



Marine tourism in the face of global change: The resilience of enterprises to crises in Thailand and Australia



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ABSTRACT

Marine-oriented nature-based tourism plays an important socio-economic role, and provides an incentive for conservation in many coastal regions. However, accelerating global change, and the associated socio-economic and political change may have severe consequences for marine tourism at the local level. Thus, understanding the ability of sectors within marine tourism to cope with, and adapt to, change is paramount. Private sector enterprises are key players in marine tourism and their capacity to adapt to change will vary across socio-economic and governance contexts. Thus, the resilience of these enterprises (their ability to adapt to, and continue to function under changing pressures and circumstances) is critical for the future of the marine tourism sector more broadly. This paper examines how socioeconomic and governance contexts influence the resilience of coral reef tourism enterprises in three settings: the formal and informal sector in Phuket, Thailand and enterprises on Australia's Great Barrier Reef. Although there are differences between the three groups of enterprises, lifestyle factors, human capital, perceived reef condition, and government support are associated with the resilience of enterprises across all three groups. These findings suggest that policy-makers should consider enterprise lifestyle benefits, and that a nuanced understanding of marine tourism enterprises is required.

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1. Introduction

Nature-based tourism contributes to the coastal economy of many tropical marine systems around the world (Orams and Lück, 2014). However, increasing uncertainty over the timing of major disturbances, and how the influence of disturbances may spread, is of particular concern to the tourism industry because of its dependence on the international flows of people, money, and resources (Biggs et al., 2011; Simpson et al., 2008). These global drivers of change can interact with local drivers, such as political crises and affect the tourism sector (Balint and Mashinya, 2006; Hall, 2010). Hence, because of its importance in many coastal

regions, there is a growing urgency to understand the factors that enable the marine tourism sector, and agents within it, to cope with and positively adapt to global change and associated crises (Hall et al., 2004). Although, at a global scale tourist numbers continue to grow (UNWTO, 2013), at a local destination scale, impacts associated with global and local drivers of change can have deleterious impacts on the tourism sector as a result of significant changes in tourist arrivals by number and/or by the type of visitor (Gossling and Hall, 2006; Prideaux et al., 2008; Lean and Smyth, 2009; Nassar, 2012).

Studies assessing the effects of crises and disturbances on the tourism industry tend to examine how demand for tourism has changed, or to a lesser extent, how the tourism industry responds and the ability of the tourism industry to adapt (Hall, 2010; Ritchie et al., 2014). Studies can be grouped into five broad overlapping categories. First, those that focus on the impact of a specific large crisis, such as a disease outbreak, on tourism arrivals at the national, regional, or global scale (Kuo et al., 2008). A second group uses modelling and scenario-based analyses to explore the impacts

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of a changing climate on tourism arrivals at a destination (Scott et al., 2012). Third, studies that empirically examine the effect of climate change on the tourism industry and the potential for adaptation (Gössling et al., 2009; Hoffmann et al., 2009). These studies have tended to focus on the ski industries' response to changing snow conditions (Scott et al., 2012). Fourth, studies that examine the response of tourists and to changing condition of coral reefs (Uyarra et al., 2009, 2005). Finally, a category, of mostly qualitative case studies, focuses on the response of tourism-dependent communities to disasters or shocks (Baker and Coulter, 2007; Becken, 2013; Smith and Henderson, 2008).

Only a small number of studies have focussed specifically on the ability of the marine tourism sector to cope with crises and global change. These studies, have either focussed on one country, one destination (Biggs, 2011; Biggs et al., 2012b; Dawson et al., 2007; Hillmer-Pegram, 2013; Marshall et al., 2010), or on the relationship between marine tourism operators and conservation (Biggs et al., 2012a). What is currently lacking is an empirical investigation of the factors that may enable marine tourism enterprises in different socio-economic and governance contexts to survive or adapt to crises and change. This paper builds on earlier work (e.g. Becken, 2013; Biggs, 2011; Biggs et al., 2012b; Hillmer-Pegram, 2013) and investigates both the commonalities and the unique factors associated with the resilience of marine tourism enterprises across three different socioeconomic and governance settings. An understanding of the commonalities and context specificity of response to environmental and socio-economic stresses is valuable as there is growing acceptance of the context specificity of human environment interactions (see Ostrom et al., 2007).

Coral reef tourism provides an excellent lens through which to explore the resilience of marine tourism because it is exposed to a range of environmental and socio-economic threats. The environmental threats to reef ecosystems are particularly acute; and include coral bleaching, ocean acidification, over-fishing, fertiliser and sediment runoff, coastal development, and poorly managed tourism activities (Hughes et al., 2010; Scott et al., 2012). In addition, socio-economic and political crises can affect reef tourism at both the destination and origin of tourist generating regions (Bischof, 2010; Nunn, 2009). Moreover, resilience theory (see Folke, 2006) has attracted increasing attention from tourism researchers as a way to understand the tourism sector's ability to cope with, and adapt to, perturbations and change (Becken, 2013; Calgaro et al., 2014; Farrell and Twining-Ward, 2004; Hall, 2008; Sausmarez, 2007; Simpson et al., 2008; Strickland-Munro et al., 2010).

Reef tourism generally requires the use of a boat to access offshore reefs. Therefore, enterprises that take tourists to enjoy reefs by boat are key players in the reef tourism industry. For the purpose of this study, an enterprise is an entity consisting of one or more individuals that generates an income by delivering services to tourists. Reef tourism is characterised by a continuum of enterprise structure and size. On one end of the continuum are the large commercial enterprises, that may employ hundreds of people, and have made substantial investments into boats, offices, marketing and equipment. On the other end of the continuum are the small, often informal, enterprises and individual or family-owned businesses that do not own their boats, but rent boats or space on boats when they have clients. In contrast to formal enterprises, informal enterprises consist of small-scale self-employed entrepreneurs that are lawful in nature but are typically not officially licensed or registered for taxation because they operate under specified thresholds of annual revenue (Aguilar and Campuzano, 2009) and are therefore fully or partially outside of formal government regulation and observation. Despite historically negative connotations of non-compliance and marginality, the informal sector in increasingly recognised as a substantial contributor to economic

life in developing and developed countries (Chen, 2012), that is characterised by flexible and innovative organisational forms (Godfrey, 2011; Williams and Nadin, 2010).

This paper empirically investigates the factors that are associated with perceived resilience in coral reef tourism enterprises in three different contexts. We define perceived resilience as the extent to which enterprise owners and senior managers feel that their enterprise will be able to maintain or grow its existing level of employment and income and stay operating in reef tourism in the face of crises and change (Biggs, 2011). Our study investigates commercial enterprises on Australia's Great Barrier Reef (GBR); commercial enterprises in the formal tourism sector in Phuket, Thailand; and informal enterprises in Phuket, Thailand. In particular, our study identifies: 1) The common and unique characteristics associated with the resilience of reef tourism enterprises in Australia, formal reef enterprises in Thailand, and informal enterprises in Thailand; 2) The differences in the levels of resilience between formal and informal sector enterprises in Thailand, and enterprises on Australia's GBR; 3) The theoretical and management implications of the commonalities and differences between the three reef tourism sectors for strengthening enterprise resilience.

2. Overview: resilience and marine tourism

2.1. Resilience theory

The resilience concept emerged from the ecological sciences and is a measure of the ability of a system to recover from and adapt to perturbations without fundamentally changing structure and function (Berkes and Folke, 2000; Gunderson and Holling, 2002; Holling, 1973). A resilience-based approach is useful in understanding tourism's response to crises because it considers the ability of a system to maintain and adapt its essential structure, identity, and functioning in the face of often unpredictable change (Adger, 2000; Cumming et al., 2005; Holling, 1973). Resilience theory recognises the inherent uncertainty in predicting the complex and dynamic ways in which individuals, organisations, and society may respond to disturbances and change (Gallopín, 2006; Marshall, 2010). Within the resilience literature there is a distinction between 'specified resilience' and 'general resilience' (Folke et al., 2010). General resilience refers to the resilience of any and all parts of a system to all kinds of disturbances, including novel ones. Specified resilience refers to the resilience of some particular part of a system, related to one or more particular disturbances.

The growing but limited literature on resilience in tourism to date consists mainly of conceptual pieces on the potential value of the resilience concept (e.g. Cochrane, 2010; Farrell and Twining-Ward, 2004) and qualitative applications to protected area and community-based tourism (Ruiz-Ballesteros, 2010; Strickland-Munro et al., 2010). Yet, to date, there has been no quantitative, empirical study investigating the determinants of different levels of actors' resilience in marine tourism enterprises, or tourism enterprises more broadly across different socio-economic and governance contexts. This paper is the first attempt to understand the context specificity, as well as the commonalities in the resilience of reef tourism enterprises to disturbances in different governance and socio-economic contexts.

Resilience is closely related to the overlapping concepts of adaptive capacity and vulnerability. Vulnerability is the susceptibility of a system to disturbances and is determined by exposure and sensitivity to perturbations and the capacity to adapt (Adger, 2006; Gallopín, 2006; Nelson et al., 2007). The adaptive capacity of social systems can be defined as the capacity of a system, from the individual to humankind, to increase (or at least maintain) the quality of life of its members (Kinzig et al., 2006; Smit and Wandel,

2006). The determinants of adaptive capacity are both local (e.g. strong social networks) (Hall, 2013) and larger scale (e.g. national socio-economic and governance frameworks) (Smit and Wandel, 2006). The resilience concept incorporates many elements of vulnerability and adaptive capacity (Calgaro et al., 2014; Gallopin, 2006). A resilient community, organisation, or enterprise by definition has the capacity to adapt to the stressors and change it is exposed to, hereby reducing its vulnerability.

2.2. Conceptualising enterprise resilience

A resilient organisation or community is one that is able to maintain and adapt its essential structure, identity, and functioning in the face of crisis and change (Adger, 2000; Cumming et al., 2005; Gunderson and Holling, 2002). The resilience concept implies the existence of two or more alternative states characterised by different structures, functions, and identities (Adger, 2000). Once in an alternative state, return to the earlier state can be made difficult or impossible (Walker and Meyers, 2004). Alternative states exist at different scales. At the scale of a small country, region or destination, an economy may shift between sectors, for example from one based on agricultural production (such as sugar cane) to being based on tourism, or vice versa. Alternatively, an economy may shift within sectors, such as changes in the type of tourism, (e.g. from reef tourism to casino tourism).

At the enterprise scale, an enterprise may shift from a solvent state to an insolvent one, or may switch from reef tourism as its core business to another form of tourism. A resilient reef tourism enterprise is able to maintain or grow its existing level of employment and income and stay operating in reef tourism in the face of crises and change (Biggs, 2011; Biggs et al., 2012b). An enterprise that becomes insolvent, closes down, drastically down-sizes, or substantially shifts its core business away from reef tourism is defined in this study as non-resilient. By focussing on enterprise resilience within the coral reef tourism sector, this study evaluates specified rather than general resilience (Folke et al., 2010).

2.3. Factors that enable enterprise resilience

The factors that confer resilience to enterprises comprise lifestyle values and social, human, financial and natural capital (Biggs, 2011; Biggs et al., 2012a,b). Small and medium-sized tourism entrepreneurs, particularly in non-urban areas, are often driven by lifestyle considerations that change their enterprise's entry and exit characteristics (Ateljevic and Doorne, 2000; Biggs et al., 2012a; Hall and Rusher, 2005). Entrepreneurs and staff are frequently attracted to an area, and want to maintain a desired lifestyle associated with working in that particular location (Ateljevic and Doorne, 2000; Bensemann and Hall, 2010; Roberts and Tribe, 2008). Several studies (Biggs, 2011; Biggs et al., 2012b; Getz and Carlsen, 2005; Lynch et al., 2009) have suggested that owner–operators of lifestyle tourism enterprises can develop an emotional attachment to their businesses and the associated sense of place, identity and lifestyle, making them more reluctant to abandon the enterprise and the location in difficult times thus potentially strengthening their resilience.

Social capital can provide a supporting buffer to enterprises in the face of a crisis (Adger, 2001; Jones, 2005; Norris et al., 2008). The networks of enterprises and individuals that are characterised by shared norms, trust and reciprocity can provide support to enterprises in difficult times and aids in business growth (Cooke, 2007). Social capital includes the capital that exists between the different levels of government and its subjects, between family and friends, and between enterprises, that enables effective

collaboration. Economic relations and actions of enterprises are embedded within social structures of places. There is also growing evidence that high levels of social capital and being embedded in thick networks of social and economic relations, allows greater access to various forms of economic and human capital and imparts higher levels of resilience in the face of external change (Adger, 2001; Forbes et al., 2009; Norris et al., 2008).

Human capital refers to the skill-set and capacity of individuals to respond and adapt to change. Informal enterprises such as longtail boat operators in Thailand usually have lower levels of formal training and managerial skills than larger formal sector commercial enterprises (Main and Dearden, 2007; Smith and Henderson, 2008).

Enterprise age and experience are components of human capital, as older enterprises are more likely to have dealt with crises and change in the past, and have the self-confidence and skills to plan for, and manage future crises (Hall and Williams, 2008). Healthy profits, income levels, and access to finance are integral to enterprise survival and prosperity and represent financial capital.

The conditions of coral reefs that tourists experience are a central element of the natural capital that reef tourism enterprises rely on and which contribute to the attractiveness of a reef tourism destination for lifestyle entrepreneurs and tourists alike. Depending on their knowledge and expectations, tourists appear to be less likely to visit a reef after degradation or coral bleaching and are willing to pay more to experience a reef that is perceived to be more pristine (Kragt et al., 2009; Uyarra et al., 2005).

3. Methods

3.1. Study sites

Phuket, Thailand and Australia's GBR were chosen as study sites because of the contrast of contexts that they present.

3.1.1. Thailand

Thailand is one of the leading tourist destinations of south east Asia. International tourism in Thailand grew from 14.15 million arrivals in 2009 to 26.57 million in 2013, although annual rates of growth showed significant variability over this period ranging from 12.6% for 2010/09 to 20.7% in the following year-on-year period (UNWTO, 2013). Tourism is a major source of foreign exchange and economic development. In 2009 international tourism



Fig. 1. Longtail boats in Phuket. Duan Biggs.

international tourist expenditure was US\$20.6 billion (UNCTAD, 2010) with Tourism accounting for 6.0% of GDP (Tourism Authority of Thailand, 2010). However, Phuket and Thailand have suffered from a number of disasters over the last 15 years, most notably the 2004 tsunami and the political crises of 2008–2009 (Biggs et al., 2012a,b; Cohen and Neal, 2010) and 2013–2014 which have affected tourist arrivals at a national and regional level.

The island province of Phuket is situated in the Andaman Sea and is historically Thailand's main centre for reef and dive tourism. Reef tourism in Phuket grew quickly during the 1980s and 1990s. In 1980, there were fewer than ten commercial dive enterprises in Phuket and by 2002 there were 85 (Main and Dearden, 2007). Phuket still dominates reef tourism in Thailand, although new Thai dive destinations such as Krabi, Koh Tao and Khao Lak have emerged since 2000. Tourism in Phuket is distinctly seasonal, driven by the south-western monsoon which brings rainy, stormy and unpredictable weather from May to late October. Phuket's high season for reef tourism typically falls between October and late April. Many enterprises downsize or close down for the low season.

In Phuket, this study included both formal and informal sector enterprises that operate with longtail boats (Fig. 1). Formal enterprises typically own or have the capacity to lease at least one speed or dive boat, or spaces on these boats. The boats used by formal enterprises can cover substantially greater distances than the boats used by informal enterprises. The majority of formal enterprises have a storefront and numerous agents that they market through, in addition to websites and international marketing networks and travel markets. The informal enterprises base their longtail boats at a range of popular tourist beaches, primarily on Phuket's west coast, and mainly rely on walk-in customers (Biggs et al., 2012a,b). The staff of formal enterprises are mostly able to communicate in one or more international languages (e.g. English, German, Japanese), whereas international language skills are limited among informal enterprises.

3.1.2. Australia's Great Barrier Reef

Australia is a high-income country with good governance and political and socio-economic stability (UNCTAD, 2010). Tourism plays a lesser role in the Australian national economy although it is extremely important for some regional economies (Hall, 2007). Australia received 5.6 million international tourists in 2007 with a total expenditure of US\$29.1 billion (UNCTAD, 2010). This had grown to 6.15 million arrivals by 2012 (UNWTO, 2013). Tourism directly contributes approximately 2.5% of Australia's national GDP (World Travel and Tourism Council, 2013). Expenditure per international tourist is substantively higher in Australia than in Thailand. Although the tourism industry on the GBR has been affected by cyclones and the global financial crisis, the extent of impact on the industry is substantially less than in Phuket (Biggs et al., 2012a,b).

Regarded as one of the world's premier reef tourism destinations, the GBR is located along Australia's tropical north-east coast in the state of Queensland and extends north–south for more than 1200 km (Johnson and Marshall, 2007). The majority of reefs on the GBR lie over 20 km offshore and necessitate the use of well-equipped boats to visit. This study collected data in the Cairns and Whitsundays regions. Since 1994, an average of 88% of tourists who visited the GBR did so in these two regions (GBRMPA, 2010).

3.2. Data collection

The surveys focussed on enterprises whose dominant source of income was derived from taking tourists to dive and snorkel at coral reef attractions. A complete list of all the commercial enterprises that met these criteria was compiled through a combination of

tourism association and conservation agency websites and lists, Google searches, and key informant discussions. A list of 68 formal enterprises was compiled for Phuket and 76 for the GBR. The longtail boat enterprises in Phuket were contacted with the assistance of Thai researchers from Prince of Songkla University and the Phuket Marine and Coastal Resource Conservation Centre. Interviewers visited all the beaches on Phuket's south and west coast where longtail boat enterprises operate. Interviewers visited the beaches until all the informal enterprises present during the time of the data collection in 2009 had been interviewed. In total 48 enterprises on the GBR, 57 longtail boat enterprises, and 46 formal enterprises in Phuket were surveyed.

Surveys were conducted by the primary author (GBR and Phuket's formal sector enterprises) and four Thai research assistants (Phuket's informal sector enterprises). Semi-structured interviews were used – in which interviews had a fixed list of questions, but respondents could provide more detail on any topic if they chose to (Bernard, 2002). The survey was translated into Thai to interview the longtail boat enterprises. The survey tool was piloted by the primary author with enterprises on the GBR (Biggs, 2011). The translated survey tool was piloted by Thai research assistants in Phuket to ensure consistency in response and allow for comparison between the commercial enterprises in Phuket and the enterprises on the GBR. Interviews took between 25 and 90 min to complete due to the differences in the extent of open-ended discussion. All variables were measured on a 5 point Likert scale, other than the response to a crisis scenario which was measured with a binary variable. The Likert scale responses in response to statements were: 1 = strongly disagree, 2 = disagree, 3 = average/indifferent, 4 = agree and 5 = strongly agree.

Data was collected on eight dependent variables, including four measures of perceived resilience and four measures of a perceived lack of resilience. The measures of perceived resilience were: 1) the perceived ability of their enterprises to endure change (labelled: endure change); 2) levels of confidence in their enterprise (labelled: confidence); 3) the perceived levels of enterprise adaptability (labelled: adaptability); and 4) the ability to maintain options within the industry (labelled: options) (Table 1). The measures of a perceived lack of resilience were: whether enterprises were currently looking to close down or exit (labelled: looking to exit); whether life was becoming increasingly difficult (labelled: increasingly difficult); whether interviewers felt that their enterprise was unlikely to survive for much longer (labelled:

Table 1
Measures of perceived enterprise resilience and lack of resilience.

Variable	Variable description
Measures of perceived resilience	
Endure change	There is no reason to believe that foreseeable changes will make my business go under
Confidence	I am confident that things will turn out well for my business in the future
Adaptability	My business is in a better position to adapt to changes and stay in the reef-based tourism sector than others I know
Options	There are many options for my business to adapt to changes and stay working in the reef-based tourism sector
Measures of a perceived lack of resilience	
Looking to exit	I am looking for opportunities to move out of the reef-based tourism sector
Unlikely to survive	I do not think that my enterprise will survive much longer
Increasingly difficult	Life has become increasingly difficult in the reef-based tourism sector
Will exit in a 50% shock	Binary variable of whether respondents indicated their enterprise would exit the reef tourism industry in the face of a 50% reduction in tourist revenue for 12 months

unlikely to survive); and a measure of how they would respond to a crisis (Table 1). Response to a crisis was measured by a binary variable of whether respondents indicated their enterprise would exit the reef tourism industry in the face of a 50% slump (labelled: will exit in a 50% shock) in tourist revenue for 12 months, adapted from Cinner et al. (2009) (Table 1).

In addition, the following factors that were hypothesised to be associated with enterprise resilience were measured: lifestyle values, social capital, human capital, financial capital, and natural capital (Table 2). Lifestyle values were further broken down through questions into three components (Table 2): the extent of the importance of identity (labelled: identity) and attachment (labelled: love) associated with their participation in reef tourism; and the extent to which enterprises felt that knowledge and experiences of coral reefs (labelled: sharing knowledge) delivered lifestyle benefits. Social capital was further broken down, through questions, into three components: the extent to which respondents expected their enterprises to receive support from family and friends (labelled: family support); the government or an NGO (labelled: Gov/NGO support); and through collaboration with competing reef tourism enterprises (labelled: collaboration) during a 50% slump scenario (Table 2). One question was used to elicit enterprises levels of human capital. This question evaluated the confidence of owners and senior managers of enterprises in the ability of their key staff to adapt successfully to future changes. Financial capital (labelled financial capital) was the enterprises average response to four questions establishing levels of revenue, profit, assets to liabilities, and access to finance during a scenario of a 50% slump for 12 months (all measured in a five-point Likert scale) (Table 2) (adapted from Cinner et al. (2009) and others). Finally, natural capital was established from one question asking enterprises about their perception of the condition of the reef/s (labelled reef condition) that they visit with their clients.

Table 2
Factors associated with enterprise resilience.

Hypothesised factors associated with enterprise resilience	
Lifestyle values	
Identity	Working in the reef-based tourism sector is an important part of who I am and how I see myself
Love	I love working in reef-based tourism
Share knowledge	I enjoy working in an industry where I share my knowledge and experiences of the reef and marine environment with others
Social capital	
Family and friends support	The extent of support to your enterprise from your family and friends during a scenario of a 50% slump in tourist revenue for 12 months
Gov/NGO support	The extent of support to your enterprise from government or an NGO during a scenario of a 50% slump in tourist revenue for 12 months
Collaboration	The extent to which increased collaboration with competing reef tourism enterprises enables enterprise survival during a 50% slump scenario.
Other	
Human capital	My business has what it takes to be able to deal with future changes in the reef-based tourism sector
Financial capital	Average score of revenue, profits, assets to liabilities ratio and access to finance in a 50% slump scenario
Natural capital measured through perceived reef condition	What is the current condition of the coral reefs that are the focus of your tourist activities (1 = very bad to 5 = very good)

Note: All variables measured on a 5 point Likert scale (1 = strongly disagree, 2 = disagree, 3 = average/indifferent, 4 = agree, 5 = strongly agree).

3.3. Analysis

A Kruskal Wallis test was used to test whether the three groups of enterprises surveyed had significant differences in the levels of perceived resilience, lack of resilience, and the characteristics hypothesised to be associated with enterprise resilience (lifestyle values and capitals). Monte Carlo significance values were calculated for the Kruskal Wallis test (Field, 2009). Data were normalised in PRIMER to ensure that all the variables were on the same scale. Normalisation was achieved by subtracting the mean of the variable and dividing by the standard deviation. A cluster analysis was conducted to ascertain whether the grouping of resilience and lack of resilience responses were consistent across interviewees (Legendre and Legendre, 1998).

A redundancy analysis (RDA), which effectively visualises a multiple regression, was conducted to see how the factors hypothesised to be associated with resilience were empirically associated with our measures of enterprise resilience, and lack of resilience. A separate RDA analysis was conducted for the Thai longtail boat enterprises, the Thai formal sector enterprises, and the enterprises on Australia's GBR. An RDA analysis was also conducted for all the enterprises together. An RDA analysis looks for associations between groups of variables by combining multiple regression analysis with ordination (Cinner et al., 2011; Legendre and Legendre, 1998). For the analysis, factors associated with resilience were assigned as predictor variables and the response variables were perceived enterprise resilience and perceived lack of enterprise resilience.

4. Results

4.1. Descriptive statistics for measures of enterprise resilience

There was broad similarity in measures of resilience and lack of resilience across the three groups of enterprises. All three groups of enterprises had an average score of above 3 on a five point Likert scale (1 = strongly disagree to 5 = strongly agree) on the measures of resilience, although there were significant differences across the three enterprises in their perceived adaptability.

Overall, 38% of enterprises indicated that they would exit the reef tourism industry when faced with the scenario of a 50% slump

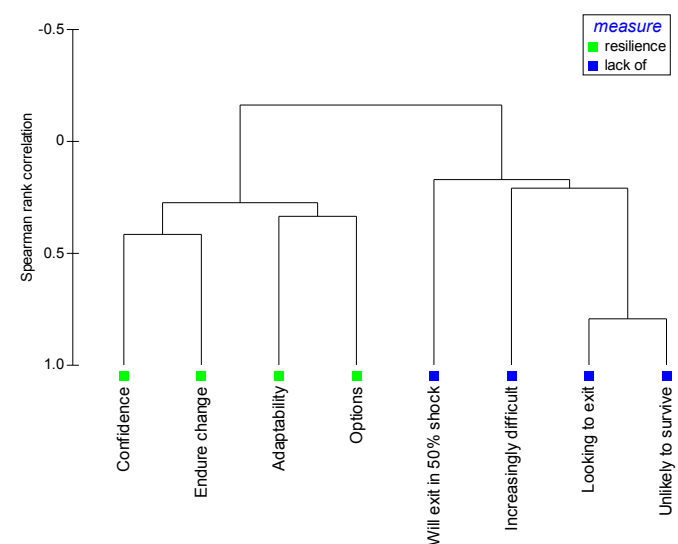


Fig. 2. Cluster analysis. The figure shows how the measures of all enterprise resilience and non-resilience cluster together.

in tourism for 12 months. This result varied between the groups, and only 26% of the Thai longtail boat enterprises and 32% of the Thai formal sector enterprises indicated that they would exit in the face of 50% slump for 12 months. In contrast, 60% of the enterprises on the GBR reported that they would exit reef tourism when presented the scenario of a 50% slump for 12 months. A Spearman rank correlation cluster analysis confirmed the conceptual grouping of the measures used for enterprise resilience and lack of resilience (Fig. 2).

4.2. Results of redundancy analysis: factors associated with enterprise resilience

RDA diagrams are interpreted by the length and direction of the arrows for each of the variables in the diagram (Figs. 3–6). Variables with arrows in the same direction indicate that those variables cluster together (i.e. are associated with each other). The strength of the variable is a combination of the length of the arrow, the angle between the arrow and the axis and the variation explained by that axis. A two dimensional ordination is unlikely to capture all the variation where many variables are represented, the per cent explained by the first and second axis each axis gives us an idea of how much of the total variation is captured in the diagram.

The variables 'identity', 'human capital' and 'Gov/NGO support' are most closely associated with the measures of enterprise resilience among Phuket's longtail boat enterprises (Fig. 3). In particular 'Gov/NGO support', 'human capital' and 'identity' cluster closely with 'endure change', and perceived 'reef condition' clusters together 'adaptability' and 'options'. Fifty three per cent of the variation across all variables is captured by the first canonical (horizontal) axis for the Thai long tail boat enterprises ($p = NS$) (Fig. 3).

'Human capital', 'love', 'reef condition', and two measures of social capital – 'family support' and 'collaboration' – clustered together with three measures of resilience: 'options', 'adaptability', and 'confidence' for Phuket's formal sector enterprises. 'Identity' and 'financial capital' clustered closely with 'endure change'. Fifty per cent of the variation across all variables is captured by the first canonical (horizontal) axis for the Thai formal sector enterprises ($p < 0.05$) (Fig. 4).

'Human capital', 'Gov/NGO support', and 'love' clustered together with the measures of enterprise resilience for enterprises on Australia's GBR (Fig. 5). 'Gov/NGO support' and 'identity' also

Thai Comm, $P = 0.048$, $F = 1.44$, $C1 = 50.1$, $C2 = 18.7$

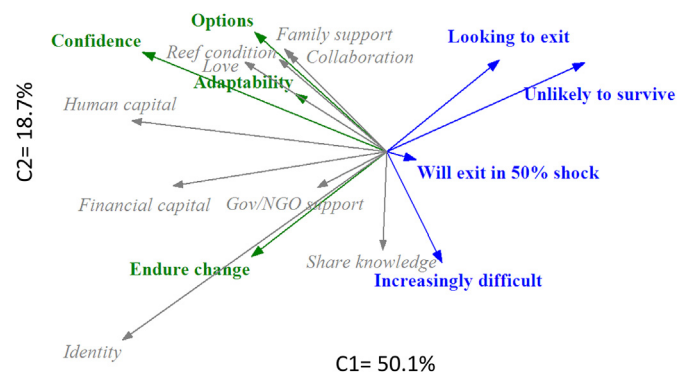


Fig. 4. RDA diagram for Phuket's formal sector enterprises.

GBR, $P = 0.002$, $F = 2.6$, $C1 = 67.7$, $C2 = 11.7$

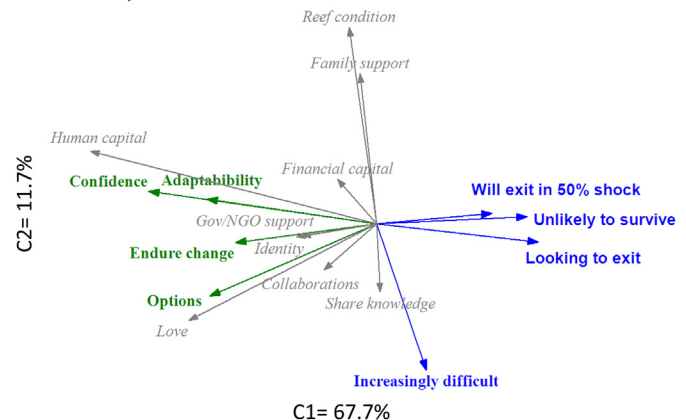


Fig. 5. RDA diagram for enterprises on Australia's GBR.

Thai Long tail, $P = 0.13$, $F = 1.24$, $C1 = 53.5$, $C2 = 16.8$

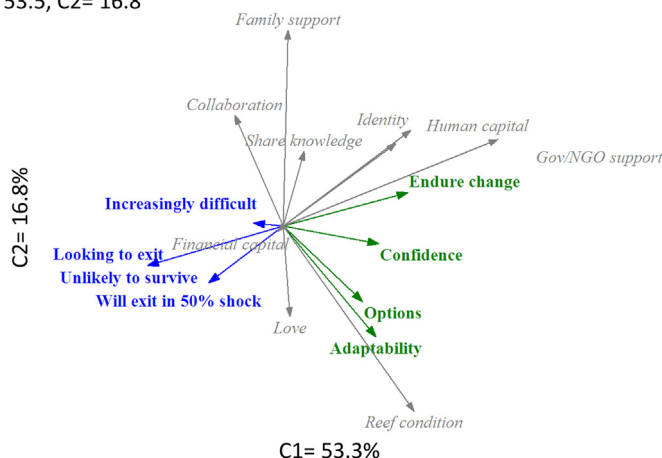


Fig. 3. RDA diagram for Phuket's longtail boat enterprises.

All; $P = 0.002$, $F = 3.02$, $C1 = 65.3$, $C2 = 12.1$

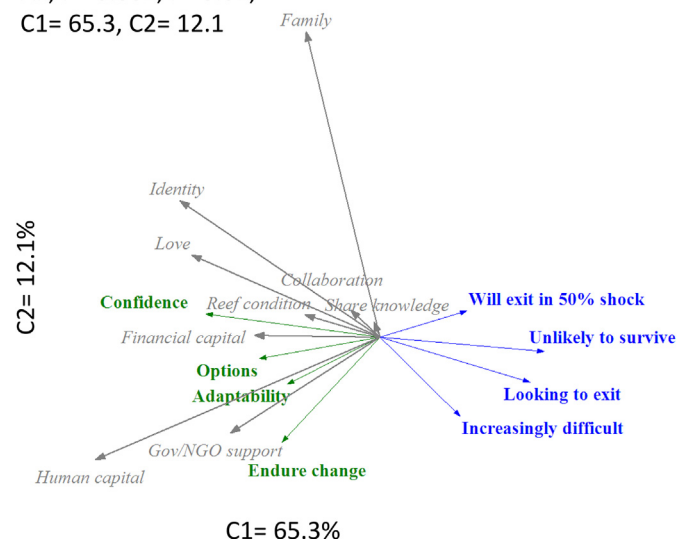


Fig. 6. RDA diagram for all enterprises.

clustered in the same direction as the measures of resilience, but the influence of these two variables was weaker, indicated by the short arrows. Sixty eight per cent of the variation across all variables is captured by the first canonical (horizontal) axis for the GBR commercial enterprises ($p < 0.05$) (Fig. 5).

'Gov/NGO support' and 'human capital' are closely associated with three measures of resilience: 'endure change', 'adaptability', and 'options' across all enterprises (Fig. 6). Financial capital clusters more closely with 'confidence' and 'options'. The lifestyle value measures identity and love are more closely clustered with confidence. Sixty five per cent of the variation across all variables is captured by the first canonical (horizontal) axis for all enterprises ($p < 0.05$) (Fig. 6). Measures of resilience are separated from the measures of lack of resilience along this axis.

5. Discussion

This paper set out to explore the unique and the common characteristics associated with the resilience of three different groups of marine tourism enterprises. Across the three groups of enterprises, the characteristics that are most strongly associated with resilience were different (Figs. 3–5), suggesting that resilience is indeed context dependent. Human capital was the only characteristic strongly associated with resilience across all three enterprises. Overall, human capital, financial capital, the social capital measure of government and NGO support, and the lifestyle values of love and identity, were the characteristics most closely associated with measures of resilience across all three groups of enterprises (Fig. 6). The importance of human capital for enterprise success is widely recognised in the literature on enterprise success (Becken, 2013; Bosma et al., 2004). Enterprises with higher human capital and characteristics such as stronger managerial skills and with a greater age and experience are more likely to have dealt with crises in the past and have the skills to cope with future crises (Hall and Williams, 2008).

There are also differing levels of resilience between the three groups of enterprises. A lower proportion of longtail boat enterprises and commercial enterprises in Phuket, are likely to exit the reef tourism industry when faced with a scenario of 50% slump than enterprises in Queensland. This is probably because enterprises in Thailand have suffered a number of crises approaching a 50% slump over the past decade (Cohen and Neal, 2010). Conversely, enterprises on the GBR have not suffered similar levels of decline since an airline strike in 1989 and the collapse of Ansett Airlines in 2001 (Leiper, 2002). The prospect of such a crisis is therefore more daunting. The importance of past experience in dealing with crises for building resilience to future crises is well established in the broader literature (Folke, 2004; Norris et al., 2008; Wybo, 2004). There is also the possibility that in Thailand, enterprises that are less able to deal with crises have already closed down. In addition, in a well-recognised characteristic of informal businesses (Williams and Nadin, 2010), the entrepreneurial longtail boat enterprises with their more flexible organisational forms are able to switch to alternative income streams or subsistence during a crisis to enable their survival (Biggs et al., 2012a,b). This can also include new forms of formal–informal firm relationships that can support more formal businesses by keeping costs down while maintaining quality (Blunch et al., 2001).

Lifestyle values are important for the resilience of enterprises on the GBR, and in the formal and informal sector enterprises in Phuket. Entrepreneurs driven by lifestyle motivations appear more willing to absorb and tolerate poor financial performance and accept a greater degree of risk (Getz, 2004; Hall and Rusher, 2005). Some lifestyle entrepreneurs operate on the verge of bankruptcy, content with a modest revenue and profit margin associated with

living a chosen lifestyle (Ateljevic, 2007). However, the majority of studies on the lifestyle associated motivations of tourism entrepreneurs come from high-income countries (Carlsen et al., 2008) and there is only a sparse literature on informal tourism enterprises in low and middle-income countries. Participation in the informal tourism economy is often viewed externally as a livelihood option of last resort (Aguilar and Campuzano, 2009). Yet, studies of informal businesses in both high (Bensemann and Hall, 2010; Hall and Rusher, 2005) and low-income countries (Minard, 2009; Varcin, 2000) have shown the importance of social capital and lifestyle motivations in business and entrepreneurial decision-making (Godfrey, 2011). This paper shows that lifestyle and social values are also important motivating factor for informal reef tourism enterprises and contribute to enterprise resilience.

Reef condition is associated with the measures of resilience for Phuket's longtail boat enterprises and commercial enterprises in Phuket, but not for enterprises on the GBR. The lack of importance of reef condition to enterprise resilience on the GBR is possibly because all enterprises on the GBR have access to healthy reefs. According to the ecological literature, coral reefs on the GBR are in better condition than the reefs around Phuket (Wilkinson, 2008).

A number of studies show a lower willingness to visit reefs, and decreased revenue from tourism to reefs, following bleaching and degradation (Uyerra et al., 2005). However, tourists who visit a reef site, before and after degradation, are still willing to visit, and tourists are often unaware that a reef is bleached or ecologically degraded (Gössling et al., 2007; Uyerra et al., 2009). However, more research is needed that investigates how ecologically measured and perceived reef condition affects tourist behaviour and demand and the mediating role marketing may play in this relationship (Scott et al., 2012).

Furthermore, the importance of healthy reefs to tourists may differ between Phuket's longtail boats and formal sector enterprises in Thailand and Australia. The longtail boat enterprises are restricted to reefs accessible from Phuket; therefore, the ecological condition of the reefs they can access is likely to be poorer given higher use levels and closer proximity to coastal development and pollution. However, the experienced and special interest clientele who aim to visit the sites with the best reef condition, are less likely to patronise longtail boats because of their a-priori knowledge of the more distant reefs they want to visit. It is likely therefore, that longtail boat enterprises have clientele who are willing to visit closer reefs with higher levels of human impact and reef degradation (see Leujak and Ormond (2007) for an Egyptian example of this phenomena).

Government and NGO support feature most strongly as part of the resilience cluster for longtail boat enterprises (Fig. 4). This is striking because informal sector enterprises, such as longtail boats, are generally viewed to have limited access to government support (Aguilar and Campuzano, 2009). The low expectation of government support among Phuket's commercial enterprises (see S1), together with the clustering of government support with the resilience measures in the RDA plot (Fig. 4), suggests that the lack of government support may be a key constraint to enterprise response to crisis recovery. The higher expectation of government support by enterprises in a crisis on the GBR is in keeping with the nature of governance and government intervention in Australia and a history of support to tourism enterprises during crises (Hall, 2007).

The RDA plot for Phuket's longtail boat enterprises (Fig. 3) shows that support from family and friends during a crisis clusters further away from the measures of resilience. This contrasts with the widely held notion that social capital in the form of support from family and kinship networks is important for informal sector enterprises (Rogerson, 2005). However, if one considers that longtail boat enterprise owners may be part of the wealthier segments of

their community and families, they may be seen as providers of support to their families and kinship networks rather than receivers. Thus, the longtail boat enterprise owners and staff may be supported with food and shelter if their enterprise has to shut down, but they may be able to garner only limited support towards the survival of their enterprise. The role of the support from family and friends in enterprise resilience is another indication of the extent to which economic relations and actions are embedded within the social structures of places (Granovetter, 1985).

Phuket's commercial enterprises are the only group of businesses where collaboration with other reef tourism enterprises during a crisis is associated with the measures of resilience (Fig. 5). Indeed, among Thai longtail boat enterprises it is more closely associated with a lack of resilience (Fig. 3). This reflects a competitive environment in which some enterprises may only collaborate as a last resort to prevent bankruptcy or closing down. Collaboration between businesses takes place for a variety of reasons, crises have been identified as one such impetus (Racherla and Hu, 2009; Slywotzky and Hoban, 2007) as well as social embeddedness, including family ties and religion (Varcin, 2000). The importance of collaboration to the resilience of the Thai formal sector enterprises is perhaps an indication of the pressure that this group of enterprises is under following the 2004 tsunami and the various Thai political crises. Research on collaboration and dealing with crises suggests that when conditions become really difficult, individuals and groups can find ways of working together that seemed difficult or impossible prior to the crisis (Ritchie, 2008). The crises that Phuket's commercial enterprises have suffered from, may therefore have led to innovation in the form of collaboration with respect to boat access.

Financial capital is strongly associated with the measures of resilience only among Phuket's commercial enterprises (Fig. 4). The weak association of financial capital with the resilience variables on the GBR, suggests that decisions to stay in the reef tourism industry on the GBR may be driven more by lifestyle motivations (see lifestyle discussion above, Fig. 6). The longtail boat enterprises score the highest on financial capital during a crisis scenario (see S1), which may be because a large drop in income for an extended period of time is less problematic than for larger commercial enterprises. Informal enterprises, such as longtail boat enterprises, have lower levels of capitalisation and exposure to financial risk and therefore potentially possess the ability to survive without a steady flow of income for long periods of time (Biggs et al., 2012b). In addition, because of their business structures the flexibility of informal enterprises means they can more easily switch to alternative sources of income or activities such as subsistence fishing. Indeed, it is becoming increasingly recognised that it is the flexible informal internal arrangements atypical of formal normative organisational and administrative procedures that allow informal enterprises to react to rapid changes in the business environment (Chen, 2012). In seeking to gain better understandings of organisational resilience researchers need to decipher the informal–formal bundles of varied arrangements and elements, from which most effective organisational configurations may be chosen, rather than rely solely on the highly-structured formal businesses that are the most researched in management studies (Godfrey, 2011).

6. Conclusions and recommendations

This paper is the first to explore the commonalities and contrasts between the factors that are associated with the resilience of marine tourism enterprises in three different contexts of the vulnerable reef tourism sector. Human capital and lifestyle values of love and identity are closely associated with the resilience of all

enterprises. The paper also reinforces the importance of understanding the social ties and social and economic resources available to businesses and entrepreneurs. The importance of lifestyle benefits to the resilience of informal tourism enterprises has received little attention in the literature and this study makes a novel contribution in this regard. This research makes an exploratory start to describing the context specificity, but also the commonalities of the responses of reef tourism enterprises to crises.

The most significant finding from this study is that lifestyle values are important for the resilience of all three groups of enterprises. Hence, government support of enterprises during times of crisis should recognise the importance of lifestyle values because individuals will respond differently to policy, economic and environmental change, if their participation in an industry and their relationship to place delivers high lifestyle benefits (Biggs et al., 2012b; Calgaro et al., 2014; Getz, 2004; Hall and Rusher, 2005). For the individuals that own or work in Phuket's longtail boat enterprises for example, government and NGOs are likely to have greater success supporting enterprises to stay in the reef tourism industry in difficult times than trying to support individuals to switch to alternative occupations that deliver lower lifestyle benefits. Moreover, the authorities responsible for regulating reef tourism should carefully consider the potential impact of new and existing regulations on the lifestyle benefits that accrue to enterprises (Biggs, 2011). A policy or tax that reduces the lifestyle benefits that enterprise owners and staff experience may unintentionally undermine the resilience of reef tourism enterprises.

Government and tourism authorities should ensure that regulations and norms should not unnecessarily restrict enterprise capacity to adapt to change (Hillmer-Pegram, 2013). Enterprises should have the flexibility to cut costs and streamline their activities, and regulatory and governance processes should support this (Biggs, 2011). In addition, small enterprises should be able to close down temporarily and re-open later when conditions improve, with minimal transaction costs and barriers to entry and exit (Ayyagari et al., 2007). This flexibility will enable enterprises to adapt to sudden changes in the business environment (Minard, 2009).

The importance of human capital to enterprise resilience suggests that policies that enable enterprises to strengthen their levels of human capital may enhance enterprise resilience. For example, growth of human capital in reef tourism can be supported by a simple, fast, and easy process for enterprises to apply for and obtain work permits for skilled workers. Government schemes to support skills development and financial access are also just as important to informal enterprises as they are to enterprises in the formal sector.

In addition, governments and tourism bodies can play a key role in supporting enterprise resilience by seeking to influence the perceptions of potential tourists through marketing campaigns and educational programmes. Such activities were particularly important during and after crises such as the 2004 tsunami and the 2008 political crisis in Thailand (Cohen and Neal, 2010). Larger enterprises have a greater capacity to promote their businesses on a global stage, whereas smaller enterprises, and informal enterprises in particular, have a very limited global marketing reach (Main and Dearden, 2007). Enterprises without established global marketing networks, or well-developed networks of direct client contact, are dependent on the perceptions of prospective tourists from other parts of the world that may be far-removed from the realities of the on-site tourist experience. Thus, there is a clear and important role for government and tourism bodies to support enterprise resilience through coordinated marketing efforts to manage the negative perceptions associated with crises.

This study is a starting point for further research on the resilience, vulnerability and adaptive capacity of nature-based marine

tourism enterprises. The findings presented in this paper are a basis for policy-makers and researchers to actively consider the importance of lifestyle and social dimensions of marine tourism enterprises as a major factor in coastal destination resilience. Finally, the commonalities and differences in the factors associated with enterprise resilience in different contexts reinforces the importance of the refined understanding and management of marine tourism enterprises in different settings. The nuanced management and support of marine tourism enterprises will be essential for this sector to continue to play an important role in the non-extractive use of marine biodiversity to provide economic benefits to coastal societies.

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Appendix A. Supplementary data

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References

- Adger, W.N., 2000. Social and ecological resilience: are they related? *Prog. Hum. Geogr.* 24, 347–364.
- Adger, W.N., 2001. Advancing a political ecology of global environmental discourses. *Dev. Change* 32, 681–715.
- Adger, W.N., 2006. Vulnerability. *Glob. Environ. Change* 16, 268–281.
- Aguilar, A.G., Campuzano, E.P., 2009. Informal sector. In: Kithcin, R., Thrift, N. (Eds.), *International Encyclopedia of Human Geography*. Elsevier, Amsterdam, pp. 446–453.
- Ateljevic, I., Doorne, S., 2000. “Staying within the fence” Lifestyle entrepreneurship in tourism. *J. Sustain. Tour.* 8, 378–392.
- Ateljevic, J., 2007. Small tourism firms and management practices in New Zealand: the Centre Stage Macro Region. *Tour. Manag.* 28, 307–316.
- Ayyagari, M., Beck, T., Demircig-Kunt, A., 2007. Small and medium enterprises across the Globe. *Small Bus. Econ.* 29, 415–434.
- Baker, K., Coulter, A., 2007. Terrorism and tourism: the vulnerability of beach vendors’ livelihoods in Bali. *J. Sustain. Tour.* 15, 249–265.
- Balint, P.J., Mashinya, J., 2006. The decline of a model community-based conservation project: governance, capacity, and devolution in Mahenye, Zimbabwe. *Geoforum* 37, 805–815.
- Becken, S., 2013. Developing a framework for assessing resilience of tourism sub-systems to climatic factors. *Ann. Tour. Res.* 43, 506–528.
- Benemann, J., Hall, C.M., 2010. Copreneurship in rural tourism: exploring women’s experiences. *Int. J. Gend. Entrepreneursh.* 2, 228–244.
- Berkes, F., Folke, C., 2000. Linking social and ecological systems for resilience and sustainability. In: Berkes, F., Folke, C. (Eds.), *Linking Social and Ecological Systems: Management Practices and Social Mechanisms*. Cambridge University Press, Cambridge, pp. 1–26.
- Bernard, H.R., 2002. *Research Methods in Anthropology. Qualitative and Quantitative Approaches*, third ed. Altamira Press.
- Biggs, D., 2011. Understanding resilience in a vulnerable industry – the case of reef tourism on Australia’s Great Barrier Reef. *Ecol. Soc.* 16, 30. Available online: <http://www.ecologyandsociety.org/vol16/iss31/art30/>.
- Biggs, D., Ban, N.C., Hall, C.M., 2012a. Lifestyle values, resilience, and nature-based tourism’s contribution to conservation on Australia’s Great Barrier Reef. *Environ. Conserv.* 39, 370–379.
- Biggs, D., Biggs, R., Dakos, V., Scholes, R.J., Schoon, M., 2011. Are we entering an Era of concatenated global crises? *Ecol. Soc.* 16. Available online: <http://www.ecologyandsociety.org/vol16/iss2/art27/ES-2011-4079.pdf>.
- Biggs, D., Hall, C.M., Stoeckl, N., 2012b. The resilience of formal and informal tourism enterprises to disasters: reef tourism in Phuket, Thailand. *J. Sustain. Tour.* 20, 645–665.
- Bischof, B.G., 2010. Negotiating uncertainty: framing attitudes, prioritizing issues, and finding consensus in the coral reef environment management “crisis”. *Ocean Coast. Manag.* 53, 597–614.
- Blunch, N., Canagarajah, S., Raju, D., 2001. *The Informal Sector Revisited: a Synthesis Across Space and Time*. World Bank Social Protection Discussion Paper Series, No. 0119. World Bank, Washington DC.
- Bosma, N., van Praag, M., Thurik, R., de Wit, G., 2004. The value of human and social capital investments for the business performance of startups. *Small Bus. Econ.* 23, 227–236.
- Calgario, E., Lloyd, K., Dominey-Howes, D., 2014. From vulnerability to transformation: a framework for assessing the vulnerability and resilience of tourism destinations. *J. Sustain. Tour.* 22, 341–360.
- Carlsen, J., Morrison, A., Weber, P., 2008. Lifestyle oriented small tourism firms. *Tour. Recreat. Res.* 33, 255–263.
- Chen, M.A., 2012. *The Informal Economy: Definitions, Theories and Policies*. WIEGO Working Paper No. 1. WIEGO, Cambridge, MA.
- Cinner, J.E., Daw, T., McClanahan, T.R., 2009. Socioeconomic factors that affect artisanal fishers’ readiness to exit a declining fishery. *Conserv. Biol.* 23, 124–130.
- Cinner, J.E., Folke, C., Daw, T., Hicks, C.C., 2011. Responding to change: using scenarios to understand how socioeconomic factors may influence amplifying or dampening exploitation feedbacks among Tanzanian fishers. *Glob. Environ. Change* 21, 7–12.
- Cochrane, J., 2010. The sphere of tourism resilience. *Tour. Recreat. Res.* 35, 173–186.
- Cooke, P., 2007. Social capital, embeddedness, and market interactions: an analysis of firm performance in UK regions. *Rev. Soc. Econ.* 65, 79–106.
- Cohen, E., Neal, M., 2010. Coinciding crises and tourism in contemporary Thailand. *Curr. Issues Tour.* 13, 455–475.
- Cumming, G.S., Barnes, G., Perz, S., Schmink, M., Sieving, K., Southworth, J., Binford, M., Holt, R.D., Stickler, C., Van Holt, T., 2005. An exploratory framework for the empirical measurement of resilience. *Ecosystems* 8, 975–987.
- Dawson, J., Maher, P., Slocombe, S., 2007. Climate change, Marine tourism, and sustainability in the Canadian Arctic: contributions from systems and complexity approaches. *Tour. Mar. Environ.* 4, 69–83.
- Farrell, B.H., Twining-Ward, L., 2004. Reconceptualising tourism. *Ann. Tour. Res.* 31, 274–295.
- Field, A., 2009. *Discovering Statistics Using SPSS*, third ed. SAGE Publications.
- Folke, C., 2004. Social-ecological resilience and behavioural responses. In: Biel, A., Hansson, B., Martensson, M. (Eds.), *Individual and Structural Determinants of Environmental Practice*. Ashgate, Aldershot, pp. 226–287.
- Folke, C., 2006. Resilience: the emergence of a perspective for social-ecological systems analyses. *Glob. Environ. Change* 16, 253–267.
- Folke, C., Carpenter, S.R., Walker, B., Scheffer, M., Chapin, T., Rockstrom, J., 2010. Resilience thinking: integrating resilience, adaptability and transformability. *Ecol. Soc.* 15.
- Forbes, B.C., Stammer, F., Kumpula, T., Meschtyb, N., Pajunen, A., Kaarlejärvi, E., 2009. High resilience in the Yamal-Nenets social-ecological system, west Siberian Arctic, Russia. *Proc. Natl. Acad. Sci.* 106, 22041–22048.
- Gallop, G.C., 2006. Linkages between vulnerability, resilience, and adaptive capacity. *Glob. Environ. Change* 16, 293–303.
- GBRMPA, 2010. Number of Tourists Visiting the Great Barrier Reef Marine Park. Great Barrier Reef Marine Park Authority.
- Getz, D., 2004. *The Family Business in Tourism and Hospitality*. CABI Publishing, Oxfordshire, UK.
- Getz, D., Carlsen, J., 2005. Family business in tourism: state of the Art. *Ann. Tour. Res.* 32, 237–258.
- Godfrey, P.C., 2011. Toward a theory of the informal economy. *Acad. Manag. Ann.* 5, 231–277.
- Gössling, S., Hall, C.M., 2006. *Tourism & Global Environmental Change*. Routledge, London.
- Gössling, S., Hall, C.M., Weaver, D., 2009. *Sustainable Tourism Futures: Perspectives on Systems, Restructuring and Innovations*. Routledge, New York.
- Gössling, S., Lindén, O., Helmersson, J., Liljenberg, J., Quarm, S., 2007. Diving and global environmental change: a Mauritius case study. In: Garrod, B., Gössling, S. (Eds.), *New Frontiers in Marine Tourism: Diving Experiences, Management and Sustainability*. Elsevier, Amsterdam, pp. 115–136.
- Granovetter, M., 1985. Economic action and social structure: the problem of embeddedness. *Am. J. Sociol.* 91, 481–493.
- Gunderson, L., Holling, C., 2002. *Panarchy: Understanding Transformations in Human and Natural Systems*. Island Press, Washington DC.
- Hall, C.M., 2007. *Introduction to Tourism in Australia: Development, Issues and Change*, fifth ed. Pearson, Frenchs Forest.
- Hall, C.M., 2008. *Tourism Planning: Policies, Processes and Relationships*. Prentice Hall, Harlow.
- Hall, C.M., 2010. Crisis events in tourism: subjects of crisis in tourism. *Curr. Issues Tour.* 13, 401–417.
- Hall, C.M., 2013. Climate change and human security: the individual and community response. In: Redclift, M., Grasso, M. (Eds.), *Handbook on Climate Change and Human Security*. Edward Elgar, Cheltenham.
- Hall, C.M., Rusher, K., 2005. Entrepreneurial characteristics and issues in the small-scale accommodation sector in New Zealand. In: Jones, E., Haven-Tang, C. (Eds.), *Tourism SMEs, Service Quality and Destination Competitiveness: International Perspectives*. CABI, Wallingford.
- Hall, C.M., Timothy, D., Duval, D., 2004. *Safety and Security in Tourism: Relationships, Management and Marketing*. Haworth Press, New York.
- Hall, C.M., Williams, A., 2008. *Tourism and Innovation*. Routledge, London.
- Hillmer-Pegram, K.C., 2013. Understanding the resilience of dive tourism to complex change. *Tour. Geogr.* <http://dx.doi.org/10.1080/14616688.2013.851268>.
- Hoffmann, V.H., Sprengel, D.C., Ziegler, A., Kolb, M., Abegg, B., 2009. Determinants of corporate adaptation to climate change in winter tourism: an econometric analysis. *Glob. Environ. Change* 19, 256–264.
- Holling, C.S., 1973. Resilience and stability of ecological systems. *Annu. Rev. Ecol. Syst.* 4, 1–24.
- Hughes, T.P., Graham, N.A.J., Jackson, J.B.C., Mumby, P.J., Steneck, R.S., 2010. Rising to the challenge of sustaining coral reef resilience. *Trends Ecol. Evol.* 25, 633–642.
- Jones, S., 2005. Community-based ecotourism: the significance of social capital. *Ann. Tour. Res.* 32, 303–324.

- Johnson, J.E., Marshall, P.A., 2007. Climate Change and the Great Barrier Reef: a Vulnerability Assessment. Great Barrier Reef Marine Park Authority, Townsville, Australia.
- Kinzig, A.P., Ryan, P., Etienne, M., Allison, H., Elmqvist, T., Walker, B.H., 2006. Resilience and regime shifts: assessing cascading effects. *Ecol. Soc.* 11, 20. Available online: <http://www.ecologyandsociety.org/vol11/iss1/art20/>.
- Kragt, M.E., Roebeling, P.C., Ruijs, A., 2009. Effects of Great Barrier Reef degradation on recreational reef-trip demand: a contingent behaviour approach. *Aust. J. Agric. Resour. Econ.* 53, 213–229.
- Kuo, H.-I., Chen, C.-C., Tseng, W.-C., Ju, L.-F., Huang, B.-W., 2008. Assessing impacts of SARS and Avian Flu on international tourism demand to Asia. *Tour. Manag.* 29, 917–928.
- Lean, H.H., Smyth, R., 2009. Asian financial crisis, Avian Flu and Terrorist threats: are shocks to Malaysian tourist arrivals permanent or transitory? *Asia Pac. J. Tour. Res.* 14, 301–321.
- Legendre, P., Legendre, L., 1998. *Numerical Ecology*, second english ed. Elsevier.
- Leiper, N., 2002. Why Ansett Airlines failed and how to prevent it happening again. *Curr. Issues Tour.* 5, 134–148.
- Leujak, W., Ormond, R., 2007. Visitor perceptions and the shifting social carrying capacity of south Sinai's coral reefs. *Environ. Manag.* 39, 472–489.
- Lynch, P., McIntosh, A., Tucker, H., 2009. *The Commercial Home*. Routledge, London.
- Main, M.A., Dearden, P., 2007. Tsunami impacts on Phuket's diving industry: geographical implications for marine conservation. *Coast. Manag.* 35, 467–481.
- Marshall, N.A., 2010. Understanding social resilience to climate variability in primary enterprises and industries. *Glob. Environ. Change* 20, 36–43.
- Marshall, N.A., Marshall, P.A., Abdulla, A., Roupahel, T., Amr, A., 2010. Preparing for climate change: recognising its early impacts through the perceptions of dive tourists and dive operators in the Egyptian Red Sea. *Curr. Issues Tour.* 13, 1–12.
- Minard, C.S.L., 2009. Valuing entrepreneurship in the informal economy in Senegal. *Soc. Enterp. J.* 5, 186–209.
- Nassar, M.A., 2012. Political unrest costs Egyptian tourism dearly: an ethnographical study. *Int. Bus. Res.* 5, 166–174.
- Nelson, D.R., Adger, W.N., Brown, K., 2007. Adaptation to environmental change: contributions of a resilience framework. *Annu. Rev. Environ. Resour.* 32, 395–419.
- Norris, F.H., Stevens, S.P., Pfefferbaum, B., Wyche, K.F., Pfefferbaum, R.L., 2008. Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *Am. J. Community Psychol.* 41, 127–150.
- Nunn, P.D., 2009. Responding to the challenges of climate change in the Pacific Islands: management and technological imperatives. *Clim. Res.* 40, 211–231.
- Orams, M., Lück, M., 2014. Coastal and marine tourism: emerging issues, future trends, and research priorities. In: Lew, A., Hall, C.M., Williams, A. (Eds.), *The Wiley Blackwell Companion to Tourism*. John Wiley & Sons, Chichester.
- Ostrom, E., Janssen, M.A., Anderies, J.M., 2007. Going beyond panaceas. *Proc. Natl. Acad. Sci.* 104, 15176–15178.
- Prideaux, B., Coghlan, A., Falco-Mammone, F., 2008. Post crisis recovery. *J. Travel Tour. Mark.* 23, 163–174.
- Racherla, P., Hu, C., 2009. A framework for knowledge-based crisis management in the hospitality and tourism industry. *Cornell Hosp. Q.* 50, 561–577.
- Ritchie, B., 2008. Tourism disaster planning and management: from response and recovery to reduction and readiness. *Curr. Issues Tour.* 11, 315–348.
- Ritchie, B., Mair, J., Walters, G., 2014. Tourism crises and disasters: moving the research agenda forward. In: Lew, A., Hall, C.M., Williams, A. (Eds.), *The Wiley Blackwell Companion to Tourism*. John Wiley & Sons, Chichester.
- Roberts, S., Tribe, J., 2008. Sustainability indicators for small tourism enterprises – an exploratory perspective. *J. Sustain. Tour.* 16, 575–594.
- Rogerson, C., 2005. Unpacking tourism SMMEs in South Africa: structure, support needs and policy response. *Dev. S. Afr.* 22, 623–642.
- Ruiz-Ballesteros, E., 2010. Social-ecological resilience and community-based tourism an approach from Agua Blanca, Ecuador. *Tour. Manag.* 32, 655–666.
- Sausmarez, N.d., 2007. Crisis management, tourism and sustainability: the role of indicators. *J. Sustain. Tour.* 15, 700–714.
- Scott, D., Gössling, S., Hall, C.M., 2012. *Tourism and Climate Change: Impacts, Adaptation and Mitigation*. Routledge, London.
- Simpson, M.C., Gössling, S., Scott, D., Hall, M.C., Gladin, E., 2008. *Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices*. UNEP, University of Oxford, UNWTO, WMO, Paris, France.
- Slywotzky, A., Hoban, C., 2007. Stop competing yourself to death: strategic collaboration among rivals. *J. Bus. Strategy* 28, 45–55.
- Smit, B., Wandel, J., 2006. Adaptation, adaptive capacity and vulnerability. *Glob. Environ. Change* 16, 282–292.
- Smith, R.A., Henderson, J.C., 2008. Integrated beach resorts, informal tourism commerce and the 2004 Tsunami: Laguna Phuket in Thailand. *Int. J. Tour. Res.* 10, 271–282.
- Strickland-Munro, J.K., Allison, H.E., Moore, S.A., 2010. Using resilience concepts to investigate the impacts of protected area tourism on communities. *Ann. Tour. Res.* 37, 499–519.
- UNWTO, 2013. *Tourism Highlights*. UNWTO, Madrid.
- Uyarra, M., Watkinson, A., Côté, I., 2009. Managing dive tourism for the sustainable use of coral Reefs: validating diver perceptions of attractive site features. *Environ. Manag.* 43, 1–16.
- Uyarra, M.C., Cote, I.M., Gill, J.A., Tinch, R.R.T., Viner, D., Watkinson, A.R., 2005. Island-specific preferences of tourists for environmental features: implications of climate change for tourism-dependent states. *Environ. Conserv.* 32, 11–19.
- Varcin, R., 2000. Competition in the informal sector of the economy: the case of market traders in Turkey. *Int. J. Sociol. Soc. Policy* 20, 5–33.
- Walker, B., Meyers, J.A., 2004. Thresholds in ecological and social-ecological systems: a developing database. *Ecol. Soc.* 9.
- Wilkinson, C., 2008. *Status of Coral Reefs of the World: 2008*. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia.
- Williams, C.C., Nadin, S., 2010. Entrepreneurship and the informal economy: an overview. *J. Dev. Entrepreneursh.* 15, 361–378.
- World Travel and Tourism Council, 2013. *Travel & Tourism Economic Impact Australia 2013*. WTTC, London.
- Wybo, J.-L., 2004. Mastering risks of damage and risks of crisis: the role of organisational learning. *Int. J. Emerg. Manag.* 2, 22–34.