantees of personal safety from natural disasters	1	2	3	4	5	
Provided information about disaster response procedures to guests	1	2	3	4	5	

**6. How much do you agree or disagree with the following statements about coastal hoteliers preparing for coastal hazards, hydro-meteorological hazards and climate change?**

	Strongly Disagree				Strongly Agree			
There is a need to prepare for coastal and hydro-meteorological hazards (e.g., coastal erosion, severe storms)	1	2	3	4	5	6	7	
There is a need to adapt to climate change	1	2	3	4	5	6	7	

**7. In general, how important do you think the following items are to tourists staying at your hotel?**

	Not important at all				Extremely important			
Natural appearance of your hotel's nearest beach	1	2	3	4	5	6	7	
Your hotel having disaster plans	1	2	3	4	5	6	7	
Offering guests guarantees of personal safety from natural disasters	1	2	3	4	5	6	7	
Providing information about disaster response procedures to guests	1	2	3	4	5	6	7	
Closeness of the beach to your hotel	1	2	3	4	5	6	7	

**8a. What is your opinion of the following hazard events and their potential impact generally on your hotel at the present time?**

	Strongly Disagree				Strongly Agree			
As far as I know, coastal erosion poses a risk	1	2	3	4	5	6	7	
As far as I know, hurricanes pose no risk	1	2	3	4	5	6	7	
As far as I know, sea level rise poses a risk	1	2	3	4	5	6	7	
I worry about the risk that coastal erosion poses	1	2	3	4	5	6	7	
I do not worry about the risk that hurricanes pose	1	2	3	4	5	6	7	
I worry about the risk that sea level rise poses	1	2	3	4	5	6	7	

**b. What is your opinion of the following hazard events and their potential impact generally on your hotel as a result of climate change within the next 15 years?**

	Strongly Disagree				Strongly Agree			
As far as I know, changes to the frequency and severity of coastal erosion as a result of climate change will pose no risk	1	2	3	4	5	6	7	
As far as I know, changes to the frequency and severity of hurricanes as a result of climate change will pose a risk	1	2	3	4	5	6	7	
As far as I know, sea level rise as a result of climate change will pose no risk	1	2	3	4	5	6	7	



I worry about the risk that changes to the frequency and severity of coastal erosion as a result of climate change poses	1	2	3	4	5	6	7
I do not worry about the risk that changes to the frequency and severity of hurricanes as a result of climate change poses	1	2	3	4	5	6	7
I do not worry about the risk that sea level rise as a result of climate change poses	1	2	3	4	5	6	7

The purpose of the next Section is to find out your views and beliefs about 4 specific climate change adaptation strategies called Approaches A, B, C, and D. The questions in this Section are designed to measure four factors:

1. Your attitude towards Approaches A, B, C and D
2. How much social pressure you feel to use Approaches A, B, C and D
3. Whether you feel you are actually able to use Approaches A, B, C and D, and
4. Your intentions to adapt to climate change using Approaches A, B, C and D.

There are between three to four questions for each factor. Some questions may therefore appear repetitive. However, this is necessary as previous research has found that people respond differently to slightly different wording.

9. To begin, please read the following passage:

“Changes in climate will worsen the already existing coastal problems in the Caribbean. Scientists project that these destinations will experience a **rise in sea level** leading to the loss of many beaches. **Beach erosion** is expected to be a constant challenge that also contributes to the **loss of beaches**. There will be **more intense and more frequent storms and hurricanes** that bring with them **large amounts of storm surge and flooding** (Journal of Climatic Sciences, 2011)”. In order to cope with the greater challenge of operating on the coast described above, coastal hoteliers may take four different Approaches. Each of these Approaches have associated features in relation to coastal hotels:

1. Approach A – focuses on dealing with beach erosion and sea level rise
2. Approach B – focuses on strengthening hotel buildings and disaster management systems
3. Approach C – focuses on placing hotel buildings further inland, and
4. Approach D – focuses on other forms of tourism.

APPROACH A: BEACH EROSION AND SEA LEVEL RISE							
Please rate the following features of Approach A:	Extremely undesirable			Extremely desirable			
Building more concrete walls than are generally present now on beaches is	1	2	3	4	5	6	7
Building more rock structures than are generally present now on beaches is	1	2	3	4	5	6	7
Raising the height of existing walls and structures is	1	2	3	4	5	6	7
Beaches that increasingly have an appearance that is not 100% natural are	1	2	3	4	5	6	7
How strongly do you agree or disagree with the following statements about your hotel using Approach A to adapt to climate change within the next 15 years?	Strongly disagree			Strongly agree			
Using Approach A would be bad practice	1	2	3	4	5	6	7
I intend to support the use of Approach A	1	2	3	4	5	6	7
<u>Hotel guests</u> would expect my hotel to use Approach A	1	2	3	4	5	6	7
Using Approach A would be effective	1	2	3	4	5	6	7
<u>International tour operators</u> would think that my hotel should use Approach A	1	2	3	4	5	6	7
Using Approach A would be necessary	1	2	3	4	5	6	7
It is very likely that my hotel will use Approach A	1	2	3	4	5	6	7

Using Approach A is entirely up to the management team at my hotel	1	2	3	4	5	6	7
Using Approach A would not be feasible	1	2	3	4	5	6	7
I expect that my hotel will use Approach A	1	2	3	4	5	6	7
Using Approach A would be easy	1	2	3	4	5	6	7
<u>Government policy-makers</u> would approve of my hotel using Approach A	1	2	3	4	5	6	7
I do not want my hotel to use Approach A	1	2	3	4	5	6	7
<b>APPROACH B: HOTEL BUILDINGS AND DISASTER MANAGEMENT SYSTEMS</b>							
<b>Please rate the following features of Approach B:</b>	<b>Extremely undesirable</b>			<b>Extremely desirable</b>			
Investing in the resistance of hotel buildings and infrastructure is	1	2	3	4	5	6	7
Investing in disaster management systems is	1	2	3	4	5	6	7
Lifting hotel buildings up on piles is	1	2	3	4	5	6	7
No longer offering rooms on the ground floor is	1	2	3	4	5	6	7
<b>How strongly do you agree or disagree with the following statements about your hotel using Approach B to adapt to climate change within the next 15 years?</b>	<b>Strongly disagree</b>			<b>Strongly agree</b>			
Using Approach B would be effective	1	2	3	4	5	6	7
Using Approach B would be bad practice	1	2	3	4	5	6	7
<u>Hotel guests</u> would expect my hotel to use Approach B	1	2	3	4	5	6	7
I do not want my hotel to use Approach B	1	2	3	4	5	6	7
Using Approach B would be necessary	1	2	3	4	5	6	7
<u>Government policy-makers</u> would approve of my hotel using Approach B	1	2	3	4	5	6	7
It is very likely that my hotel will use Approach B	1	2	3	4	5	6	7
I expect that my hotel will use Approach B	1	2	3	4	5	6	7
Using Approach B is entirely up to the management team at my hotel	1	2	3	4	5	6	7
Using Approach B would not be feasible	1	2	3	4	5	6	7
I intend to support the use of Approach B	1	2	3	4	5	6	7
<u>International tour operators</u> would think that my hotel should use Approach B	1	2	3	4	5	6	7
Using Approach B would be easy	1	2	3	4	5	6	7
<b>APPROACH C: HOTEL BUILDINGS FURTHER INLAND</b>							
<b>Please rate the following features of Approach C:</b>	<b>Extremely undesirable</b>			<b>Extremely desirable</b>			
Not having hotel rooms that are right on the beach is	1	2	3	4	5	6	7
Asking guests to take a 100 m walk to get to the beach is	1	2	3	4	5	6	7
Asking guests to take a 500 m walk to get to the beach is	1	2	3	4	5	6	7
Asking guests to take a free shuttle bus to get to the beach is	1	2	3	4	5	6	7
<b>How strongly do you agree or disagree with the following statements about your hotel using Approach C to adapt to climate change within the next 15 years?</b>	<b>Strongly disagree</b>			<b>Strongly agree</b>			
I intend to support the use of Approach C	1	2	3	4	5	6	7
<u>Government policy-makers</u> stakeholders would approve of my hotel using Approach C	1	2	3	4	5	6	7
Using Approach C would be bad practice	1	2	3	4	5	6	7
Using Approach C would be effective	1	2	3	4	5	6	7
Using Approach C is entirely up to the management team at my hotel	1	2	3	4	5	6	7

<u>International tour operators</u> would think that my hotel should use Approach C	1	2	3	4	5	6	7
It is very likely that my hotel will use Approach C	1	2	3	4	5	6	7
Using Approach C would not be feasible	1	2	3	4	5	6	7
Using Approach C would be necessary	1	2	3	4	5	6	7
Using Approach C would be easy	1	2	3	4	5	6	7
I expect that my hotel will use Approach C	1	2	3	4	5	6	7
<u>Hotel guests</u> would expect my hotel to use Approach C	1	2	3	4	5	6	7
I do not want my hotel to use Approach C	1	2	3	4	5	6	7

**APPROACH D: OTHER FORMS OF TOURISM**

<b>Please rate the following features of Approach D:</b>	<b>Extremely undesirable</b>			<b>Extremely desirable</b>			
Having less beach hotels in operation is	1	2	3	4	5	6	7
Offering more ecotourism activities is	1	2	3	4	5	6	7
Offering more cultural tourism activities is	1	2	3	4	5	6	7
<b>How strongly do you agree or disagree with the following statements about your hotel using Approach D to adapt to climate change within the next 15 years?</b>	<b>Strongly disagree</b>			<b>Strongly agree</b>			
Using Approach D would be necessary	1	2	3	4	5	6	7
I do not want my hotel to use Approach D	1	2	3	4	5	6	7
Using Approach D would be effective	1	2	3	4	5	6	7
<u>Hotel guests</u> would expect my hotel to use Approach D	1	2	3	4	5	6	7
<u>Government policy-makers</u> would approve of my hotel using Approach D	1	2	3	4	5	6	7
I intend to support the use of Approach D	1	2	3	4	5	6	7
It is very likely that my hotel will use Approach D	1	2	3	4	5	6	7
Using Approach D is entirely up to the management team at my hotel	1	2	3	4	5	6	7
Using Approach D would not be feasible	1	2	3	4	5	6	7
Using Approach D would be easy	1	2	3	4	5	6	7
Using Approach D would be bad practice	1	2	3	4	5	6	7
I expect that my hotel will use Approach D	1	2	3	4	5	6	7
<u>International tour operators</u> would think that my hotel should use Approach D	1	2	3	4	5	6	7

**Thank you for taking the time to complete this questionnaire. Your assistance is very much appreciated. If there is anything else you would like to tell us about this survey, please do so in the space provided below.**



## Appendix H Study 3: Policy-maker and industry association questionnaire

ID #: \_\_\_\_\_

Completed on: \_\_\_\_\_

### GOVERNMENT AND INDUSTRY TOURISM STAKEHOLDERS PERCEPTION OF CLIMATE CHANGE ADAPTATION STRATEGIES SURVEY

#### TELL US WHAT YOU THINK

You are invited to participate in a study of national level Government and industry tourism stakeholders being carried out in ten Caribbean countries as part of my Ph.D. research to understand supply-side stakeholder views on ways Caribbean destinations might adapt to climate change. Your response is appreciated and will help to ensure that a wide range of stakeholder views are represented. As a token of my appreciation for participating in this survey, you will receive:

1. The preliminary results of a similar survey done with a sample of 286 tourists to the Caribbean island of Tobago in January – March 2012. The results can be downloaded at: <http://hdl.handle.net/10182/5297> on June 1<sup>st</sup>, 2013.
2. A summary of the results of the present survey is expected to be available for download on September 1<sup>st</sup>, 2013 at: <http://hdl.handle.net/10182/5298>.

#### YOUR PARTICIPATION

**Your participation in this study is voluntary** and will involve taking **15 minutes to complete** the questionnaire that follows. You do not have to answer any questions that you would prefer not to answer. Any answers you provide will be anonymous. The questions ask for general information and opinions only. There are no right or wrong answers.

#### YOUR RIGHTS

The data collected for this study may be used as a baseline against which similar research in the future may be compared. If you tick the consent box located at the top of the next page, this is accepted as your consent to participate in this study. Your name and other information that would identify you or your hotel are **not** collected. This ensures that you remain anonymous. However, at the start of the survey you will be given a unique identifying number that will enable you to withdraw any or all information that you provide. If you wish to withdraw any or all information, you can do so no later than **Friday May 31st, 2013** by contacting one of the researchers mentioned below, quoting the unique identifying number and we will be able to remove and destroy information that you have provided.

#### CONTACT US

This research is being undertaken in partial fulfilment of the requirements for the degree of Doctor of Philosophy at Lincoln University in Christchurch, New Zealand and has been reviewed and approved by the Lincoln University Human Ethics Committee. If you require any further information about this project, or have any concerns about your participation, please feel free to contact the researchers involved as follows:

Study conducted by:	Study supervised by:	
Roché Mahon (Ph.D. Candidate)	Hamish Rennie (Senior Lecturer)	Gary Steel (Senior Lecturer)
Faculty of Environment, Society and Design	Faculty of Environment, Society and Design	Faculty of Environment, Society and Design
Lincoln University	Lincoln University	Lincoln University
PO Box 84, Lincoln 7647, Christchurch, New Zealand	PO Box 84, Lincoln 7647, Christchurch, New Zealand	PO Box 84, Lincoln 7647, Christchurch, New Zealand
Phone: 64 3 325 3838 ext. 8768 (o)	Phone: 64 3 325 3838 ext. 8002 (o)	Phone: 64 3 325 3838 ext. 8784 (o)
E-mail: roche.mahon@lincolnuni.ac.nz	E-mail: hamish.rennie@lincoln.ac.nz	E-mail: gary.steel@lincoln.ac.nz

Thank you for your time and cooperation.

**Please retain this sheet for your reference**

ID #: \_\_\_\_\_

Completed on: \_\_\_\_\_

- I have read and understood the information sheet about this research project;
- I understand that if I have any additional questions, I can contact the research team;
- I understand that my participation is voluntary and that I am free to withdraw any information I have provided no later than **Friday May 31<sup>st</sup>, 2013.**

- I agree to participate in the project

#### START HERE

##### 1. Where in the Caribbean are you located?

- |   |  |
|---|--|
| <input type="checkbox"/> Antigua & Barbuda            | <input type="checkbox"/> Barbados          |
| <input type="checkbox"/> Bahamas                      | <input type="checkbox"/> Belize            |
| <input type="checkbox"/> Grenada                      | <input type="checkbox"/> Jamaica           |
| <input type="checkbox"/> Saint Lucia                  | <input type="checkbox"/> St. Kitts & Nevis |
| <input type="checkbox"/> St. Vincent & the Grenadines | <input type="checkbox"/> Trinidad & Tobago |
| <input type="checkbox"/> Other _____                  |  |

##### 2. Please tick the box that best describes your organisation.

- |  |   |
|--|---|
| <input type="checkbox"/> Ministry of Tourism         | <input type="checkbox"/> Hotel and/or Tourism Association       |
| <input type="checkbox"/> Tourism Development Company | <input type="checkbox"/> Tourism Product and Investment Company |
| <input type="checkbox"/> Other _____                 |   |

##### 3. Please provide us with some information about the coastal hotels in your country. For this study, a 'coastal hotel' in the Caribbean is defined as a hotel that is located no more than 800 metres from the high water mark.

Approximate number of coastal hotels at your destination: \_\_\_\_\_hotels

Approximate number of coastal hotel rooms at your destination: \_\_\_\_\_rooms

Approximate number of coastal hotel employees at your destination: \_\_\_\_\_employees

Typical distance of coastal hotels from the high water mark (in metres): \_\_\_\_\_metres

##### 4. Please provide us with some general information about yourself.

Number of years of industry experience: \_\_\_\_\_ years

Length of time employed at your current organisation: \_\_\_\_\_ years

Age (in full years): \_\_\_\_\_ years

Sex:

- |                               |                                 |
|-------------------------------|---------------------------------|
| <input type="checkbox"/> Male | <input type="checkbox"/> Female |
|-------------------------------|---------------------------------|

Please tick the box that best describes your position in relation to the management team at your organisation.

- |   |  |
|---|--|
| <input type="checkbox"/> Executive Management | <input type="checkbox"/> Policy and Planning |
| <input type="checkbox"/> Operations           | <input type="checkbox"/> Product Development |
| <input type="checkbox"/> Marketing            | <input type="checkbox"/> Investment          |
| <input type="checkbox"/> Other _____          |  |

**5. As far as you are aware, how often have coastal hotels at your destination implemented the following measures? (Please tick the box or boxes to indicate which, if any, of the following apply).**

	Never			All of the Time	
Used artificial defence structures (e.g., concrete walls, rock structures)	1	2	3	4	5
Invested in the resistance of hotel buildings and infrastructure	1	2	3	4	5
Prepared or revised disaster plans	1	2	3	4	5
Offered guests guarantees of personal safety from natural disasters	1	2	3	4	5
Provided information about disaster response procedures to guests	1	2	3	4	5

**6. How much do you agree or disagree with the following statements about coastal hoteliers preparing for coastal hazards, hydro-meteorological hazards and climate change?**

	Strongly Disagree				Strongly Agree		
There is a need to prepare for coastal and hydro-meteorological hazards (e.g., coastal erosion, severe storms)	1	2	3	4	5	6	7
There is a need to adapt to climate change	1	2	3	4	5	6	7

**7. In general, how important do you think the following items are to tourists staying at your destination's coastal hotels?**

	Not at all important				Extremely important		
Natural appearance of coastal hotel beaches	1	2	3	4	5	6	7
Coastal hotels having disaster plans	1	2	3	4	5	6	7
Offering guests guarantees of personal safety from natural disasters	1	2	3	4	5	6	7
Providing information about disaster response procedures to guests	1	2	3	4	5	6	7
Closeness of the beach to coastal hotels	1	2	3	4	5	6	7

**8a. What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels at the present time?**

	Strongly Disagree				Strongly Agree		
As far as I know, coastal erosion poses a risk	1	2	3	4	5	6	7
As far as I know, hurricanes pose no risk	1	2	3	4	5	6	7
As far as I know, sea level rise poses a risk	1	2	3	4	5	6	7
I worry about the risk that coastal erosion poses	1	2	3	4	5	6	7
I do not worry about the risk that hurricanes pose	1	2	3	4	5	6	7
I worry about the risk that sea level rise poses	1	2	3	4	5	6	7

**b. What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels as a result of climate change within the next 15 years?**

	Strongly Disagree				Strongly Agree		
As far as I know, changes to the frequency and severity of coastal erosion as a result of climate change will pose no risk	1	2	3	4	5	6	7
As far as I know, changes to the frequency and severity of hurricanes as a result of climate change will pose a risk	1	2	3	4	5	6	7
As far as I know, sea level rise as a result of climate change will pose no risk	1	2	3	4	5	6	7
I worry about the risk that changes to the frequency and severity of coastal erosion as a result of climate change poses	1	2	3	4	5	6	7

I do not worry about the risk that changes to the frequency and severity of hurricanes as a result of climate change poses	1	2	3	4	5	6	7
I do not worry about the risk that sea level rise as a result of climate change poses	1	2	3	4	5	6	7

The purpose of the next Section is to find out your views and beliefs about 4 specific climate change adaptation strategies called Approaches A, B, C, and D. The questions in this Section are designed to measure four factors:

1. Your attitude towards Approaches A, B, C and D
2. How much social pressure you feel to help coastal hotels to use Approaches A, B, C and D
3. Whether you feel you are actually able to help coastal hotels to use Approaches A, B, C and D, and
4. Your intentions to help coastal hotels to adapt to climate change using Approaches A, B, C and D.

There are between three to four questions for each factor. Some questions may therefore appear repetitive. However, this is necessary as previous research has found that people respond differently to slightly different wording.

9. To begin, please read the following passage:

“Changes in climate will worsen the already existing coastal problems in the Caribbean. Scientists project that these destinations will experience a **rise in sea level** leading to the loss of many beaches. **Beach erosion** is expected to be a constant challenge that also contributes to the **loss of beaches**. There will be **more intense and more frequent storms and hurricanes** that bring with them **large amounts of storm surge and flooding** (Journal of Climatic Sciences, 2011)”. In order to cope with the greater challenge of operating on the coast described above, coastal hoteliers may take four different Approaches. Each of these Approaches have associated features in relation to coastal hotels:

1. Approach A – focuses on dealing with beach erosion and sea level rise
2. Approach B – focuses on strengthening hotel buildings and disaster management systems
3. Approach C – focuses on placing hotel buildings further inland, and
4. Approach D – focuses on other forms of tourism.

<b>APPROACH A: BEACH EROSION AND SEA LEVEL RISE</b>							
<b>Please rate the following features of Approach A:</b>	<b>Extremely undesirable</b>				<b>Extremely desirable</b>		
Building more concrete walls than are generally present now on beaches is	1	2	3	4	5	6	7
Building more rock structures than are generally present now on beaches is	1	2	3	4	5	6	7
Raising the height of existing walls and structures is	1	2	3	4	5	6	7
Beaches that increasingly have an appearance that is not 100% natural are	1	2	3	4	5	6	7
<b>How strongly do you agree or disagree with the following statements about helping coastal hotels at your destination to use Approach A to adapt to climate change within the next 15 years?</b>	<b>Strongly disagree</b>				<b>Strongly agree</b>		
Helping coastal hotels to use Approach A would be bad practice	1	2	3	4	5	6	7
I intend to support my organisation helping coastal hotels to use Approach A	1	2	3	4	5	6	7
<u>Hotel guests</u> would approve of my organisation helping coastal hotels to use Approach A	1	2	3	4	5	6	7
Helping coastal hotels to use Approach A would be effective	1	2	3	4	5	6	7
<u>International tour operators</u> would think that my organisation should help coastal hotels to use Approach A	1	2	3	4	5	6	7
Helping coastal hotels to use Approach A would be necessary	1	2	3	4	5	6	7
It is very likely that my organisation will help coastal hotels to use Approach A	1	2	3	4	5	6	7
Helping coastal hotels to use Approach A is entirely up to the management team at my organisation	1	2	3	4	5	6	7

Helping coastal hotels to use Approach A would not be feasible	1	2	3	4	5	6	7
I expect that my organisation will help coastal hotels to use Approach A	1	2	3	4	5	6	7
Helping coastal hotels to use Approach A would be easy	1	2	3	4	5	6	7
<u>Hotel operators</u> would expect my organisation to help coastal hotels to use Approach A	1	2	3	4	5	6	7
I do not want my organisation to help coastal hotels to use Approach A	1	2	3	4	5	6	7
<b>APPROACH B: HOTEL BUILDINGS AND DISASTER MANAGEMENT SYSTEMS</b>							
<b>Please rate the following features of Approach B:</b>	Extremely undesirable			Extremely desirable			
Investing in the resistance of hotel buildings and infrastructure is	1	2	3	4	5	6	7
Investing in disaster management systems is	1	2	3	4	5	6	7
Lifting hotel buildings up on piles is	1	2	3	4	5	6	7
No longer offering rooms on the ground floor is	1	2	3	4	5	6	7
<b>How strongly do you agree or disagree with the following statements about helping coastal hotels at your destination to use Approach B to adapt to climate change within the next 15 years?</b>	Strongly disagree			Strongly Agree			
Helping coastal hotels to use Approach B would be effective	1	2	3	4	5	6	7
Helping coastal hotels to use Approach B would be bad practice	1	2	3	4	5	6	7
<u>Hotel guests</u> would approve of my organisation helping coastal hotels to use Approach B	1	2	3	4	5	6	7
I do not want my organisation to help coastal hotels to use Approach B	1	2	3	4	5	6	7
Helping coastal hotels to use Approach B would be necessary	1	2	3	4	5	6	7
<u>Hotel operators</u> would expect my organisation to help coastal hotels to use Approach B	1	2	3	4	5	6	7
It is very likely that my organisation will help coastal hotels to use Approach B	1	2	3	4	5	6	7
I expect that my organisation will help coastal hotels to use Approach B	1	2	3	4	5	6	7
Helping coastal hotels to use Approach B is entirely up to the management team at my organisation	1	2	3	4	5	6	7
Helping coastal hotels to use Approach B would not be feasible	1	2	3	4	5	6	7
I intend to support my organisation helping coastal hotels to use Approach B	1	2	3	4	5	6	7
<u>International tour operators</u> would think that my organisation should help coastal hotels to use Approach B	1	2	3	4	5	6	7
Helping coastal hotels to use Approach B would be easy	1	2	3	4	5	6	7
<b>APPROACH C: HOTEL BUILDINGS FURTHER INLAND</b>							
<b>Please rate the following features of Approach C:</b>	Extremely undesirable			Extremely desirable			
Not having hotel rooms that are not right on the beach is	1	2	3	4	5	6	7
Asking guests to take a 100 m walk to get to the beach is	1	2	3	4	5	6	7
Asking guests to take a 500 m walk to get to the beach is	1	2	3	4	5	6	7
Asking guests to take a free shuttle bus to get to the beach is	1	2	3	4	5	6	7
<b>How strongly do you agree or disagree with the following statements about helping coastal hotels at your destination to use Approach C to adapt to climate change within the next 15 years?</b>	Strongly disagree			Strongly agree			
I intend to support my organisation helping coastal hotels to use Approach C	1	2	3	4	5	6	7
<u>Hotel operators</u> would expect my organisation to help coastal hotels to use Approach C	1	2	3	4	5	6	7
Helping coastal hotels to use Approach C would be bad practice	1	2	3	4	5	6	7



Helping coastal hotels to use Approach C would be effective	1	2	3	4	5	6	7
Helping coastal hotels to use Approach C is entirely up to the management team at my organisation	1	2	3	4	5	6	7
<u>International tour operators</u> would think that my organisation should help coastal hotels to use Approach C	1	2	3	4	5	6	7
It is very likely that my organisation will help coastal hotels to use Approach C	1	2	3	4	5	6	7
Helping coastal hotels to use Approach C would not be feasible	1	2	3	4	5	6	7
Helping coastal hotels to use Approach C would be necessary	1	2	3	4	5	6	7
Helping coastal hotels to use Approach C would be easy	1	2	3	4	5	6	7
I expect that my organisation will help coastal hotels to use Approach C	1	2	3	4	5	6	7
<u>Hotel guests</u> would approve of my organisation helping coastal hotels to use Approach C	1	2	3	4	5	6	7
I do not want my organisation to help coastal hotels to use Approach C	1	2	3	4	5	6	7

#### APPROACH D: OTHER FORMS OF TOURISM

Please rate the following features of Approach D:	Extremely undesirable			Extremely desirable			
Having less coastal hotels in operation is	1	2	3	4	5	6	7
Offering more ecotourism activities is	1	2	3	4	5	6	7
Offering more cultural tourism activities is	1	2	3	4	5	6	7
How strongly do you agree or disagree with the following statements about helping coastal hotels at your destination to use Approach D to adapt to climate change within the next 15 years?	Strongly disagree			Strongly agree			
Helping coastal hotels to use Approach D would be necessary	1	2	3	4	5	6	7
I do not want my organisation to help coastal hotels to use Approach D	1	2	3	4	5	6	7
Helping coastal hotels to use Approach D would be effective	1	2	3	4	5	6	7
<u>Hotel guests</u> would approve of my organisation helping coastal hotels to use Approach D	1	2	3	4	5	6	7
<u>Hotel operators</u> would expect my organisation to help coastal hotels to use Approach D	1	2	3	4	5	6	7
I intend to support my organisation helping coastal hotels to use Approach D	1	2	3	4	5	6	7
It is very likely that my organisation will help coastal hotels to use Approach D	1	2	3	4	5	6	7
Helping coastal hotels to use Approach D is entirely up to the management team at my organisation	1	2	3	4	5	6	7
Helping coastal hotels to use Approach D would not be feasible	1	2	3	4	5	6	7
Helping coastal hotels to use Approach D would be easy	1	2	3	4	5	6	7
Helping coastal hotels to use Approach D would be bad practice	1	2	3	4	5	6	7
I expect that my organisation will help coastal hotels to use Approach D	1	2	3	4	5	6	7
<u>International tour operators</u> would think that my organisation should help coastal hotels to use Approach D	1	2	3	4	5	6	7

**Thank you for taking the time to complete this questionnaire. Your assistance is very much appreciated.  
If there is anything else you would like to tell us about this survey, please do so in the space below.**



## Appendix I Study 2: Hotelier questionnaire variable and coding sheet

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
		ID # assigned to each questionnaire	001-124
	Respondent_Type	Online versus paper-based questionnaire	1= online questionnaire 2= paper-based questionnaire
<b>Where in the Caribbean is your hotel located?</b>	Location	Country location	1 = Antigua and Barbuda 2 = Barbados 3 = The Bahamas 4 = Belize 5 = Grenada 6 = Jamaica 7= Saint Lucia 8= St. Kitts and Nevis 9= St. Vincent & the Grenadines 10= Trinidad & Tobago Enter 1 if ticked on questionnaire
<b>Please tick the box(es) that best describe(s) your hotel investment and ownership structure (please tick as many that apply).</b>	Org_Type_Recoded	Hotel investment and ownership structure	1= Sole_Ownership 2= Franchise 3= Strategic_Alliance 4= Foreign_Owned 5= Publicly_Operated 6= Joint_Venture 7= Management_Contract 8= Consortium 9= Locally_Owned 10= Privately_Operated 11= Partnership 12=Family Owned
Total number of rooms at your hotel	No_Rms_Recoded	Total number of rooms at your hotel	
Total number of employees at your hotel	No_Empl_Recoded	Total number of employees at your hotel	
Estimated distance of the nearest hotel building to the high water mark (in metres)	Dist_HWM_Recoded	Estimated distance of the nearest hotel building to the high water mark (in metres)	1= 0-50 2= 51-100 3= 101-200 4= 201-500 5= More than 500
Number of years of industry experience	Yrs_Exp_Recoded	Number of years of industry experience	1= 1-5 2= 6-10 3= 11-15 4= 16-20 5= More than 20
Length of time employed at your current hotel	Yrs_Emp_Recoded	Length of time employed at your current hotel	1= 1-5 2= 6-10 3= 11-15 4= 16-20 5= More than 20

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
Age (in full years)	Age_Recoded	Age (in full years)	1= 18-25 2= 26-40 3= 41-55 4= 56-70 5= Over 70
Sex:	Sex	Sex	1=Male 2=Female
Please tick the box that best describes your position in relation to the hotel management team	Postion_Recoded	Position in relation to the hotel management team	1= Owner 2= CEO/Managing Director 3= Department Head 4= General Manager 5= Executive Committee member 6= Property Manager 7= Assistant Manager
<b>As far as you are aware, how often has your hotel implemented the following measures at any time since the start of its operations?</b> Used artificial defence structures (e.g., concrete walls, rock structures)	PAB1	Rate frequency of using artificial defence structures	Range: 1=Never 5=All the time
<b>As far as you are aware, how often has your hotel implemented the following measures at any time since the start of its operations?</b> Invested in the resistance of hotel buildings and infrastructure	PAB2	Rate frequency of investing in the resistance of hotel buildings and infrastructure	Range: 1=Never 5=All the time
<b>As far as you are aware, how often has your hotel implemented the following measures at any time since the start of its operations?</b> Prepared or revised disaster plans	PAB3	Rate frequency of preparing or revising disaster plans	Range: 1=Never 5=All the time
<b>As far as you are aware, how often has your hotel implemented the following measures at any time since the start of its operations?</b> Offered guests guarantees of personal safety from natural disasters	PAB4	Rate frequency of offering guests guarantees of personal safety from natural disasters	Range: 1=Never 5=All the time
<b>As far as you are aware, how often has your hotel implemented the following measures at any time since the start of its operations?</b> Provided information about disaster response procedures to guests	PAB5	Rate frequency of providing information about disaster response procedures to guests	Range: 1=Never 5=All the time
	PABTOTAL	Composite variable made up of aggregate score of 5 items:	Total past adjustment behaviour.

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
		1. PAB1 2. PAB2 3. PAB3 4. PAB4 5. PAB5	Higher scores indicate greater past adjustment behaviour (Range from 5=low past adjustment behaviour to 25=high past adjustment behaviour)
<b>How much do you agree or disagree with the following statements about coastal hoteliers preparing for coastal hazards, hydro-meteorological hazards and climate change?</b> There is a need to prepare for coastal and hydro-meteorological hazards (e.g., coastal erosion, severe storms)	CHP	Rate agreement with the need to prepare for coastal and hydro-meteorological hazards	Range: 1=Strongly disagree 7=Strongly agree
<b>How much do you agree or disagree with the following statements about coastal hoteliers preparing for coastal hazards, hydro-meteorological hazards and climate change?</b> There is a need to adapt to climate change	CCP	Rate agreement with the need to adapt to climate change	Range: 1=Strongly disagree 7=Strongly agree
<b>In general, how important do you think the following items are to tourists staying at your hotel?</b> Natural appearance of your hotel's nearest beach	APPEAR	Rate importance of natural appearance of hotel beach to tourists staying at your hotel	Range: 1 = Not important at all 7 = Extremely important
<b>In general, how important do you think the following items are to tourists staying at your hotel?</b> Closeness of the beach to your hotel	CLOSE	Rate importance of closeness of beach to hotel to tourists staying at your hotel	Range: 1 = Not important at all 7 = Extremely important
	BEACH_PERCEP	Composite variable made up of aggregate score of 2 items: 1. APPEAR 2. CLOSE	Total perception of the importance of natural appearance and closeness of beach to tourists staying at your hotel. Higher scores indicate higher perception of the importance of natural appearance and closeness of beach to tourists (Range from 2=low perception of beach importance to 14=high perception of beach importance)
<b>In general, how important do you think the following items are to tourists staying at your hotel?</b>	DISPLANS	Rate importance of hotel having disaster plans to tourists staying at your hotel	Range: 1 = Not important at all 7 = Extremely important

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
<p>Your hotel having disaster plans</p> <p><b>In general, how important do you think the following items are to tourists staying at your hotel?</b></p> <p>Offering guests guarantees of personal safety from natural disasters</p>	GUARANTEE	Rate importance of guarantees of personal safety from natural disasters to tourists staying at your hotel	Range: 1 = Not important at all 7 = Extremely important
<p><b>In general, how important do you think the following items are to tourists staying at your hotel?</b></p> <p>Providing information about disaster response procedures to guests</p>	DISINFO	Rate importance of information about natural disaster events to tourists staying at your hotel	Range: 1 = Not important at all 7 = Extremely important
	DRR_PERCEP	Composite variable made up of aggregate score of 3 items: 1. DISPLANS 2. GUARANTEE 3. DISINFO	Total perception of the importance of DRR measures to tourists staying at your hotel. Higher scores indicate higher perception of importance of DRR measures to tourists staying at your hotel (Range from 3=low perception of importance of DRR measures to 21=high perception of importance of DRR measures)
<p><b>What is your opinion of the following hazard events and their potential impact generally on your hotel at the present time?</b></p> <p>As far as I know, coastal erosion poses a risk</p>	COG1	Rate awareness/knowledge of risk posed by coastal erosion on your hotel at the present time	Range: 1=Strongly disagree 7=Strongly agree
<p><b>What is your opinion of the following hazard events and their potential impact generally on your hotel at the present time?</b></p> <p>As far as I know, hurricanes pose no risk</p>	COG2	Rate knowledge of risk posed by hurricanes on your hotel at the present time	Range: 1=Strongly disagree 7=Strongly agree  This variable has been reverse coded to COG2R
<p><b>What is your opinion of the following hazard events and their potential impact generally on your hotel at the present time?</b></p> <p>As far as I know, sea level rise poses a risk</p>	COG3	Rate knowledge of risk posed by sea level rise on your hotel at the present time	Range: 1=Strongly disagree 7=Strongly agree
<p><b>What is your opinion of the following hazard events and their potential impact generally on your hotel at the present time?</b></p>	AF1	Rate worry about the risk posed by coastal erosion on your hotel in 15 years	Range: 1=Strongly disagree 7=Strongly agree

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
I worry about the risk that coastal erosion poses <b>What is your opinion of the following hazard events and their potential impact generally on your hotel at the present time?</b>	AF2	Rate worry about the risk posed by hurricanes on your hotel in 15 years	Range: 1=Strongly disagree 7=Strongly agree  This variable has been reverse coded to AF2R
I do not worry about the risk that hurricanes pose <b>What is your opinion of the following hazard events and their potential impact generally on your hotel at the present time?</b>	AF3	Rate worry about the risk posed by sea level rise on your hotel in 15 years	Range: 1=Strongly disagree 7=Strongly agree
I worry about the risk that sea level rise poses	CRP_PRESENT1	Composite variable made up of aggregate score of 6 items: 1. COG1 2. COG2R 3. COG3 4. AF1 5. AF2R 6. AF3	Total CRP score of perceived knowledge and worry about risk posed by hazards on hotel at the present time. Higher scores indicate higher perceived knowledge and worry for risk posed by hazards at the present time (Range from 6=low CRP to 42=high CRP)
	CRP_PRESENT2	Composite variable made up of aggregate score of 6 items: 1. COG1 2. COG2R 3. AF1 4. AF2R	Total CRP score of perceived knowledge and worry about risk posed by hazards on hotel at the present time. Higher scores indicate higher perceived knowledge and worry for risk posed by hazards at the present time (Range from 6=low CRP to 42=high CRP)
<b>What is your opinion of the following hazard events and their potential impact generally on your hotel as a result of climate change within the next 15 years?</b> As far as I know, changes to the frequency and severity of coastal erosion as a result of climate change will pose no risk	COG1F	Rate knowledge of risk posed by increased coastal erosion as a result of climate change on hotel within 15 years	Range: 1=Strongly disagree 7=Strongly agree  This variable has been reverse coded to COG1FR
<b>What is your opinion of the following hazard events and their potential impact generally on your hotel as a result of climate change within the next 15 years?</b> As far as I know, changes to the frequency and severity	COG2F	Rate risk posed by more hurricanes as a result of climate change on hotel within 15 years	Range: 1=Strongly disagree 7=Strongly agree

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
<p>of hurricanes as a result of climate change will pose a risk</p> <p><b>What is your opinion of the following hazard events and their potential impact generally on your hotel as a result of climate change within the next 15 years?</b></p> <p>As far as I know, sea level rise as a result of climate change will pose no risk</p>	COG3F	Rate risk posed by sea level rise as a result of climate change on hotel within 15 years	<p>Range: 1=Strongly disagree 7=Strongly agree</p> <p>This variable has been reverse coded to COG3FR</p>
<p><b>What is your opinion of the following hazard events and their potential impact generally on your hotel as a result of climate change within the next 15 years?</b></p> <p>I worry about the risk that changes to the frequency and severity of coastal erosion as a result of climate change poses</p>	AF1F	Rate worry about the risk posed by increased coastal erosion as a result of climate change on hotel within 15 years	<p>Range: 1=Strongly disagree 7=Strongly agree</p>
<p><b>What is your opinion of the following hazard events and their potential impact generally on your hotel as a result of climate change within the next 15 years?</b></p> <p>I do not worry about the risk that changes to the frequency and severity of hurricanes as a result of climate change poses</p>	AF2F	Rate worry about the risk posed by more hurricanes as a result of climate change on hotel within 15 years	<p>Range: 1=Strongly disagree 7=Strongly agree</p> <p>This variable has been reverse coded to AF2FR</p>
<p><b>What is your opinion of the following hazard events and their potential impact generally on your hotel as a result of climate change within the next 15 years?</b></p> <p>I do not worry about the risk that sea level rise as a result of climate change poses</p>	AF3F	Rate worry about the risk posed by sea level rise as a result of climate change on hotel within 15 years	<p>Range: 1=Strongly disagree 7=Strongly agree</p> <p>This variable has been reverse coded to AF3FR</p>
	CRP_FUTURE1	<p>Composite variable made up of aggregate score of 6 items:</p> <ol style="list-style-type: none"> <li>1. COG1FR</li> <li>2. COG2F</li> <li>3. COG3FR</li> <li>4. AF1F</li> <li>5. AF2FR</li> <li>6. AF3FR</li> </ol>	<p>Total CRP score of perceived knowledge and worry about risk posed by hazards on hotel within 15 years</p> <p>Higher scores indicate higher perceived knowledge and worry for risk posed by hazards on hotel within 15 years</p> <p>(Range from 6=low CRP_ future to 42=high CRP_ future)</p>

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
	CRP_FUTURE2	Composite variable made up of aggregate score of 4 items: 1. COG1FR 2. COG2F 3. AF1F 4. AF2FR	Total CRP score of perceived knowledge and worry about risk posed by hazards on hotel within 15 years Higher scores indicate higher perceived knowledge and worry for risk posed by hazards on hotel within 15 years (Range from 4=low CRP_future to 28=high CRP_future)
	CRP_TOTAL1	Composite variable made up of aggregate score of 12 items: 1. COG1 2. COG2R 3. COG3 4. AF1 5. AF2R 6. AF3 7. COG1FR 8. COG2F 9. COG3FR 10. AF1F 11. AF2FR 12. AF3FR	Total CRP score of perceived knowledge and worry about risk posed by hazards at the present time and in 15 years. Higher scores indicate higher total CRP for present and future hazards (Range from 12=low total CRP to 84=high total CRP)
	CRP_TOTAL2	Composite variable made up of aggregate score of 8 items: 1. COG1 2. COG2R 3. AF1 4. AF2R 5. COG1FR 6. COG2F 7. AF1F 8. AF2FR	Total CRP score of perceived knowledge and worry about risk posed by hazards at the present time and in 15 years. Higher scores indicate higher total CRP for present and future hazards (Range from 8=low total CRP to 56=high total CRP)
It is very likely that my hotel will use Approach A	A_LIKELY	Rate likelihood of choosing Approach A (Protection) in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
It is very likely that my hotel will use Approach B	B_LIKELY	Rate likelihood of choosing Approach B (Accommodation) in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
It is very likely that my hotel will use Approach C	C_LIKELY	Rate likelihood of choosing Approach C (Retreat) in the future	1 = Extremely unlikely 7 = Extremely likely
It is very likely that my hotel will use Approach D	D_LIKELY	Rate likelihood of choosing Approach D (Diversification) in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
Building more concrete walls than are generally present now on beaches is	A1	Rate beaches that have more concrete walls	Range: 1 = Extremely undesirable 7 = Extremely desirable
Building more rock structures than are generally present now on beaches is	A2	Rate beaches that have more rock	Range: 1 = Extremely undesirable 7 = Extremely desirable



Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
Raising the height of existing walls and structures is	A3	Rate beaches that have more concrete walls and rock	Range: 1 = Extremely undesirable 7 = Extremely desirable
Beaches that increasingly have an appearance that is not 100% natural are	A4	Rate beaches that have an appearance that is not natural	Range: 1 = Extremely undesirable 7 = Extremely desirable
	A_TOTAL	Composite variable made up of aggregate score of 4 items: 1. A1 2. A2 3. A3 4. A4	Total perception of Approach A Higher scores indicate higher positive perception (Range from 4=low positive perception of Approach A to 28 = high positive perception of Approach A)
Using Approach A would be bad practice	A_ATT1	Rate agreement that using Approach A would be bad practice	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach A would be effective	A_ATT2	Rate agreement that using Approach A would be effective	This variable has been reverse coded to A_ATT1R Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach A would be necessary	A_ATT3	Rate agreement that using Approach A would be necessary	Range: 1 = Strongly disagree 7 = Strongly agree
	A_ATT_TOT	Composite variable made up of aggregate score of 4 items: 1. A_ATT1R 2. A_ATT2 3. A_ATT3	Total score of attitude of adapting to climate change within 15 years using Approach A Higher scores indicate more positive attitude (Range from 3=negative attitude to 21=positive attitude)
Hotel guests would expect my hotel to use Approach A	A_SN1	Rate agreement that hotel guests would expect my hotel to use Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
			This variable has been reverse coded to A_SN1R. Due to differences in wording in the paper-based and online versions of the questionnaire, the final version of this variable is A_SN1_Final
International tour operators would think that my hotel should use Approach A	A_SN2	Rate agreement that international tour operators would think that my hotel should use Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
Government policy-makers would approve of my hotel using Approach A	A_SN3	Rate agreement that government policy-makers would approve of my hotel using Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
	A_SN_TOT	Composite variable made up of aggregate score of 3 items: 1. A_SN1_Final 2. A_SN2	Total score of perceived social pressure to adapt to climate change within 15 years using Approach A

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
		3. A_SN3	Higher scores indicate higher perceived social pressure (Range from 3=low perceived social pressure to 21=high perceived social pressure)
Using Approach A is entirely up to the management team at my hotel	A_PBC1	Rate agreement that using Approach A is entirely up to the management team at my hotel	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach A would not be feasible	A_PBC2	Rate agreement that using Approach A would not be feasible	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach A would be easy	A_PBC3	Rate agreement that using Approach A would be easy	This variable has been reverse coded to A_PBC2R Range: 1 = Strongly disagree 7 = Strongly agree
	A_PBC_TOT	Composite variable made up of aggregate score of 3 items: 1. A_PBC1 2. A_PBC2R 3. A_PBC3	Total score of perceived ability to adapt to climate change within 15 years using Approach A Higher scores indicate greater perceived ability (Range from 3=low perceived ability to 21=high perceived ability)
I intend to support the use of Approach A	A_IN1	Rate agreement to support the use of Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
I expect that my hotel will use Approach A	A_IN2	Rate agreement that I expect that my hotel will use Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
I do not want my hotel to use Approach A	A_IN3	Rate agreement that I do not want my hotel to use Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
	A_IN_TOT	Composite variable made up of aggregate score of 3 items: 1. A_IN1 2. A_IN2 3. A_IN3R	This variable has been reverse coded to A_IN3R Total score of perceived readiness to adapt using Approach A Higher scores indicate greater perceived readiness to adapt using Approach A (Range from 3=low perceived readiness to 21=high perceived readiness)
Investing in the resistance of hotel buildings and infrastructure is	B1	Rate stronger and safer buildings	Range: 1 = Extremely undesirable 7 = Extremely desirable
Investing in disaster management systems is	B2	Rate investing in disaster management systems	Range: 1 = Extremely undesirable 7 = Extremely desirable
Lifting hotel buildings up on piles is	B3	Rate buildings that are lifted up on piles	Range: 1 = Extremely undesirable 7 = Extremely desirable

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
No longer offering rooms on the ground floor is	B4	Rate hotels that do not offer rooms on the ground floor	Range: 1 = Extremely undesirable 7 = Extremely desirable
	B_TOTAL1	Composite variable made up of aggregate score of 4 items: 1. B1 2. B2 3. B3 4. B4	Total perception of Approach B Higher scores indicate higher positive perception (Range from 4=low positive perception of Approach B to 28 = high positive perception of Approach B)
	B_TOTAL2	Composite variable made up of aggregate score of 4 items: 1. B1 2. B3 3. B4	Total perception of Approach B Higher scores indicate higher positive perception (Range from 3=low positive perception of Approach B to 21 = high positive perception of Approach B)
Using Approach B would be bad practice	B_ATT1	Rate agreement that using Approach B would be bad practice	Range: 1 = Strongly disagree 7 = Strongly agree This variable has been reverse coded to B_ATT1R
Using Approach B would be effective	B_ATT2	Rate agreement that using Approach B would be effective	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach B would be necessary	B_ATT3	Rate agreement that using Approach B would be necessary	Range: 1 = Strongly disagree 7 = Strongly agree
	B_ATT_TOT	Composite variable made up of aggregate score of 3 items: 1. B_ATT1R 2. B_ATT2 3. B_ATT3	Total score of attitude of adapting to climate change within 15 years using Approach B Higher scores indicate more positive attitude (Range from 3=negative attitude to 21=positive attitude)
Hotel guests would expect my hotel to use Approach B	B_SN1	Rate agreement that hotel guests would expect my hotel to use Approach B	Range: 1 = Strongly disagree 7 = Strongly agree  This variable has been reverse coded to B_SN1R. Due to differences in wording in the paper-based and online versions of the questionnaire, the final version of this variable is B_SN1_Final
International tour operators would think that my hotel should use Approach B	B_SN2	Rate agreement that international tour operators would think that my hotel should use Approach B	Range: 1 = Strongly disagree 7 = Strongly agree
Government policy-makers would approve of my hotel using Approach B	B_SN3	Rate agreement that government policy-makers	Range: 1 = Strongly disagree 7 = Strongly agree

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
	B_SN_TOT	would approve of my hotel using Approach B Composite variable made up of aggregate score of 3 items: 1. B_SN1_Final 2. B_SN2 3. B_SN3	Total score of perceived social pressure to adapt to climate change within 15 years using Approach B Higher scores indicate higher perceived social pressure (Range from 3=low perceived social pressure to 21=high perceived social pressure) Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach B is entirely up to the management team at my hotel	B_PBC1	Rate agreement that using Approach B is entirely up to the management team at my hotel	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach B would not be feasible	B_PBC2	Rate agreement that using Approach B would not be feasible	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach B would be easy	B_PBC3	Rate agreement that using Approach B would be easy	This variable has been reverse coded to B_PBC2R Range: 1 = Strongly disagree 7 = Strongly agree
	B_PBC_TOT	Composite variable made up of aggregate score of 3 items: 1. B_PBC1 2. B_PBC2R 3. B_PBC3	Total score of perceived ability to adapt to climate change within 15 years using Approach B Higher scores indicate greater perceived ability (Range from 3=low perceived ability to 21=high perceived ability)
I intend to support the use of Approach B	B_IN1	Rate agreement that I intend to support the use of Approach B	Range: 1 = Strongly disagree 7 = Strongly agree
I expect that my hotel will use Approach B	B_IN2	Rate agreement that I expect that my hotel will use Approach B	Range: 1 = Strongly disagree 7 = Strongly agree
I do not want my hotel to use Approach B	B_IN3	Rate agreement that I do not want my hotel to use Approach B	Range: 1 = Strongly disagree 7 = Strongly agree
	B_IN_TOT	Composite variable made up of aggregate score of 3 items: 1. B_IN1 2. B_IN2 3. B_IN3R	This variable has been reverse coded to B_IN3R Total score of perceived readiness to adapt using Approach B Higher scores indicate greater intention to adapt using Approach B (Range from 3=low perceived readiness to 21=high perceived readiness)
Not having hotel rooms that are right on the beach is	C1	Rate hotel rooms that are not right on the beach	Range: 1 = Extremely undesirable 7 = Extremely desirable

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
Asking guests to take a 100 m walk to get to the beach is	C2	Rate taking a 100m walk	Range: 1 = Extremely undesirable 7 = Extremely desirable
Asking guests to take a 500 m walk to get to the beach is	C3	Rate taking a 500m walk	Range: 1 = Extremely undesirable 7 = Extremely desirable
Asking guests to take a free shuttle bus to get to the beach is	C4	Rate taking a shuttle to the beach	Range: 1 = Extremely undesirable 7 = Extremely desirable
	C_TOTAL1	Composite variable made up of aggregate score of 4 items: 1. C1 2. C2 3. C3 4. C4	Total perception of Approach C Higher scores indicate higher positive perception (Range from 4=low positive perception of Approach C to 28 = high positive perception of Approach C)
	C_TOTAL2	Composite variable made up of aggregate score of 5 items: 1. C1 2. C2 3. C3 4. C4 5. D1/C5	Total perception of Approach C Higher scores indicate higher positive perception (Range from 5=low positive perception of Approach C to 35 = high positive perception of Approach C)
Using Approach C would be bad practice	C_ATT1	Rate agreement that using Approach C would be bad practice	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach C would be effective	C_ATT2	Rate agreement that using Approach C would be effective	This variable has been reverse coded to C_ATT1R Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach C would be necessary	C_ATT3	Rate agreement that using Approach C would be necessary	Range: 1 = Strongly disagree 7 = Strongly agree
	C_ATT_TOT	Composite variable made up of aggregate score of 3 items: 1. C_ATT1R 2. C_ATT2 3. C_ATT3	Total score of attitude of adapting to climate change within 15 years using Approach C Higher scores indicate more positive attitude (Range from 3=negative attitude to 21=positive attitude)
Hotel guests would expect my hotel to use Approach C	C_SN1	Rate agreement that hotel guests would expect my hotel to use Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
			This variable has been reverse coded to C_SN1R. Due to differences in wording in the paper-based and online versions of the questionnaire, the final version of this variable is C_SN1_Final

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
International tour operators would think that my hotel should use Approach C	C_SN2	Rate agreement that international tour operators would think that my hotel should use Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
Government policy-makers would approve of my hotel using Approach C	C_SN3	Rate agreement that government policy-makers would approve of my hotel using Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
	C_SN_TOT	Composite variable made up of aggregate score of 3 items: 1. C_SN1_Final 2. C_SN2 3. C_SN3	Total score of perceived social pressure to adapt to climate change within 15 years using Approach C Higher scores indicate higher perceived social pressure (Range from 3=low perceived social pressure to 21=high perceived social pressure)
Using Approach C is entirely up to the management team at my hotel	C_PBC1	Rate agreement that using Approach C is entirely up to the management team at my hotel	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach C would not be feasible	C_PBC2	Rate agreement that using Approach C would not be feasible	Range: 1 = Strongly disagree 7 = Strongly agree
			This variable has been reverse coded to C_PBC2R
Using Approach C would be easy	C_PBC3	Rate agreement that using Approach C would be easy	Range: 1 = Strongly disagree 7 = Strongly agree
	C_PBC_TOT	Composite variable made up of aggregate score of 3 items: 1. C_PBC1 2. C_PBC2R 3. C_PBC3	Total score of perceived ability to adapt to climate change within 15 years using Approach C Higher scores indicate greater perceived ability (Range from 3=low perceived ability to 21=high perceived ability)
I intend to support the use of Approach C	C_IN1	Rate agreement that I intend to support the use of Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
I expect that my hotel will use Approach C	C_IN2	Rate agreement that I expect that my hotel will use Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
I do not want my hotel to use Approach C	C_IN3	Rate agreement that I do not want my hotel to use Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
	C_IN_TOT	Composite variable made up of aggregate score of 3 items: 1. C_IN1 2. C_IN2 3. C_IN3R	This variable has been reverse coded to C_IN3R Total score of perceived readiness to adapt using Approach C Higher scores indicate greater intention to adapt using Approach C

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
Having less beach hotels in operation is	D1	Rate less beach hotels	(Range from 3=low perceived readiness to 21=high perceived readiness) Range: 1 = Extremely undesirable 7 = Extremely desirable
Offering more ecotourism activities is	D2	Rate more ecotourism	Range: 1 = Extremely undesirable 7 = Extremely desirable
Offering more cultural tourism activities is	D3	Rate more cultural tourism	Range: 1 = Extremely undesirable 7 = Extremely desirable
	D_TOTAL1	Composite variable made up of aggregate score of 3 items: 1. D1 2. D2 3. D3	Total perception of Approach D Higher scores indicate higher positive perception (Range from 3=low positive perception of Approach D to 21 = high positive perception of Approach D)
	D_TOTAL2	Composite variable made up of aggregate score of 2 items: 1. D1 2. D2	Total perception of Approach D Higher scores indicate higher positive perception (Range from 2=low positive perception of Approach D to 14 = high positive perception of Approach D)
Using Approach D would be bad practice	D_ATT1	Rate agreement that using Approach D would be bad practice	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach D would be effective	D_ATT2	Rate agreement that using Approach D would be effective	This variable has been reverse coded to D_ATT1R Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach D would be necessary	D_ATT3	Rate agreement that using Approach D would be necessary	Range: 1 = Strongly disagree 7 = Strongly agree
	D_ATT_TOT	Composite variable made up of aggregate score of 3 items: 1. D_ATT1R 2. D_ATT2 3. D_ATT3	Total score of attitude of adapting to climate change within 15 years using Approach D Higher scores indicate more positive attitude (Range from 3=negative attitude to 21=positive attitude)
Hotel guests would expect my hotel to use Approach D	D_SN1	Rate agreement that hotel guests would expect my hotel to use Approach D	Range: 1 = Strongly disagree 7 = Strongly agree

International tour operators would think that my hotel should use Approach D	D_SN2	Rate agreement that international tour operators would think that my hotel should use Approach D	This variable has been reverse coded to D_SN1R. Due to differences in wording in the paper-based and online versions of the questionnaire, the final version of this variable is D_SN1_Final Range: 1 = Strongly disagree 7 = Strongly agree
Government policy-makers would approve of my hotel using Approach D	D_SN3	Rate agreement that government policy-makers would approve of my hotel using Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
	D_SN_TOT	Composite variable made up of aggregate score of 3 items: 1. D_SN1_Final 2. D_SN2 3. D_SN3	Total score of perceived social pressure to adapt to climate change within 15 years using Approach D Higher scores indicate higher perceived social pressure (Range from 3=low perceived social pressure to 21=high perceived social pressure) Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach D is entirely up to the management team at my hotel	D_PBC1	Rate agreement that using Approach D is entirely up to the management team at my hotel	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach D would not be feasible	D_PBC2	Rate agreement that using Approach D would not be feasible	Range: 1 = Strongly disagree 7 = Strongly agree
Using Approach D would be easy	D_PBC3	Rate agreement that using Approach D would be easy	Range: 1 = Strongly disagree 7 = Strongly agree
	D_PBC_TOT	Composite variable made up of aggregate score of 3 items: 1. D_PBC1 2. D_PBC2R 3. D_PBC3	Total score of perceived ability to adapt to climate change within 15 years using Approach D Higher scores indicate greater perceived ability (Range from 3=low perceived ability to 21=high perceived ability) Range: 1 = Strongly disagree 7 = Strongly agree
I intend to support the use of Approach D	D_IN1	Rate agreement that I intend to support the use of Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
I expect that my hotel will use Approach D	D_IN2	Rate agreement that I expect that my hotel will use Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
I do not want my hotel to use Approach D	D_IN3	Rate agreement that I do not want my hotel to use Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
			This variable has been reverse coded to D_IN3R



D\_IN\_TOT

Composite variable made up of aggregate score of 3 items:

1. D\_IN1
2. D\_IN2
3. D\_IN3R

Total score of perceived readiness to adapt using Approach D  
Higher scores indicate greater intention to adapt using Approach D  
(Range from 3=low perceived readiness to 21=high perceived readiness)

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## Appendix J Study 3: Policy-maker questionnaire variable and coding sheet

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
	ID #	ID # assigned to each questionnaire	001-39
	Respondent_Type	Online versus paper-based questionnaire	1= online questionnaire 2= paper-based questionnaire
<b>Where in the Caribbean are you located?</b>	Location	Country location	1 = Antigua and Barbuda 2 = Barbados 3 = The Bahamas 4 = Belize 5 = Grenada 6 = Jamaica 7= Saint Lucia 8= St. Kitts and Nevis 9= St. Vincent & the Grenadines 10= Trinidad & Tobago
<b>Please tick the box that best describes your organisation</b>	Org_Type_Recoded		Enter 1 if ticked on questionnaire  1= Ministry of Tourism 2= Tourism Development Company 3= Hotel and/or Tourism Association 4= Tourism Product and Investment Company 5= Tourism Authority 6= Tourism Board 7= Tourism Marketing Organisation 8= Related Government Agency
Number of years of industry experience	Yrs_Exp_Recoded	Number of years of industry experience	1= 1-5 2= 6-10 3= 11-15 4= 16-20 5= More than 20
Length of time employed at your current organisation	Yrs_Employed_Recoded	Length of time employed at your current organisation	1= 1-5 2= 6-10 3= 11-15 4= 16-20 5= More than 20
Age (in full years)	Age_Recoded	Age (in full years)	1= 18-25 2= 26-40 3= 41-55 4= 56-70 5= Over 70
Sex:	Sex	Sex	1= Male 2= Female
Please tick the box that best describes your position in relation to the management team at your organisation	Position_Recoded	Position in relation to the management team at your organisation	1= Executive Management 2= Operations 3= Marketing 4= Investment 5= Policy and Planning 6= Product Development

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
<p><b>How much do you agree or disagree with the following statements about coastal hoteliers preparing for coastal hazards, hydro-meteorological hazards and climate change?</b></p> <p>There is a need for coastal hoteliers to prepare for coastal and hydro-meteorological hazards (e.g., coastal erosion, severe storms)</p>	CHP	Rate agreement with the need for coastal hoteliers to prepare for coastal and hydro-meteorological hazards	7= Administration 8= Research, Education, Training and Awareness 9= Quality Assurance 10= Finance Range: 1= Strongly disagree 7= Strongly agree
<p><b>How much do you agree or disagree with the following statements about coastal hoteliers preparing for coastal hazards, hydro-meteorological hazards and climate change?</b></p> <p>There is a need for coastal hoteliers to adapt to climate change</p>	CCP	Rate agreement with the need for coastal hoteliers to adapt to climate change	Range: 1= Strongly disagree 7= Strongly agree
<p><b>In general, how important do you think the following items are to tourists staying at your destination's coastal hotels?</b></p> <p>Natural appearance of coastal hotel beaches</p>	APPEAR	Rate importance of natural appearance of hotel beaches to tourists staying at your destination's coastal hotels	Range: 1 = Not important at all 7 = Extremely important
<p><b>In general, how important do you think the following items are to tourists staying at your destination's coastal hotels?</b></p> <p>Closeness of the beach to coastal hotels</p>	CLOSE	Rate importance of closeness of beach to tourists staying at your destination's coastal hotels	Range: 1 = Not important at all 7 = Extremely important
	BEACH_PERCEP	Composite variable made up of aggregate score of 2 items: 3. APPEAR 4. CLOSE	Total perception of the importance of natural appearance and closeness of beach to tourists staying destination's coastal hotels. Higher scores indicate higher perception of the importance of natural appearance and closeness of beach to tourists

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
<p><b>In general, how important do you think the following items are to tourists staying at your destination's coastal hotels?</b> Coastal hotels having disaster plans</p>	DISPLANS	Rate importance of destination's coastal hotels having disaster plans to tourists	(Range from 2=low perception of beach importance to 14=high perception of beach importance) Range: 1 = Not important at all 7 = Extremely important
<p><b>In general, how important do you think the following items are to tourists staying at your destination's coastal hotels?</b> Offering guests guarantees of personal safety from natural disasters</p>	GUARANTEE	Rate importance of guarantees of personal safety from natural disasters to tourists	Range: 1 = Not important at all 7 = Extremely important
<p><b>In general, how important do you think the following items are to tourists staying at your destination's coastal hotels?</b> Providing information about disaster response procedures to guests</p>	DISINFO	Rate importance of information about natural disaster events to tourists	Range: 1 = Not important at all 7 = Extremely important
	DRR_PERCEP	Composite variable made up of aggregate score of 3 items: 4. DISPLANS 5. GUARANTEE 6. DISINFO	Total perception of the importance of DRR measures to tourists staying at destination's coastal hotels. Higher scores indicate higher perception of importance of DRR measures to tourists staying at destination's coastal hotels (Range from 3=low perception of importance of DRR measures to 21=high perception of importance of DRR measures)
<p><b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels at the present time?</b> As far as I know, coastal erosion poses a risk</p>	COG1	Rate awareness/knowledge of risk posed by coastal erosion on destination's coastal hotels at the present time	Range: 1=Strongly disagree 7=Strongly agree

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
<p><b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels at the present time?</b></p> <p>As far as I know, hurricanes pose no risk</p>	COG2	Rate knowledge of risk posed by hurricanes on destination's coastal hotels at the present time	<p>Range: 1=Strongly disagree 7=Strongly agree</p> <p>This variable has been reverse coded to COG2R</p>
<p><b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels at the present time?</b></p> <p>As far as I know, sea level rise poses a risk</p>	COG3	Rate knowledge of risk posed by sea level rise on destination's coastal hotels at the present time	<p>Range: 1=Strongly disagree 7=Strongly agree</p>
<p><b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels at the present time?</b></p> <p>I worry about the risk that coastal erosion poses</p>	AF1	Rate worry about the risk posed by coastal erosion on destination's coastal hotels in 15 years	<p>Range: 1=Strongly disagree 7=Strongly agree</p>
<p><b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels at the present time?</b></p> <p>I do not worry about the risk that hurricanes pose</p>	AF2	Rate worry about the risk posed by hurricanes on destination's coastal hotels in 15 years	<p>Range: 1=Strongly disagree 7=Strongly agree</p> <p>This variable has been reverse coded to AF2R</p>
<p><b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels at the present time?</b></p> <p>I worry about the risk that sea level rise poses</p>	AF3	Rate worry about the risk posed by sea level rise on destination's coastal hotels in 15 years	<p>Range: 1=Strongly disagree 7=Strongly agree</p>
	CRP_PRESENT1	Composite variable made up of aggregate score of 6 items: 7. COG1 8. COG2R 9. COG3	Total CRP score of perceived knowledge and worry about risk posed by hazards on destination's coastal hotels at the present time.

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
		10. AF1 11. AF2R 12. AF3	Higher scores indicate higher perceived knowledge and worry for risk posed by hazards at the present time (Range from 6=low CRP to 42=high CRP)
	CRP_PRESENT2	Composite variable made up of aggregate score of 4 items: 1. COG1 2. COG2R 3. AF1 4. AF2R	Total CRP score of perceived knowledge and worry about risk posed by hazards on destination's coastal hotels at the present time. Higher scores indicate higher perceived knowledge and worry for risk posed by hazards at the present time (Range from 4=low CRP to 28=high CRP)
<b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels as a result of climate change within the next 15 years?</b> As far as I know, changes to the frequency and severity of coastal erosion as a result of climate change will pose no risk	COG1F	Rate knowledge of risk posed by increased coastal erosion as a result of climate change destination's coastal hotels within 15 years	Range: 1=Strongly disagree 7=Strongly agree  This variable has been reverse coded to COG1FR
<b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels as a result of climate change within the next 15 years?</b> As far as I know, changes to the frequency and severity of hurricanes as a result of climate change will pose a risk	COG2F	Rate risk posed by more hurricanes as a result of climate change on destination's coastal hotels 15 years	Range: 1=Strongly disagree 7=Strongly agree
<b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels as a result of climate change within the next 15 years?</b>	COG3F	Rate risk posed by sea level rise as a result of climate change on destination's coastal hotels within 15 years	Range: 1=Strongly disagree 7=Strongly agree  This variable has been reverse coded to COG3FR

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
As far as I know, sea level rise as a result of climate change will pose no risk			
<b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels as a result of climate change within the next 15 years?</b> I worry about the risk that changes to the frequency and severity of coastal erosion as a result of climate change poses	AF1F	Rate worry about the risk posed by increased coastal erosion as a result of climate change on your destination's coastal hotels within 15 years	Range: 1=Strongly disagree 7=Strongly agree
<b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels as a result of climate change within the next 15 years?</b> I do not worry about the risk that changes to the frequency and severity of hurricanes as a result of climate change poses	AF2F	Rate worry about the risk posed by more hurricanes as a result of climate change on destination's coastal hotels within 15 years	Range: 1=Strongly disagree 7=Strongly agree  This variable has been reverse coded to AF2FR
<b>What is your opinion of the following hazard events and their potential impact generally on your destination's coastal hotels as a result of climate change within the next 15 years?</b> I do not worry about the risk that sea level rise as a result of climate change poses	AF3F	Rate worry about the risk posed by sea level rise as a result of climate change on destination's coastal hotels within 15 years	Range: 1=Strongly disagree 7=Strongly agree  This variable has been reverse coded to AF3FR
	CRP_FUTURE1	Composite variable made up of aggregate score of 6 items: 7. COG1FR 8. COG2F 9. COG3FR 10. AF1F 11. AF2FR 12. AF3FR	Total CRP score of perceived knowledge and worry about risk posed by hazards destination's coastal hotels within 15 years Higher scores indicate higher perceived knowledge and worry for risk posed by hazards on hotel within 15 years (Range from 6=low CRP_ future to 42=high CRP_ future)

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
	CRP_FUTURE2	Composite variable made up of aggregate score of 4 items: 1. COG1FR 2. COG2F 3. AF1F 4. AF2FR	Total CRP score of perceived knowledge and worry about risk posed by hazards destination's coastal hotels within 15 years Higher scores indicate higher perceived knowledge and worry for risk posed by hazards on hotel within 15 years (Range from 4=low CRP_future to 28=high CRP_future)
	CRP_TOTAL1	Composite variable made up of aggregate score of 12 items: 13. COG1 14. COG2R 15. COG3 16. AF1 17. AF2R 18. AF3 19. COG1FR 20. COG2F 21. COG3FR 22. AF1F 23. AF2FR 24. AF3FR	Total CRP score of perceived knowledge and worry about risk posed by hazards on destination's coastal hotels at the present time and in 15 years. Higher scores indicate higher total CRP for present and future hazards (Range from 12=low total CRP to 84=high total CRP)
	CRP_TOTAL2	Composite variable made up of aggregate score of 8 items: 1. COG1 2. COG2R 3. AF1 4. AF2R 5. COG1FR 6. COG2F 7. AF1F 8. AF2FR	Total CRP score of perceived knowledge and worry about risk posed by hazards on destination's coastal hotels at the present time and in 15 years. Higher scores indicate higher total CRP for present and future hazards (Range from 8=low total CRP to 56=high total CRP)
It is very likely that my organisation will help coastal hotels to use Approach A	A_LIKELY	Rate likelihood of your organisation helping coastal hotels to use (Protection) in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
It is very likely that my organisation will help coastal hotels to use Approach B	B_LIKELY	Rate likelihood of your organisation helping coastal hotels to use Approach B (Accommodation) in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
It is very likely that my organisation will help coastal hotels to use Approach C	C_LIKELY	Rate likelihood of your organisation helping coastal hotels to use Approach C (Retreat) in the future	1 = Extremely unlikely 7 = Extremely likely
It is very likely that my organisation will help coastal hotels to use Approach D	D_LIKELY	Rate likelihood of your organisation helping coastal hotels to use Approach D (Diversification) in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
Building more concrete walls than are generally	A1	Rate beaches that have more concrete walls	Range: 1 = Extremely undesirable 7 = Extremely desirable



Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
present now on beaches is			
Building more rock structures than are generally present now on beaches is	A2	Rate beaches that have more rock	Range: 1 = Extremely undesirable 7 = Extremely desirable
Raising the height of existing walls and structures is	A3	Rate beaches that have more concrete walls and rock	Range: 1 = Extremely undesirable 7 = Extremely desirable
Beaches that increasingly have an appearance that is not 100% natural are	A4	Rate beaches that have an appearance that is not natural	Range: 1 = Extremely undesirable 7 = Extremely desirable
	A_TOTAL	Composite variable made up of aggregate score of 4 items: 5. A1 6. A2 7. A3 8. A4	Total perception of Approach A Higher scores indicate higher positive perception (Range from 4=low positive perception of Approach A to 28 = high positive perception of Approach A)
Helping coastal hotels to use Approach A would be bad practice	A_ATT1	Rate agreement that helping coastal hotels to use Approach A would be bad practice	Range: 1 = Strongly disagree 7 = Strongly agree  This variable has been reverse coded to A_ATT1R
Helping coastal hotels to use Approach A would be effective	A_ATT2	Rate agreement that helping coastal hotels to use Approach A would be effective	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach A would be necessary	A_ATT3	Rate agreement that helping coastal hotels to use Approach A would be necessary	Range: 1 = Strongly disagree 7 = Strongly agree
	A_ATT_TOT	Composite variable made up of aggregate score of 4 items: 4. A_ATT1R 5. A_ATT2 6. A_ATT3	Total score of attitude of helping coastal hotels to adapt to climate change within 15 years using Approach A Higher scores indicate more positive attitude (Range from 3=negative attitude to 21=positive attitude)
<u>Hotel guests</u> would approve of my organisation helping coastal hotels to use Approach A	A_SN1	Rate agreement that hotel guests would expect my organisation to help coastal hotels to adapt using Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
<u>International tour operators</u> would think that my organisation should help coastal hotels to use Approach A	A_SN2	Rate agreement that international tour operators would think that my organisation to help coastal hotels to adapt using Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
<u>Hotel operators</u> would expect my organisation	A_SN3	Rate agreement that hotel operators would approve of my organisation helping	Range: 1 = Strongly disagree 7 = Strongly agree

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
to help coastal hotels to use Approach A		coastal hotels to adapt using Approach A	This variable has been reverse coded to A_SN3R. Due to differences in wording in the paper-based and online versions of the questionnaire, the final version of this variable is A_SN3_Final
	A_SN_TOT	Composite variable made up of aggregate score of 3 items: 4. A_SN1 5. A_SN2 6. A_SN3_Final	Total score of perceived social pressure to adapt to climate change within 15 years using Approach A Higher scores indicate higher perceived social pressure (Range from 3=low perceived social pressure to 21=high perceived social pressure)
Helping coastal hotels to use Approach A is entirely up to the management team at my organisation	A_PBC1	Rate agreement that helping coastal hotels to use Approach A is entirely up to the management team at my organisation	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach A would not be feasible	A_PBC2	Rate agreement that helping coastal hotels to use Approach A would not be feasible	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach A would be easy	A_PBC3	Rate agreement that helping coastal hotels to use Approach A would be easy	This variable has been reverse coded to A_PBC2R Range: 1 = Strongly disagree 7 = Strongly agree
	A_PBC_TOT	Composite variable made up of aggregate score of 3 items: 4. A_PBC1 5. A_PBC2R 6. A_PBC3	Total score of perceived ability to help coastal hotels to adapt to climate change within 15 years using Approach A Higher scores indicate greater perceived ability (Range from 3=low perceived ability to 21=high perceived ability)
I intend to support my organisation helping coastal hotels to use Approach A	A_IN1	Rate agreement to support organisation helping coastal hotels to use Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
I expect that my organisation will help coastal hotels to use Approach A	A_IN2	Rate agreement with expectation that my organisation will help coastal hotels to use Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
I do not want my organisation to help coastal hotels to use Approach A	A_IN3	Rate agreement that I do not want my organisation to help coastal hotels to use Approach A	Range: 1 = Strongly disagree 7 = Strongly agree
	A_IN_TOT	Composite variable made up of aggregate score of 3 items: 4. A_IN1 5. A_IN2 6. A_IN3R	This variable has been reverse coded to A_IN3R Total score of perceived readiness of organisation to help coastal hotels to adapt using Approach A Higher scores indicate greater perceived readiness to help coastal hotels to adapt using Approach A

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
Investing in the resistance of hotel buildings and infrastructure is	B1	Rate stronger and safer buildings	(Range from 3=low perceived readiness to 21=high perceived readiness) Range: 1 = Extremely undesirable 7 = Extremely desirable
Investing in disaster management systems is	B2	Rate investing in disaster management systems	Range: 1 = Extremely undesirable 7 = Extremely desirable
Lifting hotel buildings up on piles is	B3	Rate buildings that are lifted up on piles	Range: 1 = Extremely undesirable 7 = Extremely desirable
No longer offering rooms on the ground floor is	B4	Rate hotels that do not offer rooms on the ground floor	Range: 1 = Extremely undesirable 7 = Extremely desirable
	B_TOTAL1	Composite variable made up of aggregate score of 4 items: 5. B1 6. B2 7. B3 8. B4	Total perception of Approach B Higher scores indicate higher positive perception (Range from 7=low positive perception of Approach B to 28 = high positive perception of Approach B)
	B_TOTAL2	Composite variable made up of aggregate score of 3 items: 1. B1 2. B3 3. B4	Total perception of Approach B Higher scores indicate higher positive perception (Range from 3=low positive perception of Approach B to 21 = high positive perception of Approach B)
Helping coastal hotels to use Approach B would be bad practice	B_ATT1	Rate agreement that helping coastal hotels to use Approach B would be bad practice	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach B would be effective	B_ATT2	Rate agreement that helping coastal hotels to use Approach B would be effective	This variable has been reverse coded to B_ATT1R Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach B would be necessary	B_ATT3	Rate agreement that helping coastal hotels to use Approach B would be necessary	Range: 1 = Strongly disagree 7 = Strongly agree
	B_ATT_TOT	Composite variable made up of aggregate score of 3 items: 4. B_ATT1R 5. B_ATT2 6. B_ATT3	Total score of attitude of helping coastal hotels to adapt to climate change within 15 years using Approach B Higher scores indicate more positive attitude (Range from 3=negative attitude to 21=positive attitude)
<u>Hotel guests</u> would approve of my organisation helping	B_SN1	Rate agreement that hotel guests would expect my organisation to help coastal	Range: 1 = Strongly disagree 7 = Strongly agree

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
coastal hotels to use Approach B		hotels to adapt using Approach B	
International tour operators would think that my organisation should help coastal hotels to use Approach B	B_SN2	Rate agreement that international tour operators would think that my organisation to help coastal hotels to adapt using Approach B	Range: 1 = Strongly disagree 7 = Strongly agree
Hotel operators would expect my organisation to help coastal hotels to use Approach B	B_SN3	Rate agreement that hotel operators would approve of my organisation helping coastal hotels to adapt using Approach B	Range: 1 = Strongly disagree 7 = Strongly agree
	B_SN_TOT	Composite variable made up of aggregate score of 3 items: 4. B_SN1 5. B_SN2 6. B_SN3_Final	This variable has been reverse coded to B_SN3R. Due to differences in wording in the paper-based and online versions of the questionnaire, the final version of this variable is B_SN3_Final Total score of perceived social pressure to adapt to climate change within 15 years using Approach B Higher scores indicate higher perceived social pressure (Range from 3=low perceived social pressure to 21=high perceived social pressure)
Helping coastal hotels to use Approach B is entirely up to the management team at my organisation	B_PBC1	Rate agreement that helping coastal hotels to use Approach B is entirely up to the management team at my organisation	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach B would not be feasible	B_PBC2	Rate agreement that helping coastal hotels to use Approach B would not be feasible	Range: 1 = Strongly disagree 7 = Strongly agree
			This variable has been reverse coded to B_PBC2R
Helping coastal hotels to use Approach B would be easy	B_PBC3	Rate agreement that helping coastal hotels to use Approach B would be easy	Range: 1 = Strongly disagree 7 = Strongly agree
	B_PBC_TOT	Composite variable made up of aggregate score of 3 items: 4. B_PBC1 5. B_PBC2R 6. B_PBC3	Total score of perceived ability to adapt to climate change within 15 years using Approach B Higher scores indicate greater perceived ability (Range from 3=low perceived ability to 21=high perceived ability)
I intend to support my organisation helping coastal hotels to use Approach B	B_IN1	Rate agreement to support organisation helping coastal hotels to use Approach B	Range: 1 = Strongly disagree 7 = Strongly agree
I expect that my organisation will help coastal hotels to use Approach B	B_IN2	Rate agreement with expectation that my organisation will help coastal hotels to use Approach B	Range: 1 = Strongly disagree 7 = Strongly agree

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
I do not want my organisation to help coastal hotels to use Approach B	B_IN3	Rate agreement that I do not want my organisation to help coastal hotels to use Approach B	Range: 1 = Strongly disagree 7 = Strongly agree
	B_IN_TOT	Composite variable made up of aggregate score of 3 items: 4. B_IN1 5. B_IN2 6. B_IN3R	This variable has been reverse coded to B_IN3R Total score of perceived readiness to adapt using Approach B Higher scores indicate greater intention to adapt using Approach B (Range from 3=low perceived readiness to 21=high perceived readiness)
Not having hotel rooms that are right on the beach is	C1	Rate not having hotel rooms that are right on the beach	Range: 1 = Extremely undesirable 7 = Extremely desirable
Asking guests to take a 100 m walk to get to the beach is	C2	Rate asking guests to take a 100 m walk to get to the beach	Range: 1 = Extremely undesirable 7 = Extremely desirable
Asking guests to take a 500 m walk to get to the beach is	C3	Rate asking guests to take a 500 m walk to get to the beach	Range: 1 = Extremely undesirable 7 = Extremely desirable
Asking guests to take a free shuttle bus to get to the beach is	C4	Rate asking guests to take a free shuttle bus to get to the beach	Range: 1 = Extremely undesirable 7 = Extremely desirable
	C_TOTAL1	Composite variable made up of aggregate score of 4 items: 5. C1 6. C2 7. C3 8. C4	Total perception of Approach C Higher scores indicate higher positive perception (Range from 7=low positive perception of Approach C to 28 = high positive perception of Approach C)
	C_TOTAL2	Composite variable made up of aggregate score of 5 items: 6. C1 7. C2 8. C3 9. C4 10. D1/C5	Total perception of Approach C Higher scores indicate higher positive perception (Range from 7=low positive perception of Approach C to 35 = high positive perception of Approach C)
Helping coastal hotels to use Approach C would be bad practice	C_ATT1	Rate agreement that helping coastal hotels to use Approach C would be bad practice	Range: 1 = Strongly disagree 7 = Strongly agree
			This variable has been reverse coded to C_ATT1R
Helping coastal hotels to use Approach C would be effective	C_ATT2	Rate agreement that helping coastal hotels to use Approach C would be effective	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach C would be necessary	C_ATT3	Rate agreement that helping coastal hotels to use Approach C would be necessary	Range: 1 = Strongly disagree 7 = Strongly agree
	C_ATT_TOT	Composite variable made up of aggregate score of 3 items: 4. C_ATT1R	Total score of attitude of adapting to climate change within 15 years using Approach C

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
		5. C_ATT2 6. C_ATT3	Higher scores indicate more positive attitude (Range from 3=negative attitude to 21=positive attitude)
<u>Hotel guests</u> would approve of my organisation helping coastal hotels to use Approach C	C_SN1	Rate agreement that hotel guests would expect my organisation to help coastal hotels to adapt using Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
<u>International tour operators</u> would think that my organisation should help coastal hotels to use Approach C	C_SN2	Rate agreement that international tour operators would think that my organisation to help coastal hotels to adapt using Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
<u>Hotel operators</u> would expect my organisation to help coastal hotels to use Approach C	C_SN3	Rate agreement that hotel operators would approve of my organisation helping coastal hotels to adapt using Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
	C_SN_TOT	Composite variable made up of aggregate score of 3 items: 4. C_SN1 5. C_SN2 6. C_SN3_Final	This variable has been reverse coded to C_SN3R. Due to differences in wording in the paper-based and online versions of the questionnaire, the final version of this variable is C_SN3_Final Total score of perceived social pressure to adapt to climate change within 15 years using Approach C Higher scores indicate higher perceived social pressure (Range from 3=low perceived social pressure to 21=high perceived social pressure)
Helping coastal hotels to use Approach C is entirely up to the management team at my organisation	C_PBC1	Rate agreement that helping coastal hotels to use Approach C is entirely up to the management team at my organisation	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach C would not be feasible	C_PBC2	Rate agreement that helping coastal hotels to use Approach C would not be feasible	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach C would be easy	C_PBC3	Rate agreement that helping coastal hotels to use Approach C would be easy	Range: 1 = Strongly disagree 7 = Strongly agree
	C_PBC_TOT	Composite variable made up of aggregate score of 3 items: 4. C_PBC1 5. C_PBC2R 6. C_PBC3	This variable has been reverse coded to C_PBC2R Total score of perceived ability to adapt to climate change within 15 years using Approach C Higher scores indicate greater perceived ability (Range from 3=low perceived ability to 21=high perceived ability)

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
I intend to support my organisation helping coastal hotels to use Approach C	C_IN1	Rate agreement to support organisation helping coastal hotels to use Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
I expect that my organisation will help coastal hotels to use Approach C	C_IN2	Rate agreement with expectation that my organisation will help coastal hotels to use Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
I do not want my organisation to help coastal hotels to use Approach C	C_IN3	Rate agreement that I do not want my organisation to help coastal hotels to use Approach C	Range: 1 = Strongly disagree 7 = Strongly agree
	C_IN_TOT	Composite variable made up of aggregate score of 3 items: 4. C_IN1 5. C_IN2 6. C_IN3R	This variable has been reverse coded to C_IN3R Total score of perceived readiness to adapt using Approach C Higher scores indicate greater intention to adapt using Approach C (Range from 3=low perceived readiness to 21=high perceived readiness)
Having less beach hotels in operation is	D1	Rate having less beach hotels in operation	Range: 1 = Extremely undesirable 7 = Extremely desirable
Offering more ecotourism activities is	D2	Rate offering more ecotourism activities	Range: 1 = Extremely undesirable 7 = Extremely desirable
Offering more cultural tourism activities is	D3	Rate offering more ecotourism activities	Range: 1 = Extremely undesirable 7 = Extremely desirable
	D_TOTAL1	Composite variable made up of aggregate score of 3 items: 4. D1 5. D2 6. D3	Total perception of Approach D Higher scores indicate higher positive perception (Range from 7=low positive perception of Approach D to 21 = high positive perception of Approach D)
	D_TOTAL2	Composite variable made up of aggregate score of 2 items: 3. D1 4. D2	Total perception of Approach D Higher scores indicate higher positive perception (Range from 7=low positive perception of Approach D to 14 = high positive perception of Approach D)
Helping coastal hotels to use Approach D would be bad practice	D_ATT1	Rate agreement that helping coastal hotels to use Approach D would be bad practice	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach D would be effective	D_ATT2	Rate agreement that helping coastal hotels to	This variable has been reverse coded to D_ATT1R Range: 1 = Strongly disagree 7 = Strongly agree

Helping coastal hotels to use Approach D would be necessary	D_ATT3	use Approach D would be effective Rate agreement that helping coastal hotels to use Approach D would be necessary	Range: 1 = Strongly disagree 7 = Strongly agree
	D_ATT_TOT	Composite variable made up of aggregate score of 3 items: 4. D_ATT1R 5. D_ATT2 6. D_ATT3	Total score of attitude of adapting to climate change within 15 years using Approach D Higher scores indicate more positive attitude (Range from 3=negative attitude to 21=positive attitude)
<u>Hotel guests</u> would approve of my organisation helping coastal hotels to use Approach D	D_SN1	Rate agreement that hotel guests would expect my organisation to help coastal hotels to adapt using Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
<u>International tour operators</u> would think that my organisation should help coastal hotels to use Approach D	D_SN2	Rate agreement that international tour operators would think that my organisation to help coastal hotels to adapt using Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
<u>Hotel operators</u> would expect my organisation to help coastal hotels to use Approach D	D_SN3	Rate agreement that hotel operators would approve of my organisation helping coastal hotels to adapt using Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
	D_SN_TOT	Composite variable made up of aggregate score of 3 items: 4. D_SN1 5. D_SN2 6. D_SN3_Final	This variable has been reverse coded to D_SN3R. Due to differences in wording in the paper-based and online versions of the questionnaire, the final version of this variable is D_SN3_Final Total score of perceived social pressure to adapt to climate change within 15 years using Approach D Higher scores indicate higher perceived social pressure (Range from 3=low perceived social pressure to 21=high perceived social pressure)
Helping coastal hotels to use Approach D is entirely up to the management team at my organisation	D_PBC1	Rate agreement that helping coastal hotels to use Approach D is entirely up to the management team at my organisation	Range: 1 = Strongly disagree 7 = Strongly agree
Helping coastal hotels to use Approach D would not be feasible	D_PBC2	Rate agreement that helping coastal hotels to use Approach D would not be feasible	Range: 1 = Strongly disagree 7 = Strongly agree  This variable has been reverse coded to



Helping coastal hotels to use Approach D would be easy	D_PBC3	Rate agreement that helping coastal hotels to use Approach D would be easy	D_PBC2R Range: 1 = Strongly disagree 7 = Strongly agree
	D_PBC_TOT	Composite variable made up of aggregate score of 3 items: 4. D_PBC1 5. D_PBC2R 6. D_PBC3	Total score of perceived ability to adapt to climate change within 15 years using Approach D Higher scores indicate greater perceived ability (Range from 3=low perceived ability to 21=high perceived ability)
I intend to support my organisation helping coastal hotels to use Approach D	D_IN1	Rate agreement to support organisation helping coastal hotels to use Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
I expect that my organisation will help coastal hotels to use Approach D	D_IN2	Rate agreement with expectation that my organisation will help coastal hotels to use Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
I do not want my organisation to help coastal hotels to use Approach D	D_IN3	Rate agreement that I do not want my organisation to help coastal hotels to use Approach D	Range: 1 = Strongly disagree 7 = Strongly agree
			This variable has been reverse coded to D_IN3R
	D_IN_TOT	Composite variable made up of aggregate score of 3 items: 4. D_IN1 5. D_IN2 6. D_IN3R	Total score of perceived readiness to adapt using Approach D Higher scores indicate greater intention to adapt using Approach D (Range from 3=low perceived readiness to 21=high perceived readiness)

## Appendix K Study 2: Principal Components Analysis (PCA) of main research variables for hoteliers

Factor and items	Factor Loading	Eigenvalue	% of variance	Kaiser-Meyer-Olkin measure of sampling adequacy	Bartlett's test of Sphericity		Cronbach's alpha
					$\chi^2$	<i>p</i>	
<b>Past adjustment behaviour</b>				<b>.571</b>	<b>95.131</b>	<b>.000</b>	<b>.606</b>
<i>Component 1:Non-structural adjustment</i>		1.966	39.311				
Disaster plans	.835						
Guarantees of personal safety	.676						
Disaster response procedures	.860						
<i>Component 2:Structural adjustment</i>		1.406	28.123				
Artificial defence structures	.850						
Resistance of buildings/infrastructure	.803						
<b>Importance of DRM</b>		<b>2.424</b>	<b>80.802</b>	<b>.729</b>	<b>188.181</b>	<b>.000</b>	<b>.878</b>
Hotel disaster plans	.886						
Hotel guarantees of personal safety	.887						
Hotel information about disaster response procedures	.923						
<b>Present climate risk perception</b>				<b>.604</b>	<b>308.287</b>	<b>.000</b>	<b>.785</b>
<i>Component 1: Coastal hazards</i>		2.850	47.500				
Knowledge - coastal erosion	.807						
Worry - coastal erosion	.861						
Knowledge - sea level rise	.820						
Worry - sea level rise	.865						
<i>Component 2:Hydro-met hazards</i>		1.429	23.818				

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Knowledge - hurricanes	.855						
Worry - hurricanes	.794						
<b>Future climate risk perception</b>		<b>3.557</b>	<b>59.283</b>	<b>.819</b>	<b>304.034</b>	<b>.000</b>	<b>.861</b>
Knowledge - coastal erosion	.813						
Knowledge - hurricanes	.595						
Knowledge - sea level rise	.838						
Worry - coastal erosion	.770						
Worry - hurricanes	.745						
Worry - sea level rise	.833						
<b>Adjustment attributes</b>				<b>.586</b>	<b>613.361</b>	<b>.000</b>	
<i>Component 1: Protection attributes</i>		2.471	16.476				
More concrete walls	.871						
More rock structures	.774						
Raising existing walls and structures	.822						
Beaches increasingly not 100% natural	.606						
<i>Component 2: Retreat attributes</i>		3.028	20.186				
Hotel rooms that are not right on the beach	.743						
Guests taking a 100 m walk to beach	.823						
Guests taking a 500 m walk to beach	.894						
Guests taking shuttle bus to beach	.833						
<i>Component 3: Diversification attributes</i>		1.945	12.965				
Less beach hotels in operation	.591						
More ecotourism activities	.848						
More cultural tourism activities	.792						

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<i>Component 4: Accommodation safety attributes</i>		1.888	12.583				
Resistance of buildings/ infrastructure	.882						
Disaster management systems	.908						
<i>Component 5: Accommodation logistics attributes</i>		1.534	10.225				
Lifting buildings on piles	.871						
No rooms on ground floor	.818						
<b>Protection:</b>							
<b>Attitude</b>		<b>2.076</b>	<b>69.198</b>	<b>.609</b>	<b>106.541</b>	<b>.000</b>	<b>.765</b>
Good practice	.667						
Effective	.904						
Necessary	.903						
<b>Subjective norm</b>		<b>2.052</b>	<b>68.399</b>	<b>.661</b>	<b>79.605</b>	<b>.000</b>	<b>.768</b>
Hotel guests will approve	.824						
International tour operators will approve	.879						
Policy-makers/hoteliers will approve	.775						
<b>Perceived behavioural control</b>		<b>1.265</b>	<b>42.181</b>	<b>.501</b>	<b>7.031</b>	<b>.071</b>	<b>.198</b>
Entirely up to the management team	.793						
<i>Feasible</i>	-						
Easy	.792						
<b>Behavioural intention</b>		<b>2.109</b>	<b>70.288</b>	<b>.698</b>	<b>84.222</b>	<b>.000</b>	<b>.784</b>
I intend to use	.829						
I expect to use	.864						

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I want to use	.822						
<b>Accommodation:</b>							
<b>Attitude</b>		<b>1.891</b>	<b>63.028</b>	<b>.653</b>	<b>51.753</b>	<b>.000</b>	<b>.701</b>
Good practice	.769						
Effective	.842						
Necessary	.769						
<b>Subjective norm</b>		<b>2.304</b>	<b>76.785</b>	<b>.709</b>	<b>119.609</b>	<b>.000</b>	<b>.846</b>
Hotel guests will approve	.854						
International tour operators will approve	.909						
Policy-makers/hoteliers will approve	.865						
<b>Perceived behavioural control</b>		<b>1.376</b>	<b>45.877</b>	<b>.501</b>	<b>13.937</b>	<b>.003</b>	<b>.302</b>
<i>Entirely up to the management team</i>	-						
Feasible	.826						
Easy	.827						
<b>Behavioural intention</b>		<b>2.360</b>	<b>78.682</b>	<b>.656</b>	<b>151.984</b>	<b>.000</b>	<b>.864</b>
I intend to use	.941						
I expect to use	.900						
I want to use	.815						
<b>Retreat:</b>							
<b>Attitude</b>		<b>1.582</b>	<b>52.721</b>	<b>.493</b>	<b>33.848</b>	<b>.000</b>	<b>.506</b>
<i>Good practice</i>	-						
Effective	.879						
Necessary	.841						

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<b>Subjective norm</b>		<b>1.762</b>	<b>58.737</b>	<b>.551</b>	<b>49.858</b>	<b>.000</b>	<b>.609</b>
Hotel guests will approve	.545						
International tour operators will approve	.877						
Policy-makers/hoteliers will approve	.834						
<b>Perceived behavioural control</b>		<b>1.494</b>	<b>49.795</b>	<b>.536</b>	<b>19.290</b>	<b>.000</b>	<b>.461</b>
Entirely up to the management team	.463						
Feasible	.782						
Easy	.817						
<b>Behavioural intention</b>		<b>2.015</b>	<b>67.167</b>	<b>.607</b>	<b>82.322</b>	<b>.000</b>	<b>.743</b>
I intend to use	.863						
I expect to use	.898						
I want to use	.681						
<b>Diversification: Attitude</b>		<b>1.880</b>	<b>62.665</b>	<b>.575</b>	<b>62.712</b>	<b>.000</b>	<b>.685</b>
Good practice	.636						
Effective	.830						
Necessary	.888						
<b>Subjective norm</b>		<b>2.145</b>	<b>71.513</b>	<b>.649</b>	<b>95.657</b>	<b>.000</b>	<b>.800</b>
Hotel guests will approve	.852						
International tour operators will approve	.906						
Policy-makers/hoteliers will approve	.774						
<b>Perceived behavioural control</b>		<b>1.463</b>	<b>48.779</b>	<b>.590</b>	<b>13.583</b>	<b>.004</b>	<b>.471</b>
Entirely up to the management team	.705						

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Feasible	.640						
Easy	.746						
<b>Behavioural intention</b>		<b>2.288</b>	<b>76.268</b>	<b>.653</b>	<b>142.838</b>	<b>.000</b>	<b>.837</b>
I intend to use	.914						
I expect to use	.928						
I want to use	.769						

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## Appendix L Study 3: Principal Components Analysis (PCA) of main research variables for policy-makers

Factor and items	Factor Loading	Eigenvalue	% of variance	Kaiser-Meyer-Olkin measure of sampling adequacy	Bartlett's test of Sphericity		Cronbach's alpha
					$\chi^2$	<i>p</i>	
<b>Past adjustment behaviour</b>							
Artificial defence structures	-	-	-	-	-	-	-
Resistance of buildings/infrastructure	-	-	-	-	-	-	-
Disaster plans	-	-	-	-	-	-	-
Guarantees of personal safety	-	-	-	-	-	-	-
Disaster response procedures	-	-	-	-	-	-	-
<b>Importance of DRM</b>							
		<b>2.602</b>	<b>86.717</b>	<b>.709</b>	<b>89.063</b>	<b>.000</b>	<b>.921</b>
Hotel disaster plans	.921						
Hotel guarantees of personal safety	.910						
Hotel information about disaster response procedures	.961						
<b>Present climate risk perception</b>							
		<b>3.751</b>	<b>62.519</b>	<b>.822</b>	<b>118.800</b>	<b>.000</b>	<b>.869</b>
Knowledge - coastal erosion	.805						
Knowledge - hurricanes	.624						
Knowledge - sea level rise	.751						
Worry - coastal erosion	.909						
Worry - hurricanes	.901						
Worry - sea level rise	.715						
<b>Future climate risk perception</b>							
				<b>.767</b>	<b>83.851</b>	<b>.000</b>	<b>.712</b>
<i>Component 1</i>		3.119	51.977				
Knowledge - coastal erosion							
Knowledge - hurricanes							



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Knowledge - sea level rise					
Worry - coastal erosion					
Worry - hurricanes					
<i>Component 2:</i>		1.050	17.501		
Worry - sea level rise	.797				
<b>Adjustment attributes</b>				<b>.390</b>	<b>155.400</b>
<i>Component 1</i>		2.620	17.463		<b>.001</b>
No rooms on ground floor	.841				
Hotel rooms that are not right on the beach	.690				
Guests taking a 500 m walk to beach	.489				
Guests taking shuttle bus to beach	.578				
Less beach hotels in operation	.718				
<i>Component 2</i>		2.126	14.173		
<i>More rock structures</i>	-.606				
More ecotourism activities	.780				
More cultural tourism activities	.750				
<i>Component 3</i>		1.828	12.187		
More concrete walls	.736				
Raising existing walls and structures	.835				
Resistance of buildings/ infrastructure	.430				
<i>Component 4</i>		1.672	11.147		
Disaster management systems	.794				
Guests taking a 100 m walk to beach	.657				
Guests taking a 500 m walk to beach	.406				
Guests taking shuttle bus to beach	.557				

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<i>Component 5</i>		1.520	10.133				
Beaches increasingly not 100% natural	.890						
Resistance of buildings/ infrastructure	.598						
Hotel rooms that are not right on the beach	.417						
 <i>Component 6</i>		1.440	9.603				
Lifting buildings on piles	.925						
Guests taking a 500 m walk to beach	.471						
 <b>Protection:</b>							
<b>Attitude</b>		<b>2.251</b>	<b>75.044</b>	<b>.664</b>	<b>36.777</b>	<b>.000</b>	<b>.823</b>
Good practice	.787						
Effective	.918						
Necessary	.888						
 <b>Subjective norm</b>		<b>2.020</b>	<b>67.320</b>	<b>.650</b>	<b>23.030</b>	<b>.000</b>	<b>.790</b>
Hotel guests will approve	.878						
International tour operators will approve	.809						
Policy-makers/hoteliers will approve	.771						
 <b>Perceived behavioural control</b>		<b>1.606</b>	<b>53.541</b>	<b>.515</b>	<b>9.133</b>	<b>.028</b>	<b>.546</b>
Entirely up to the management team	.756						
Feasible	.545						
Easy	.858						
 <b>Behavioural intention</b>		<b>1.905</b>	<b>63.499</b>	<b>.585</b>	<b>21.617</b>	<b>.000</b>	<b>.690</b>
I intend to use	.886						

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I expect to use	.866						
I want to use	.608						
<b>Accommodation:</b>							
<b>Attitude</b>		<b>1.803</b>	<b>60.109</b>	<b>.597</b>	<b>14.412</b>	<b>.002</b>	<b>.642</b>
Good practice	.632						
Effective	.853						
Necessary	.822						
<b>Subjective norm</b>		<b>1.360</b>	<b>45.319</b>	<b>.489</b>	<b>3.546</b>	<b>.315</b>	<b>.339</b>
Hotel guests will approve	.816						
International tour operators will approve	.670						
Policy-makers/hoteliers will approve	.495						
<b>Perceived behavioural control</b>		<b>1.240</b>	<b>41.346</b>	<b>.556</b>	<b>1.108</b>	<b>.775</b>	<b>-.144</b>
<i>Entirely up to the management team</i>	-.639						
Feasible	.633						
Easy	.657						
<b>Behavioural intention</b>		<b>1.438</b>	<b>47.918</b>	<b>.538</b>	<b>4.223</b>	<b>.238</b>	<b>.384</b>
I intend to use	.793						
I expect to use	.447						
I want to use	.781						
<b>Retreat:</b>							
<b>Attitude</b>		<b>2.025</b>	<b>67.513</b>	<b>.492</b>	<b>29.252</b>	<b>.000</b>	<b>0.755</b>
Good practice	.717						
Effective	.937						
Necessary	.795						

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<b>Subjective norm</b>		<b>2.280</b>	<b>76.004</b>	<b>.648</b>	<b>36.980</b>	<b>.000</b>	<b>.840</b>
Hotel guests will approve	.817						
International tour operators will approve	.931						
Policy-makers/hoteliers will approve	.864						
<b>Perceived behavioural control</b>		<b>1.282</b>	<b>42.723</b>	<b>.536</b>	<b>1.466</b>	<b>.690</b>	<b>.316</b>
Entirely up to the management team	.631						
Feasible	.572						
Easy	.746						
<b>Behavioural intention</b>		<b>2.076</b>	<b>69.210</b>	<b>.577</b>	<b>27.115</b>	<b>.000</b>	<b>.768</b>
I intend to use	.755						
I expect to use	.920						
I want to use	.812						
<b>Diversification: Attitude</b>		<b>2.088</b>	<b>69.588</b>	<b>.554</b>	<b>30.648</b>	<b>.000</b>	<b>.781</b>
Good practice	.689						
Effective	.933						
Necessary	.861						
<b>Subjective norm</b>		<b>2.230</b>	<b>74.341</b>	<b>.679</b>	<b>31.316</b>	<b>.000</b>	<b>.844</b>
Hotel guests will approve	.847						
International tour operators will approve	.827						
Policy-makers/hoteliers will approve	.910						
<b>Perceived behavioural control</b>		<b>1.481</b>	<b>49.364</b>	<b>.525</b>	<b>5.823</b>	<b>.121</b>	<b>.455</b>
Entirely up to the management team	.816						
Feasible							

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Easy	.822						
<b>Behavioural intention</b>		<b>1.723</b>	<b>57.431</b>	<b>.525</b>	<b>14.548</b>	<b>.002</b>	<b>.579</b>
I intend to use	.889						
I expect to use	.852						
I want to use	.455						

---

Note: Complex items that loaded on more than one factor include: Safer stronger buildings, rooms not right on the beach, asking guests to take a 500 m walk to get to the beach, asking guests to take a shuttle bus to get to the beach. Measures that do not satisfy acceptability thresholds have been italicised.

## Appendix M Study 4: Tourist questionnaire

ID #: \_\_\_\_\_

Completed on: \_\_\_\_\_

### TOURIST PERCEPTION OF CLIMATE CHANGE ADAPTATION STRATEGIES SURVEY

Dear Holidaymaker,

You are invited to participate in a project to record the views of tourists on what adaptation options they view as most useful for the Caribbean tourism industry in the face of potential climate change.

This research is being undertaken in partial fulfilment of the requirements for the degree of Doctor of Philosophy at Lincoln University in Christchurch, New Zealand and has been reviewed and approved by the Lincoln University Human Ethics Committee subject to participants being aged 18 or above. Its findings will assist tourism managers in their planning activities.

**Your participation in this study is voluntary** and will involve taking **10 - 15 minutes to complete** the questionnaire that follows. You do not have to answer any questions that you would prefer not to answer. Any answers you provide will be confidential. If you tick the consent box located at the top of the next page, this is accepted as an indication of your consent to participate in this project. Your name and other information that would identify you are **not** collected. This ensures that you remain anonymous. However, each questionnaire has a unique identifying number that will enable you to withdraw any or all information that you provide. If you wish to withdraw any or all information you can do so up to thirty (30) days after the completion by contacting one of the below mentioned researchers, quoting the number at the top of this information sheet. We will then remove and destroy information that you have provided. At no stage will you be asked for information that would enable you to be identified.

If you require any further information about this project, or have any concerns about your participation, please feel free to contact the researchers involved as follows:

Study conducted by:

Roché Mahon (Ph.D. Candidate)  
Faculty of Environment, Society and Design  
Lincoln University  
PO Box 84, Lincoln 7647,  
Christchurch, New Zealand  
Phone: 64 3 325 3838 ext. 8526 (o) /  
868 741 3387 (m)  
E-mail: roche.mahon@lincolnuni.ac.nz

Study supervised by:

Hamish Rennie (Senior Lecturer)  
Faculty of Environment, Society and Design  
Lincoln University  
PO Box 84, Lincoln 7647,  
Christchurch, New Zealand  
Phone: 64 3 325 3838 ext. 8002 (o)  
E-mail: hamish.rennie@lincoln.ac.nz

Thank you for your time and cooperation.

**Please retain this sheet for your reference**

ID #: \_\_\_\_\_

Completed on: \_\_\_\_\_

- I have read and understood the information sheet about this research project;
  - I understand that the information is being kept confidential;
  - I understand that if I have any additional questions, I can contact the research team;
  - I understand that my participation is voluntary and that I am free to withdraw any information I have provided up to thirty (30) days after the completion of this questionnaire.
- I agree to participate in the project

**START HERE**

1. What is your primary reason(s) for visiting Trinidad & Tobago on this trip? (Please tick all that apply)

- |  |   |
|--|---|
| <input type="checkbox"/> To experience the local culture | <input type="checkbox"/> To experience Trinidad & Tobago Carnival |
| <input type="checkbox"/> For business                    | <input type="checkbox"/> To have a beach vacation                 |
| <input type="checkbox"/> Other: _____                    |   |

2. Do you think there is a need for coastal accommodation providers in the Caribbean to prepare for climate change?

- No  Yes

3. Please rate how important you think each of the following items were in your **choice of accommodation on this trip** by circling a number between 1 and 7 on each line.

	Not important at all				Extremely important				Don't Know
Natural appearance of the hotel beach	1	2	3	4	5	6	7	<input type="checkbox"/>	
Your hotel having disaster plans	1	2	3	4	5	6	7	<input type="checkbox"/>	
Guarantees of personal safety from natural disasters	1	2	3	4	5	6	7	<input type="checkbox"/>	
Information about natural disaster events at your hotel	1	2	3	4	5	6	7	<input type="checkbox"/>	
Closeness of the beach to your hotel	1	2	3	4	5	6	7	<input type="checkbox"/>	

4 a. What is your opinion of the following hazard events and their potential impact on the quality of your beach vacation in the Caribbean **now**? (Please circle a number on each line)

	Pose(s) no risk to the quality of my beach vacation <b>now</b>				Pose(s) great risk to the quality of my beach vacation <b>now</b>			
As far as I know, coastal erosion	1	2	3	4	5	6	7	
As far as I know, hurricanes	1	2	3	4	5	6	7	
	Not at all				A great deal			
I worry about the risk that coastal erosion poses to the quality of my beach vacation <b>now</b>	1	2	3	4	5	6	7	
I worry about the risk that hurricanes pose to the quality of my beach vacation <b>now</b>	1	2	3	4	5	6	7	

b. What is your opinion of these hazard events and their potential impact on the quality of your beach vacation in the Caribbean **in the future**? (Please circle a number on each line)

	Will pose no risk to the quality of my beach vacation <b>in the future</b>				Will pose great risk to the quality of my beach vacation <b>in the future</b>			
As far as I know, <u>increased</u> coastal erosion as a result of climate change	1	2	3	4	5	6	7	

As far as I know, <u>more</u> hurricanes as a result of climate change	1	2	3	4	5	6	7
		Not at all				A great deal	
I worry about the risk that <u>increased</u> coastal erosion as a result of climate change poses to the quality of my beach vacation <b>in the future</b>	1	2	3	4	5	6	7
I worry about the risk that <u>more</u> hurricanes as a result of climate change pose to the quality of my beach vacation <b>in the future</b>	1	2	3	4	5	6	7

5. Regardless of your views on the need for coastal accommodation providers in the Caribbean to prepare for climate change, please read the following passage:

“Changes in climate will worsen the already existing coastal problems in the Caribbean. Scientists project that these destinations will experience **a rise in sea level** leading to the loss of many beaches. **Beach erosion** is expected to be a constant challenge that also contributes to the **loss of beaches**. There will be **more intense and more frequent storms and hurricanes** that bring with them **large amounts of storm surge and flooding** (Journal of Climatic Sciences, 2011)”.

In order to cope with the greater challenge of operating on the coast, coastal accommodation providers may take four different approaches in the future:

APPROACH A	APPROACH B
Hotels may focus on beach erosion. They may: <ul style="list-style-type: none"> <li>Stay in their existing locations close to the beach.</li> <li>Build more concrete walls on beaches to protect them.</li> <li>Build more rock structures on beaches to protect them.</li> <li>Raise the height of these structures in places where these structures already exist.</li> <li>As a result, beaches may increasingly have an appearance that is <u>not</u> 100% natural.</li> </ul>	Hotels may focus on making their buildings stronger and safer. They may: <ul style="list-style-type: none"> <li>Stay in their existing locations close to the beach.</li> <li>Change the style of their buildings.</li> <li>Lift their buildings up on piles meters above sea level.</li> <li>No longer offer rooms on the ground floor.</li> <li>Not build structures on beaches to protect them.</li> </ul>
APPROACH C	APPROACH D
Hotels may focus on moving their buildings further inland. They may: <ul style="list-style-type: none"> <li>No longer offer hotel rooms close to the beach.</li> <li>Ask guests to take a short walk to get to the beach.</li> <li>Offer free shuttle buses to the beach.</li> <li>Not build structures on beaches to protect them.</li> </ul>	The tourism industry may focus on shifting to other forms of tourism. The industry may: <ul style="list-style-type: none"> <li>Have less beach hotels in operation.</li> <li>Accommodate tourists in new hotels inland.</li> <li>Offer a broad range of eco-tourism activities.</li> <li>Also offer more cultural activities with shows presented by local people.</li> <li>Not build structures on beaches to protect them.</li> </ul>

a. How likely is it that you will choose a Caribbean destination for your vacation if the destination used the following Approach(es) in the future? (Please circle a number on each line)

	Extremely unlikely					Extremely likely	
Approach A	1	2	3	4	5	6	7





## Appendix N Study 4: HEC approval letter for tourist survey

Research and Commercialisation Office

T 64 3 325 3838  
F 64 3 325 3630  
PO Box 84, Lincoln University  
Lincoln 7647, Christchurch  
New Zealand

[www.lincoln.ac.nz](http://www.lincoln.ac.nz)

Application No: 2011-39

19 December 2011

Title: Tourist Perception of Climate Change Adaptation Strategies Survey

Applicant: Roché Mahon

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*The Lincoln University Human Ethics Committee has reviewed the above noted application.*

Thank you for your detailed response to the questions which were forwarded to you on the Committee's behalf.

I am satisfied on the Committee's behalf that the issues of concern have been satisfactorily addressed.

I am pleased to give final approval to your project. Please advise Julie Ward when you have completed your research and confirming that you have complied with the terms of the ethical approval.

May I, on behalf of the Committee, wish you success in your research.

Yours sincerely



Professor Grant Cushman  
Chair, Human Ethics Committee

cc H Rennie, S Becken

**PLEASE NOTE:** The Human Ethics Committee has an audit process in place for applications. Please see 7.3 of the Human Ethics Committee Operating Procedures (ACHE) in the Lincoln University Policies and Procedures Manual for more information.

## **Appendix O Study 4: Recruitment script for tourist survey**

“Hello! My name is Roché. I’m a Ph.D. student attached to Lincoln University in Christchurch, New Zealand. I’m back at home conducting a study on what tourists think about different climate change adaptation options for Tobago. I’m interested in your opinions and if you have 10 minutes to spare now, would you be willing to fill in this 4 page questionnaire (showing a copy of the questionnaire)? It’s a very short, anonymous survey with only 9 questions. Participation is voluntary and you can decide to stop answering questions at any time. Any answers you provide will be confidential. Would you be willing to participate?”

- If yes: “Great! Thanks for your help. Here is a copy of the Research Information Sheet that tells you a little bit more about the research. Once you have read that, I will ask you again if you are willing to participate. You can stop at any time.”
- If no: “I understand. Thank you for your time.”

## Appendix P Study 4: Tourist survey variable and coding sheet

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
	Respondent	ID # assigned to each questionnaire	001-327
	Location	Data collection point in Tobago	1 = Pigeon Point 2 = Storebay 3 = Mt. Irvine 4 = Turtle Beach 5 = Speyside 6 = ANR
What is your primary reason(s) for visiting Trinidad & Tobago on this trip? (Please tick all that apply)	culture carnival business beach <i>other:</i> friendsfamily nature sports education rest yacht BEACH_TYPE	Reason(s) for visit	Enter 1 if ticked on questionnaire
Do you think there is a need for coastal accommodation providers in the Caribbean to prepare for climate change?	CCP	Beach versus non-beach tourists Rate agreement with coastal accommodation providers in the Caribbean need to prepare for CC	0= Non-beach tourists 1= Beach tourists 1 = No 2 = Yes
Please rate how important you think each of the following items were in your <b>choice of accommodation on this trip:</b> Natural appearance of the hotel beach	APPEAR	Rate importance of natural appearance of hotel beach in choice of accommodation on this trip	Range: 1 = Not important at all 7 = Extremely important
Please rate how important you think each of the following items were in your <b>choice of accommodation on this trip:</b> Closeness of the beach to your hotel	CLOSE	Rate importance of closeness of beach to hotel in choice of accommodation on this trip	Range: 1 = Not important at all 7 = Extremely important
	BEACH_PERCEP	Composite variable made up of aggregate score of 2 items: 6. APPEAR 7. CLOSE	Total perception of the importance of the appearance and closeness of beach in your choice of accommodation on this trip. Higher scores indicate higher perception of the importance of natural appearance and closeness (Range from 2= low perception of beach importance to 14=high

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
Please rate how important you think each of the following items were in your <b>choice of accommodation on this trip</b> : Your hotel having disaster plans	DISPLANS	Rate importance of hotel having disaster plans in choice of accommodation on this trip	perception of beach importance ) Range: 1 = Not important at all 7 = Extremely important
Please rate how important you think each of the following items were in your <b>choice of accommodation on this trip</b> : Guarantees of personal safety from natural disasters	GUARANTEE	Rate importance of guarantees of personal safety from natural disasters in choice of accommodation on this trip	Range: 1 = Not important at all 7 = Extremely important
Please rate how important you think each of the following items were in your <b>choice of accommodation on this trip</b> : Information about natural disaster events at your hotel	DISINFO	Rate importance of information about natural disaster events at your hotel in choice of accommodation on this trip	Range: 1 = Not important at all 7 = Extremely important
	DRR_PERCEP	Composite variable made up of aggregate score of 3 items: 7. DISPLANS 8. GUARANTEE 9. DISINFO	Total perception of the importance of DRR measures to tourists staying at your hotel. Higher scores indicate higher perception of importance of DRR measure (Range from 3=low perception of importance of DRR measures 21=high perception of importance of DRR measures
As far as I know, coastal erosion Pose(s) no risk to the quality of my beach vacation <b>now</b> / Pose(s) great risk to the quality of my beach vacation <b>now</b>	COG1	Rate knowledge of risk posed by coastal erosion on the quality of beach vacation in the Caribbean now	Range: 1 = Poses no risk at all 7 = Poses extreme risk
As far as I know, hurricanes Pose(s) no risk to the quality of my beach vacation <b>now</b> / Pose(s) great risk to the quality of my beach vacation <b>now</b>	COG2	Rate knowledge of risk posed by hurricanes on the quality of beach vacation in the Caribbean now	Range: 1 = Poses no risk at all 7 = Poses extreme risk
I worry about the risk that coastal erosion poses to the quality of my beach vacation <b>now</b> Not at all/ A great deal	AF1	Rate worry about the risk posed by coastal erosion on the quality of beach vacation in the Caribbean now	Range: 1 = Worry not at all 7 = Worry a great deal
I worry about the risk that hurricanes pose to the quality of my beach vacation <b>now</b> Not at all/ A great deal	AF2	Rate worry about the risk posed by hurricanes on the quality of beach vacation in the Caribbean now	Range: 1 = Worry not at all 7 = Worry a great deal
	CRP_PRESENT	Composite variable made up of aggregate score of 4 items: 1. COG1 2. COG2	Total CRP score of perceived knowledge and worry about risk posed by hazards now. Higher scores indicate higher perceived knowledge and

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
		3. AF1 4. AF2	worry for risk posed by hazards now (Range from 4=low present CRP to 28=high present CRP)
As far as I know, <u>increased</u> coastal erosion as a result of climate change Will pose no risk to the quality of my beach vacation <b>in the future</b> / Will pose great risk to the quality of my beach vacation <b>in the future</b>	COG1F	Rate knowledge of risk posed by increased coastal erosion as a result of climate change on the quality of beach vacation in the Caribbean in the future	Range: 1 = Poses no risk at all 7 = Poses extreme risk
As far as I know, <u>more</u> hurricanes as a result of climate change Will pose no risk to the quality of my beach vacation <b>in the future</b> / Will pose great risk to the quality of my beach vacation <b>in the future</b>	COG2F	Rate risk posed by more hurricanes as a result of climate change on the quality of beach vacation in the Caribbean in the future	Range: 1 = Poses no risk at all 7 = Poses extreme risk
I worry about the risk that <u>increased</u> coastal erosion as a result of climate change poses to the quality of my beach vacation <b>in the future</b> Will pose no risk to the quality of my beach vacation <b>in the future</b> / Will pose great risk to the quality of my beach vacation <b>in the future</b>	AF1F	Rate worry about the risk posed by increased coastal erosion as a result of climate change on the quality of beach vacation in the future	Range: 1 = Worry not at all 7 = Worry a great deal
I worry about the risk that <u>more</u> hurricanes as a result of climate change pose to the quality of my beach vacation <b>in the future</b> Will pose no risk to the quality of my beach vacation <b>in the future</b> / Will pose great risk to the quality of my beach vacation <b>in the future</b>	AF2F	Rate worry about the risk posed by more hurricanes as a result of climate change on the quality of beach vacation in the future	Range: 1 = Worry not at all 7 = Worry a great deal
	CRP_FUTURE	Composite variable made up of aggregate score of 4 items: 13. COG1F 14. COG2F 15. AF1F 16. AF2F	Total CRP score of perceived knowledge and worry about risk posed by hazards in the future Higher scores indicate higher perceived knowledge and worry for risk posed by hazards now (Range from 4=low future CRP to 28=high future CRP)
	CRP_TOTAL	Composite variable made up of aggregate score of 8 items: 25. COG1 26. COG2 27. AF1 28. AF2 29. COG1F 30. COG2F 31. AF1F 32. AF2F	Total CRP score of perceived knowledge and worry about risk posed by hazards now and in the future. Higher scores indicate higher total CRP for present and future hazards (Range from 8=low total CRP to 56=high total CRP)

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
How likely is it that you will choose a Caribbean destination for your vacation if the destination used the following Approach(es) in the future? Approach A	A_LIKELY	Rate likelihood of choosing Approach A (Protection) in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
How likely is it that you will choose a Caribbean destination for your vacation if the destination used the following Approach(es) in the future? Approach B	B_LIKELY	Rate likelihood of choosing Approach B (Accommodation) in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
How likely is it that you will choose a Caribbean destination for your vacation if the destination used the following Approach(es) in the future? Approach C	C_LIKELY	Rate likelihood of choosing Approach C (Retreat) in the future	1 = Extremely unlikely 7 = Extremely likely
How likely is it that you will choose a Caribbean destination for your vacation if the destination used the following Approach(es) in the future? Approach D	D_LIKELY	Rate likelihood of choosing Approach D (Diversification) in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
How likely is it that you will choose a Caribbean destination for your vacation if the destination used the following Approach(es) in the future? Approach AB	AB_LIKELY	Rate likelihood of choosing Approach AB in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
How likely is it that you will choose a Caribbean destination for your vacation if the destination used the following Approach(es) in the future? Approach ABD	ABD_LIKELY	Rate likelihood of choosing Approach ABD in the future	Range: 1 = Extremely unlikely 7 = Extremely likely
How desirable or undesirable do you think are the changes described? Beaches that have more concrete walls than are generally present now	A1	Rate beaches that have more concrete walls	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? Beaches that have more rock structures than are generally present now	A2	Rate beaches that have more rock	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? Beaches that have higher walls and structures than are generally present now	A3	Rate beaches that have more concrete walls and rock	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? Beaches that increasingly have an appearance that is not 100% natural	A4	Rate beaches that have an appearance that is not natural	Range: 1 = Extremely undesirable 7 = Extremely desirable
	ATOTAL	Composite variable made up of aggregate score of 4 items: 9. A1 10. A2 11. A3	Total perception of Approach A Higher scores indicate higher positive perception (Range from 4=low positive perception of Approach A to

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
		12. A4	28 = high positive perception of Approach A)
How desirable or undesirable do you think are the changes described? Hotel buildings that are stronger and safer	B1	Rate stronger and safer buildings	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? Hotel buildings that are lifted up on piles	B2	Rate buildings that are lifted up on piles	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? Hotels that do not offer rooms on the ground floor	B3	Rate hotels that do not offer rooms on the ground floor	Range: 1 = Extremely undesirable 7 = Extremely desirable
	BTOTAL	Composite variable made up of aggregate score of 3 items: 9. B1 10. B2 11. B3	Total perception of Approach B Higher scores indicate higher positive perception (Range from 3=low positive perception of Approach B to 21 = high positive perception of Approach B)
How desirable or undesirable do you think are the changes described? Hotel rooms that are not right on the beach	C1	Rate hotel rooms that are not right on the beach	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? Having to take a 100m walk to get to the beach	C2	Rate taking a 100m walk	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? Having to take a 500m walk to get to the beach	C3	Rate taking a 500m walk	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? Taking free shuttle buses to the beach	C4	Rate taking a shuttle to the beach	Range: 1 = Extremely undesirable 7 = Extremely desirable
	CTOTAL	Composite variable made up of aggregate score of 4 items: 9. C1 10. C2 11. C3 12. C4	Total perception of Approach C Higher scores indicate higher positive perception (Range from 4=low positive perception of Approach C to 28 = high positive perception of Approach C)
	CTOTAL2	Composite variable made up of aggregate score of 5 items: 11. C1 12. C2 13. C3 14. C4 15. D1/C5	Total perception of Approach C Higher scores indicate higher positive perception (Range from 5=low positive perception of Approach C to 35 = high positive perception of Approach C)



Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
How desirable or undesirable do you think are the changes described? Less beach hotels	D1	Rate less beach hotels	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? More ecotourism activities	D2	Rate more ecotourism	Range: 1 = Extremely undesirable 7 = Extremely desirable
How desirable or undesirable do you think are the changes described? More cultural tourism activities	D3	Rate more cultural tourism	Range: 1 = Extremely undesirable 7 = Extremely desirable
	DTOTAL	Composite variable made up of aggregate score of 3 items: 7. D1 8. D2 9. D3	Total perception of Approach D Higher scores indicate higher positive perception (Range from 3=low positive perception of Approach D to 21 = high positive perception of Approach D)
	DTOTAL2	Composite variable made up of aggregate score of 2 items: 5. D1 6. D2	Total perception of Approach D Higher scores indicate higher positive perception (Range from 7=low positive perception of Approach D to 14 = high positive perception of Approach D)
How many times have you stayed in coastal accommodation in the Caribbean?	timescoastalacc	Number of times stayed in coastal accommodation in the Caribbean	Enter number provided
	timescoastalrecoded	Number of times stayed in coastal accommodation	String responses recoded to numeric
What is your age?	AGE	Age	1 = to 25 2 = to 40 3 = to 55 4 = to 70 5 = over 70
Sex:	SEX	Sex	1 = Male 2 = Female
In which country do you live?	COUNTRY	Country of residence	1 = United Kingdom 2 = USA 3 = Canada 4 = Germany 5 = Sweden 6 = Norway 7 = France 8 = Netherlands 9 =Switzerland 10 = Austria 11 = Nepal 12 =Suriname 13 = Dominican Republic 14 = Venezuela 15 = Columbia 16 = Italy 17 = Finland

Questionnaire Item	SPSS Variable Name	Description	Coding Instructions
How many times have you been to the Caribbean?	timesCarib	Number of times to the Caribbean	18 = Denmark 19 = Malta Enter number provided
	timesCaribrecoded	Number of times to the Caribbean	String responses recoded to numeric

## Appendix Q Factors that drive tourism sector vulnerability at the national and business levels in three Caribbean SIDS

Drivers of vulnerability reported by respondents	Key issue(s)	Illustrative examples and quote(s)
Slow, disjointed mainstreaming of the DRM agenda	Limited institutional capacity. Both the private and the public sectors in the Caribbean have responsibilities with regard to mainstreaming the DRM agenda and both have difficulties fulfilling them.	“what the industry does is not the total picture. It is most important that the country and the region... be doing some of those things...in sync with us...” (PRI_JA_1, Industry association representative, Jamaica)
Historically deficient development planning, monitoring and enforcement	In the past, tourism developed in an ad hoc manner at a time when physical planning was not yet well conceived and the enforcement of building regulations and environmental standards were likewise not widespread. Hazard and disaster impact has been exacerbated by badly conceived/ designed development further inland.	“...they were observing a 50 foot setback from the high water mark...” (PUB_AB_1, Policy-maker, Antigua and Barbuda)
Human-induced loss and degradation of coastal ecosystems	The connection between coastal tourism development, environmental degradation, disaster impact.	One hotel executive in Jamaica (PRI_JA_6, Hotelier, Jamaica) complained about inland dirt and other by-products that gets deposited into the sea and impacts coral reefs and water quality. A public sector respondent in Antigua and Barbuda described a situation where poor inland drainage affected coastal development. One hotelier in Antigua and Barbuda (PRI_AB_4, Hotelier, Antigua and Barbuda) noted that the coastal operating area faced significant flooding and erosion due to the clearing of the mangrove swamps to make way for the construction of a harbour complex and marina.
Emphasis on a limited range of tourism development options	The dominant model of tourism has been developed on the country’s outstanding natural coastal resources which form the basis of perhaps their only competitive advantage in the tourism market.	“...it would be very, very difficult to move from the beach...because of the sheer size of the island and the natural resources that exist.... tourism basically exploits what’s there” (PUB_AB_1, Policy-maker, Antigua and Barbuda)

Drivers of vulnerability reported by respondents	Key issue(s)	Illustrative examples and quote(s)
Disproportionate dependence on tourism relative to other industries	Tourism is a primary economic activity.	<p>“...tourism is the only economic activity that at this point in time and for the unforeseeable future will remain the engine of economic growth...” (PUB_AB_8, Policy-maker, Antigua and Barbuda)</p> <p>One public official acknowledged that for Tobago tourism is “the second largest employer. The first being government, the second tourism...so it’s a very important part of the island dynamics” (PUB_TT_5, Policy-maker, Trinidad and Tobago)</p>
Engrained beach tourism identity		<p>“...I mean we’re an island....if we lose our coast, then beach tourism will be finished. And all the investors would be wiped out.... And the rest of the country that is so dependent on tourism” (PRI_JA_1, Industry association representative, Jamaica)</p> <p>“...This is especially important in our country given our dependence on our natural resources. Once these resources are compromised our ability to earn foreign exchange will be seriously affected” (PUB_TT_5, Policy-maker, Trinidad and Tobago)</p> <p>“...because if you lose...God forbid you lose the sand ...what are we offering in terms of the tourism product? That means we’ll be increasing the pressure on our eco-tourism side of things..” (PUB_TT_5, Policy-maker, Trinidad and Tobago)</p> <p>“...we will do anything... so that we... still call [ourselves] a beachfront property instead of calling it a seafront property...” (PRI_JA_3, Hotelier, Jamaica)</p>
High international tourist demand for a coastal product	High international tourist demand for a sun, sea and sand tourism product prevails. Tourists do not appear to be actively demanding that a hotel operates a prescribed distance from the sea. A dichotomy is therefore created between operating a reasonably safe distance away	

Drivers of vulnerability reported by respondents	Key issue(s)	Illustrative examples and quote(s)
Comparatively lower tourist demand for a disaster resistant product	from the high water mark and operating as close as possible to it for the economic rewards that hoteliers receive in return.  While fairly important in their own right, closeness to the beach seems to hold more importance with tourists than other attributes associated with a disaster resistant tourism product	“I’ve never had a guest ask about a disaster plan...” (PRI_AB_2, Hotelier, Antigua and Barbuda) “...safety is an important factor for all market segments...” (PUB_JA_2, Policy-maker, Jamaica) “...gravitate to the ones [operators] who can afford it...more to the tour operators that offer hurricane insurance or the hotels that give you a guarantee if they are affected by a hurricane...” (PRI_JA_4, Hotelier, Jamaica)
Perception that DRM is not a business priority or is inconsistent with business objectives	DRM is not their core business and therefore may not necessarily be a priority. A business’ profit motivation is sometimes inconsistent with DRM objectives. The short timeframes of business imperatives may work against taking the longer term view that the reduction of disaster risk necessitates.	“I think that we are pretty much ready and we are very confident...” (PRI_AB_10, Hotelier, Antigua and Barbuda)  “...we take it for granted. I’m being honest...” (PRI_TT_4, Hotelier, Trinidad and Tobago)
Lack of resources to devote to DRM	While bigger foreign owned organisations have the necessary resources and can afford to employ a team of multi-skilled professionals seeking their DRM interests, smaller locally owned organisations do not have the same level of resources	“...the small hotels are under a lot of pressure...” (PRI_AB_9, Hotelier, Antigua and Barbuda)
Lack of a multi-hazard approach	The narrow focus of hoteliers on the two most prominent physical hazards that affect them – severe weather systems and coastal erosion – with little evidence of serious consideration and action for the range of others hazards that have affected them less frequently but to which they are nevertheless exposed.	
Limited use of risk assessment	A lack of use of probabilistic risk analysis in respondents’ DRM action was apparent. Hoteliers are basing their knowledge on 1) dealing with hazard impacts over the years or 2) technical assistance and expertise of private engineering and architectural firms.	

Drivers of vulnerability reported by respondents	Key issue(s)	Illustrative examples and quote(s)
Disconnect in dialogue	There are current gaps in communication and the flow of dialogue that revolve around 1) the lack of inclusion of key respondents in the DRM policy dialogue, 2) respondents operating at different levels, and 3) various respondents from different orientations 'speaking in different languages'.	