CLIMATE CHANGE AND TOURISM ADAPTATION: LITERATURE REVIEW

Review

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Abstract
Purpose – This paper reviews published English literature on tourism adaptation to climate change. Climate change remains a challenge in the 21st centaury and beyond. Climate sensitive industries like tourism are vulnerable to climate change. It is for this reason that tourism researchers have continued to explore the relationship between tourism and climate change and further explored response strategies among tourism stakeholders. Tourism research on climate change adaptation may be traces way back in the 1960s. However, focused research on climate change and tourism has emerged in the last 15 years.
Design – This review maps tourism adaptation knowledge domains between early1960s and 2014.
Methodology – This paper rely on secondary English published tourism literature to aid the review
Findings – Findings indicate that tourism adaptation literature have advanced under five thematic areas prior 2010 to include: Business adaptation; Consumer adaptation, Destination Adaptation; adaptation Policy and; Frameworks for adaptation. However, after 2010 a new theme on 'sustainable adaptation' is tourism has emerged and it is gaining attention among tourism researchers
Originality – The originality of this paper is that the paper is the first paper in tourism that has identified sustainable adaptation as a new emerging thematic area in tourism and climate change adaptation research. The paper notes an emergence of interest on sustainable adaptation knowledge domain despite lack of clarity on what is sustainable adaptation within tourism research. It is therefore important for researchers to amicably define the term sustainable adaptation to enable comparative studies and discourse in the area.
Keywords Climate Change, Tourism, Adaptation, Sustainable Adaptation

INTRODUCTION

The relationship between climate change and tourism has been discussed in earlier literature/studies tracing way back 1960s (Scott et al., 2012). However more focused research has emerged in the last 15 years (Kaján & Saarinen, 2013). This literature review aims at fulfilling two objectives. First, is to trace key research and the direction of the discourse on adaptation in climate change and tourism nexus. Secondly is to put this piece of work in the wider context of climate change and tourism research in order to demonstrate the contribution of this research in building literature in the field.

Earliest tourism and recreational climatology can be traced from the 1960s; 5 decades ago. The period between 1960 and 1970 which lamb refers to as 'climate revolution' saw a massive investment into science and research in the area of climate and weather forecasting in order to inform human social economic activities especially in planning (Lamb, 2002). Climate revolution was as a result of long-term US government investment into metrology and climate research. Technological advancement in radar technology, satellites, communication and computer systems aided in climate recording, modeling, forecasting and reporting of climate data. The advancement of metrological and climatology enabled man to understand the relationship between climate and social economic conditions and enabled him to use climate information in planning (Scott et al., 2012). Climate information use in modern society is undisputed as it is evident in operational use in nearly all sectors and industries (Krauss & Storch, 2012) e.g. in agriculture, climate information is crucial in planning for planting and harvesting times, in transport systems management and close home in travel decision making.

It is said that tourism and climate change research began in the 1960s where weather and climate research emerged. This period has been regarded as 'formative phase' which lasted until late 1970s as noted by Scott et al., (2005) (cited in Scott et al., 2012).

Early research indicates how important climate information became an important element in decision making. This marked earliest tourism research interest in understanding the importance of weather in decision making and how it affected demand for travel as indicated by research done in the 1960s throughout late 1970s by Mandauer, (1970) (as cited in Scott et al., 2012, p. 60). Mandauer attempted to establish the 'Value of weather' in the view that tourists are climate sensitive and he wondered how a destination would be affected by the weather in the tourist place origin.

The next decade of 1980s saw an extremely low publication of research on climate change and tourism. Scott, *et al., (*2005) describes the 1980s as a 'period of stagnation' in tourism climate research attributed by varied reasons ranging from lack of interest among tourism researchers and lack of acknowledgement of anthropogenic cause of climate change. However, in the same decade, an important text on climate change and tourism was the work of Wall et al., (1986) (cited in Kaján & Saarinen, (2013). Later towards the end of the decade and in the 1990s anthropogenic climate change was acknowledged. This led to a 'renewed interest' among tourism researchers who were keen to understand how climate change would affect the tourism industry (Scott et al., 2012). Despite these 'renewed interest' in 1990s there were still scarce research output (Smith, 1993) and the nexus between climate and tourism remained understudied (Perry, 1997).

Early research on tourism and climate change nexus include the work of smith (1990) who lamented that the 'degree of consumer satisfaction and even the level of safety in some environments are likely to change. In his view winter sport and coastal tourism infrastructure would be affected directly by global warming and sea level rise (Smith, 1990).

The year 2000 and beyond marked the takeoff for tourism and climate research. (Scott et al., 2012) regards this period as the 'turning point' for tourism and climate research. This saw an increase in volume of publications across the globe. Following this 'takeoff' earlier researcher saw the need for collaborative efforts in research and knowledge dissemination. International conferences were organized including three key instrumental conferences organized by the International Society of Bio-metrology under an established Commission on Climate, Tourism and Recreation. This commission organized conferences in 2001, 2003 and 2007 which focused on tourism and climate research themes. The conferences produced a large collection of research papers which is viewed as the largest body of knowledge in the field to date (Krauss & Storch, 2012; Scott et al., 2012)

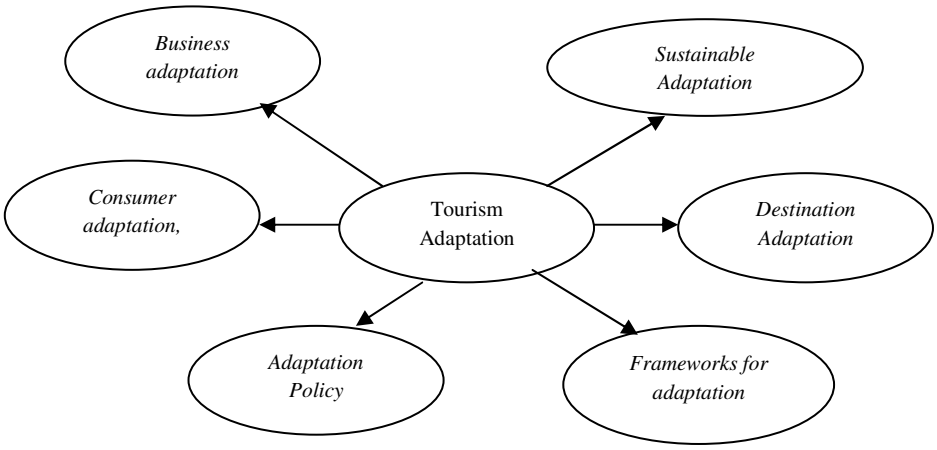
Clear concerns were raised where tourism is seen as a victim and a vector of climate change. As a vector tourism is said to contribute about 5% of global GHG contributing to anthropogenic climate change. On the other hand tourism is seen as a victim to changing climate both directly and indirectly including: cost of insurance, rise in heating and cooling costs, changes in the length and quality of vacation, alteration of key destination environment affecting its attractiveness (e.g. glacier), destruction of tourism infrastructure, effects on future economic and political stability (Scott et al., 2012; Simpson et al., 2008)

In response to these possible impacts on tourism, tourism managers, destination managers, policy makers and governments have been urged to adapt to the changing climate (Simpson et al., 2008). It should be noted that this review does not intend to review studies on climate change and tourism nexus but rather a review on key studies on adaptation as an area of interest to this research. Therefore, this paper will not provide a comprehensive chronological account of research in tourism and climate nexus, but rather current research fronts in tourism and climate change adaptation. The chapter will highlight themes emerging within tourism and climate adaptation research over the years. The review may not be inclusive of all peer reviewed research papers. However, a selection of some key researches in the topic will be reviewed. The ultimate goal of this paper is to highlight the state of tourism climate research and key knowledge domains.

TOURISM ADAPTATION RESEARCH

Although tourism research has been studied over five decades it is only in the last two decades that more focused studies has emerged in the last 15 years (Kaján & Saarinen, 2013). In this regard five key theme areas in tourism adaptation have emerged to include: Business adaptation, consumer adaptation, destination adaptation, adaptation policy studies and frameworks for adaptation (see fig 1). In addition to these five themes a sixth theme on 'sustainable adaptation' has emerged as the most recent.

Figure 1: **Climate adaptation knowledge domains in tourism research**



Source: Author's elaboration

Business adaptation

Adaptation to climate change among tourism businesses is seen as a means for sustainability or continuity of operations. As lamented by Weaver, (2011) tourism business adaptation lack commitment but rather look into their business viability. This challenges earlier thoughts on sustainability of tourism industry under the three bottom approach i.e. Social sustainability, economic sustainability and environmental sustainability.

In a review of literature published from mid 80s to mid 90s it is evident that a big share of literature emerged from the ski and mountainous regions located in northern developed countries. In a literature review by Weaver, (2011) notes that 40% of tourism climate related research under same period was from the northern developed countries while only 10% was from small island and developing countries. Further analysis by Kaján & Saarinen, (2013) reveals that slightly more than half (19 out of 36) empirical research/ literature focused on business adaptation.

To mention a few, Becken, (2005)studied how Fiji tourist resorts are responding to climate change. The study reveals that operators are ready to adapt to any climate related eventualities and they were not keen on reducing CO_2 emissions, however, they were keen on decreasing energy costs for economic reasons. In a study of Australian ski resort by Bicknell & McManus, (2006) on the response strategies among tourism operators, reports that tourism operators had varied levels of acknowledgement of climate change and those who believed about climate change were responding to it through artificial snow making. Furthermore it was revealed that operators had varied responses to climate change attributed to varied levels of capacity to adapt (Bicknell & McManus, 2006). In another study on how tourism operators in Playacar, Mexico

are promoting dynamic landscapes reveals that despite the changing landscape they have continued to be promotes as stable and pristine thus employing a 'denial strategy' (Buzinde et al., 2010)

Dawson & Scott, (2010) studied the vulnerability and adaptation of 103 ski areas across states of New York, Vermont, New Hampshire, Maine, Massachusetts, Rhode Island and Connecticut. Using multiple methods future projections include a 'contraction' of ski regions. In response to this reduction, closure of some ski regions and possible market shift (i.e. spatial substitution) have been proposed and or projected. Moen & Fredman, (2007) studied the impact of climate change in Swedish Alpine ski region and reports on aggregate of poor snow levels to support good ski industry. In their conclusion urgent strategies to make year round activities were highly recommended for the Swedish ski industry. A similar study by Pickering & Buckley, (2010) revealed similar challenges of low snow projected records for the by 2020 in low altitude resort areas. The study concludes that such adaptation strategies like snow making may not be viable hence there is need for product diversification to include year round summer like tourist activities (Pickering & Buckley, 2010). Such strategies put further pressure on water, energy and cost of operation.

In another study, Hall studied New Zealand tourism entrepreneur's attitude and behaviour with regards to climate change adaptation and mitigation. The study reports that entrepreneurs regarded climate change as a potential future concern and was significantly ranked low in their short term concern (Hall, 2006). Marshall et al., (2011) on the other hand studied on impact and awareness of climate change among tourism operators in the Egyptian Red Sea where they found a 'moderate' level of environmental and climate change awareness. Despite varied levels of awareness about climate change at this juncture we would be tempted to ask whether awareness would lead to adaptation action or whether the two correlates. This study concurs with a study on Finnish nature based tourism entrepreneurs where majority of the interviewees expressed scepticism hence no adaptation activities could be reported among the interviewed operators Saarinen & Tervo, (2006), despite confirmed concerned about the vulnerability of Finnish winter tourism (Tervo, 2008). Tervo-Kankare, (2011) in a study of Finnish tourism stakeholders in two winter destinations established that activities related to climate change were still at 'infancy' and response to changes were more reactive. However, a general development towards an all-year round tourism is desirable. A study among Swiss Ski lift operators concludes that there is a positive influence of awareness to possible adaptation intentions and actions in response to climate change Hoffmann et al., (2009). The study further showed no significant influence of vulnerability to climate change on adaptation intentions. Hamilton, (2007) examined the attractiveness of two coastal districts in Schleswig Holstein, Germany using Hedonic pricing technique. The study concludes that an increase in length of dikes in given district would result to increase in average price of accommodation.

In summary it is evident that climate change have profound impact on the tourism businesses, (Simpson et al., 2008). Despite varied levels of awareness, understanding, scepticism and commitment in responding to the impact of climate change, regions that are very sensitive to climate change especially winter tourism regions the need for proactive strategies include artificial snow making to extend the winter season, at least

as short term strategy (Bicknell & McManus, 2006; Jones & Scott, 2006; Pickering & Buckley, 2010). In the long-run it is expected that operators will have to developed strategies that ensure product divestment that will ensure an all-year round tourism (Kaján & Klemettilä, 2013; Kaján & Saarinen, 2013; Saarinen & Tervo, 2006). Moreover coastal zones have also been found to be vulnerable hence there is a need to explore adaptation strategies.

Consumer adaptation

Climate change is projected to have severe impact on the tourism industry (Simpson et al., 2008). The direct and indirect impacts of tourism will have an aggregate effect on the quality of the tourism product offered by a destination (Scott et al., 2012). While the environment has been a major motivator for tourists to travel to a destination (Saarinen et al., 2012) climate change is expected to produce both 'winners' and 'losers' as suggested by Ehmer & Heymann (2008), in a report commissioned by Deutsche Bank, due to changing tourist travel patterns (Hamilton, Maddison, & Tol, 2005).

Earliest studies on tourism and climate change focused on tourists travel behaviour under different weather conditions in early 60s, just in time with what Lamb referred to as 'climate revolution' period (Lamb, 2002). With improved ability to accurately forecast and record weather information, tourists can plan their travel more efficient. While good weather have been central to tourist travel decision (Saarinen et al., 2012) researchers have continued to vest interest in understanding tourist demand patterns under different weather and climatic conditions.

As a rule of thumb tourists would travel to enjoy 'good weather' depending on the type of tourist activity. For example a typical good weather for beach vacationers would be a warm sunshine season. However, some destinations have been projected to have too hot seasons as a result of climate change (Hamilton et al., 2005; Hamilton & Tol, 2007; Simpson et al., 2008). Such conditions will continue to be of interest to tourism researchers.

Perry, (2006) provides a 'predictive' adaptation among tourists in Mediterranean region under a mix of possible outcomes. He notes that one of the main threats to Mediterranean camping tourists is bush fires as observed in France, Portugal, South West Spain and South Italy. It is expected that tourists around this region would cut short their trips under drought or too high temperatures (Perry, 2006). He further argues that due to high temperatures in Rome and Milan cities, locals have been retreating to coastal zones to avoid a too-hot summer which leads to overcrowding in coastal zones. Furthermore, due to overcrowding the quality of beach experience could be jeopardised and in case of disease outbreaks, this would be disastrous. According to Perry's predictions, high air and sea temperatures are likely to encourage more tourists due to prolonged summer season (Perry; 2006). However under 'too hot' outdoor temperatures tourists might tend to migrate Northwards (Hamilton & Tol, 2007). Furthermore, while climate change is expected to increase tourism business operation cost due to increased heating and cooling costs under extreme weather conditions, it is

also expected to alter the rate of accommodation in future. Increase in accommodation cost will have an implication on tourist buying behaviour (Scott et al., 2012).

In another research on Egyptian Red Sea tourism industry it was established that tourists were aware of the changing coral condition and they expressed their intention to seek other sites for snorkelling and scuba diving (Marshall et al., 2011). In another study by Landauer et al., (2012) on skiers adaptation options in Finnish cross country, three types of skiers are categorised as: 'social type', 'outdoor type' and 'technical type based on their motivation for skiing. In this study it was established that the 'social type' would 'give up' skiing closer home due to poor snow conditions whereas the 'outdoor' type of skiers who are motivated by the quality of the environment and landscapes would seek better venues. The 'technical type' of skiers on contrary would travel further or use artificial snow tracks (Landauer et al., 2012). In an analysis of tourism risks and opportunities of climate change in great lake regions, Dawson & Scott, (2010) found that winter tourism is expected to be impacted negatively with reduced ski season, snowmobiling and ice fishing. Warm weather tourism on the other hand is expected to benefit in the region due to extended summer season hence activities such as golfing, park visits, camping, beach activities and boat riding will be elevated (Dawson & Scott, 2010). In this regard it is expected that business competitiveness would be altered by seasonal changes, change in tourist travel patterns and activities they indulge in. Similar study on Australia's vulnerability of the ski market, it projects a growth in skiers travelling to New Zealand under poorer snow conditions. However, these kind of projections have faced difficulties in forecasting behaviours associated with relative vulnerability (Hopkins et al. 2013). It is therefore important for researchers to explore perceptions of vulnerability in different social setups.

A study conducted by on climate change tourist adaptation behaviour it was found that although climate characteristics is an important consideration in travel decision making it may not be the only deciding factor, under certain climatic variables like more rain, storm and higher humidity are likely to influence travel decisions negatively than in higher temperatures.

In summary it is expected that climate change will alter world travel market and generate both winners and losers. Consumers are considered the most flexible as compared to destinations and tourism operators. It is therefore expected that tourism operators will continue working on strategies to meet the changing market demands in different destinations i.e. adapting.

Destination adaptation

The other adaptation research frontier in tourism scholarship is destination adaptation. There has been call for destinations to pull efforts for adaptation in the post Djerba declaration of 2003 and in research there is a clear show of interest among researchers. The outcome has been studies that have not only explored perceptions of risks and vulnerability of the destination among destination's tourism actors, but have further explored actions taken under adaptation pathways/portfolios and/or options. Majority of these studies have focused on the three key stakeholders including: tourism

businesses, policy makers and communities (supply-side) to aggregate actions taken at the individual, local, regional and national levels of a destination.

A study of the Swiss Alps examines tourism stakeholder's attitudes and adaptation strategies. The study reveals that the stakeholders were focused at maintaining status quo of winter tourism through technical and marketing strategies (Narain et al. 2011). Wyss et al., (2014) on the other hand investigates on perception of climate change in a tourism governance context in the alps region by examining existing corporation patterns in an attempt to understand how perception of climate change influence future adaptation paths. The study further explores the role of corporation in implementing climate change measure at a local and regional level. In another case study on Finnish winter destination through interviews among tourism stakeholders concludes that destination level activities related to climate change were still at infancy, reactive by nature and heavily depended on individual's motivation. However, the respondents in the study expressed support to efforts put in coping with climate change (Tervo-Kankare, 2011).

Other extensive studies can be noted emanating from Caribbean region for example (Scott et al., 2012) in a study of vulnerability of Caribbean community countries reports that an estimated 266 (29%) resort properties would be partially or fully inundated by one-metre SLR; between 440 (49%) and 546 (60%) of resort properties would be at risk of beach erosion damage associated with the same SLR scenario.

Bujosa et al., 2015) studies on climate change concerns and adaptation in the coastal provinces of Spain which they report a decreasing popularity of the regions which they propose the need for engaging in adaptation measures for affected regions.

In summary most research on destination adaptation has emanated from developed countries especially the ski regions (Kaján & Saarinen, 2013; Weaver, 2011). Literature availability from Caribbean destinations can be termed as moderate while Africa very scarce (Kaján & Saarinen, 2013; Weaver, 2011).

Adaptation Policy

Tourism came into lime light of climate change global policy in 2003 for the first time. This was at the First International Conference on Climate Change and Tourism, held in Djerba, Tunisia, from 9 to11 April 2003, convened by the World Tourism Organization, upon an invitation of the Government of Tunisia. The meeting was quite well represented in attendance by not only multinational tourism organizations representatives from the private and public sectors, as well as a number of national governments, tourism companies, academic institutions, NGOs and experts. The highlight of the meeting was a declaration on the need for tourism stakeholders at all levels (grass root to global level) to take action in response to climate change through proper policies. To date there are a number of researches that have made follow-ups in understanding various aspects of climate policies within the tourism sector and here I will just mention a few.

Becken & Clapcott (2011) studied national policy on climate change in Fiji and New Zealand in order to understand the existing policy setting, policy concerns and challenges in policy development. The study reveals that tourists in the regions despite having a policy on different aspects, they saw the need for policy integration, education, capacity building, business performance and marketing. On the other hand whilst carbon tax have been proposed as a measure in mitigating climate change and have also been proposed more recently in adaptation policies (Scott et al., 2012).

Pentelow & Scott (2011) uses tourism arrival model to examine the implication of proposed climate policy in tourism dependant Caribbean region. The result indicate that under 'business as usual' scenario there would be negligible change in arrivals from Key source regions in Europe and North America unlike under strict climate policy scenario (post 2020) which would have a significant decrease in arrivals. Similar studies have been done in other regions including: Berrittella et al., (2006) who studied the impact of climate change on domestic and international tourism; Dubois et al., (2011) reports on future tourism mobility of the world population by looking at emission growth versus climate policy; Hamilton et al., (2005) looking at climate change and international tourism and more recently a study by Peeters & Eijgelaar (2014) who argues that at reducing tourism transport through mitigation policy may be less severe than is often believed.

In a review of literature on tourism policy on climate change, there was limited publications (See for example a review by Kaján & Saarinen (2013) where only 3 papers have been featured on policy). It is also noted that climate policy related research are also scarce especially in developing countries, but South Africa has made a few steps in developing a 'white paper' on climate change (Ziervogel et al., 2014) while Kenya has a Climate Bill that awaits presidential signing it into law. It may be concluded that tourism is still an evolving knowledge domain (Becken, 2013).

Frameworks for adaptation

Adaptation in tourism takes a practical approach (Kaján & Saarinen, 2013) and frameworks are used to guide destination managers and policy makers in advancing adaptation options (Njoroge, 2014). These frameworks are closely linked with policy development and have undergone transition. There are a number of proposed frameworks in literature but this review will consider frameworks that are developed specifically for the tourism sector.

The earliest framework was conceptualised as: behavioral adaptation, technical adaptation and management adaptation (Scott et al., 2006). This did not provide a tool to guide tourism stakeholders through the adaptation process (Jopp, DeLacy, & Mair, 2010). Attempts were further made by Becken & Hay (2007) who used a risk approach, but it found little use due to the complexity of the tourism sector. Later, a more reformed framework was developed through extensive analysis of tourism literature across the globe on adaptation approaches which was constellated in a UNWTO document 'A Framework for Climate Change Adaptation in Tourism Sector (Simpson et al., 2008).

Notwithstanding the limitations that existed in frameworks developed prior the year 2010, Jopp et al., (2010) proposed a Regional Tourism Adaptation Framework (RTAF) however the framework has been criticized for not promoting/advancing sustainability through the three bottom approach of social, economic and environmental sustainability (Njoroge, 2014). Later Csete and Szécsi (2012) developed a regional sustainable adaptation portfolio but their work too had limitations as noted by Njoroge (2014).

Sustainable adaptation

The issue of sustainability has been widely featured in tourism research (Bramwell & Lane, 2008; Briassoulis, 2002; Buckley, 2012; Butler, 1999; Carlsen & Butler, 2011; Clarke, 1997; Garrod & Fyall, 1998; Gössling, 2000; Irandu, 2004; Irandu, 2006; Jiang, 2009). Despite earlier criticism of the term sustainability as 'problematic' (Brandon & Lombardi, 2005; Connelly, 2007) and 'hard to achieve', sustainable tourism development have borne fruits in many destination (Becken, 2004; Saarinen & Rogerson, 2013; Saarinen et al., 2011; Sindiga, 1999).

Despite the much progress achieved in sustainable tourism development, climate change will remain a major challenge for the industry (Njoroge, 2015; Simpson et al., 2008). In response the tourism sector have been encouraged to respond by adapting to climate change (Adger, 2007; Parry, 2007; Simpson et al., 2008b). Some destinations especially those have been hardly hit by changing climate (e.g. winter tourism) have been adapting especially by artificial snow making (Dawson et al., 2013; Hennessy et al., 2008; Hopkins, 2014; Morrison & Pickering, 2013; Scott & McBoyle, 2007) and will continue to forging a wide range of means of adapting in future. However certain adaptation options and strategies have come under criticism. For example (Hopkins, 2014) in a study of New Zealand adaptation strategies she argues that snow making has been able to enhance business sustainability even beyond traditional snow seasons but at the expense of environmental and social sustainability. In another study of the arctic region in Finland, Kaján, (2014) found that local communities are able to cope with the weather changes taking place however their development path does not fully support the idea of sustainable adaptation through maintenance of environmental integrity, seeking social justice and participation. Other research includes Valdivia & Barbieri (2014) who attempts to model Agritourism as a sustainable adaptation strategy to climate change in the Andean Altiplano, Bolivia and Njoroge (2014) who developed an enhanced Regional Tourism Sustainable Adaptation Framework. In this review it has been found that the issue of sustainable adaptation in tourism research has started emerging since 2014 and therefore still at its infancy stage.

SUMMARY

Based on this literature review I can conclude that tourism adaptation research have advanced with six (6) themes at its fore front: Business adaptation; Consumer adaptation, Destination Adaptation; adaptation Policy; Frameworks for adaptation and; more recently:-sustainable adaptation.

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