# PERCEPTIONS OF CLIMATE CHANGE VULNERABILITY AND RISKS


## ABSTRACT

The Maldives is a highly sought after tourism destination which is also extremely vulnerable to climate change impacts. Some argue that as a result of rising sea-levels the mere existence of this small island destination is in question. The gravity of climate change related risks is so significant, that at one point the government stated its intention to set-up a sovereign fund to relocate the local population of just over 300,000 people to Australia. Using in-depth interviews with pertinent stakeholders actively involved in climate adaptation or risk reduction programs in the tourism sector, the aim of this research was to better understand perceptions of climate change vulnerability and risks among tourism stakeholders. This research illustrated that while there is some recognition of climate vulnerability and risks, there is no immediate concern about these risks among the interviewees. Implications of these findings on risk management in the tourism sector are discussed.



**Keywords**: climate change, vulnerability, risk, perceptions, Maldives, Leximancer


## INTRODUCTION

Perceptions of hazards and risks are culturally and socially constructed, and societies construct different meanings to potentially hazardous situations (McIvor & Paton, 2007). For example, Wilby and Keenan (2012) note "the 'sense of place' and the values that individuals attach to landscapes influence their levels of risk perception" (p. 366). Applying behavioural psychology to understand public perceptions and attitudes towards environmental problems in four countries, Uzzell (2000) found that environmental issues were perceived to be more serious the farther away they were from the individual. With regard to climate change perceptions, the same conclusions have been drawn elsewhere (Spence, Poortinga, & Pidgeon, 2012). Such psychological bias (Johnson & Levin, 2009) influences judgement and decision-making, leading to inaction to address climate change risks.

While psychological sciences have advanced our knowledge of human behaviour more broadly, there is a lack of understanding of behaviour concerning adaptation to climate change vulnerability and risks in the context of tourism. Understanding how individuals, for example resort managers, perceive climate change vulnerability and risks is imperative in predicting their intentions to take actions for reducing risks.

This paper contributes to addressing this knowledge gap by exploring perceptions of climate change vulnerability and risks among those who are actively involved in climate adaptation programs in the tourism sector in a small island tourism destination. The context of the Maldives is presented.

## PERCEPTIONS OF CLIMATE CHANGE RISKS

The geophysical nature of small islands, in combination with the typical concentration of population and infrastructure in coastal areas, makes them highly susceptible to climate change risks. Indeed the Intergovernmental Panel on Climate Change (IPCC, 2007) projects that sea level rise attributed to climate change will exacerbate inundation, storm surge, erosion and other coastal hazards, threatening vital infrastructure, settlements and facilities that support the livelihood of island communities. Erosion and deterioration of coastal conditions and frequent episodes of coral bleaching are expected to have significant negative impacts on coastal tourism. For instance, recent research focussing on 906 coastal resort properties in the Caribbean (Scott, Simpson, & Sim, 2012) indicates that a one meter sea level rise would result in 29% of resort properties being partially or fully inundated. Significant loss of beach area and beach erosion was also identified as negatively impacting coastal tourism. The

IPCC (2007) projections further indicate that small island destinations will face water shortages due to low-rainfall periods. Salt water intrusion into water aquifers is another challenge facing small island destinations.

Adaptation to these hazards depends on the affordability of the mechanism involved. Groynes or seawalls made using concrete tetra-pods or bags are commonly used to prevent coastal inundation and beach erosion is some island destinations. Other mechanisms include beach nourishment through sand pumping. Government policies also play a crucial role in the extent to which adaptive measures are taken and how climate change risks are perceived by individuals. However, the lack of specific national policies or legal mechanism to support adaptation poses a major challenge for climate adaptation in island destinations (Barnett & Campbell, 2010). Another key challenge is that despite island destinations being highly dependent on tourism for their economic survival, "little has been done to raise awareness and understanding of how climate change and tourism interact, and what could be undertaken to mitigate negative effects both in terms of adaptation and mitigation (Becken, 2005, p. 389)".

Further challenges arise as to how climate change vulnerability and risks are perceived by individuals, groups or society. How risks are perceived is based on subjective beliefs (whether rational or irrational) and is driven by psychological and cultural factors, values, norms, and social context (American Psychological Association, 2010). Further, perceptions of risks and reactions to address these risks are shaped by motivational processes (Reser, Bradley, Glendon, Ellul, & Callaghan, 2012). This can lead to maladaptive responses addressing climate change.

For instance, denial and failure to act transpire when a person perceives that a threat is uncontrollable (Uzzell, 2000). Exceptionalism or a belief that the risk would not happen to them ('optimistic bias') is another factor which influence climate change perceptions (McCright & Dunlap, 2011). Fatalism, or a belief that only God has the power over climate (Mortreux & Barnett, 2009; Wolf & Moser, 2011), also influence how individuals address climate change risks. While the ingrained cultural and religious beliefs are recognised to influence people's adaptive responsiveness, these perceptions are understudied in tourism research.

## THE STUDY CONTEXT

The Maldives is comprised of 1,192 coralline islands and is the lowest lying country on Earth. Currently 194 islands are inhabited by locals (Department of National Planning [DNP], 2011). A further 104 islands are operated as enclave resort, and an additional 67 new resort islands are being developed (MTAC, 2012b, 2012c). Sovacool (2011) notes that, owing to the geographical nature of the country, 90% of all tourism infrastructure and 99% of resorts are within 100 metres of the coast.

Since the inception of tourism in the Maldives in 1972, the growth of tourism has boomed. By the end of July 2012, the Maldives had received over 535,000 international tourist arrivals (Ministry of Tourism, Arts and Culture [MTAC], 2012a). The motivational factors for international tourists include the beach (23%) and diving and snorkelling (22%) (MTAC, 2011a). The direct contribution of tourism to GDP in 2010 was 36% and over 70% of foreign exchange earnings (MTAC, 2011b).

(Figure 1 here)

Media stunts such as the first underwater cabinet meeting by former president Nasheed have also highlighted climate change risks facing the country. At the same time, locals appear very relaxed about climate change risks facing the country. The local proverb "*rashuge eh faraay girenyaa aneh faraay vodeyne*" (if one side of the island erodes the other will form), gives an insight into the long standing casual attitude towards vulnerabilities and risks. The main risks facing the country are tsunamis, wind storms, heavy rainfall, storm surges, droughts, earthquakes and sea-level rise (UNDP,

2007, 2009). The tourism sector is no exception to these risks. Rising sea levels exacerbate existing problems of beach erosion and saltwater intrusion into aquifers.

Due to the scattered nature of the Maldives, risk management and climate change adaptation is very costly and difficult to manage. Currently there are a number of initiatives in the Maldives addressing climate change risk reduction and adaptation, including a Least Developed Country Fund project on "Integrating Climate Change Risks into Resilient Island Planning in the Maldives". Most prominently for tourism, a UNDP project titled "Increasing Climate Change Resilience of Maldives through Adaptation in the Tourism Sector" (TAP) has been set-up.

## METHODOLOGY

A qualitative methodology was adopted for this research. The sampling technique identified key actors involved in climate adaptation programs addressing the tourism sector in the Maldives. They comprised of five government officials, four tourism industry managers, and three members from non-governmental organisations. To maintain respondent confidentiality and anonymity, further details are not presented. Interview excerpts are assigned identifiers based on whether the respondent is a government official (GOV), industry manager (IND) or non-governmental organisation (NGO). Data was gathered during April 2012, using in-depth face-to-face semi-structured interviews to explore perceptions of: (1) climate change risks that affect the tourism industry; (2) vulnerability of the industry to these risks; and (3) factors which influence adapting to climate change risks. Except for four interviews, all were conducted in English. The average duration of the interviews was 38 minutes.

The interviews conducted in the local language Dhivehi were translated and transcribed by a bi-lingual researcher. Qualitative content analysis was carried out using text analytical software Leximancer 4. Leximancer employs a statistical algorithm to determine the frequently used concepts within a body of text and the relationship between these concepts (Smith & Humphreys, 2006). Leximancer also generates a concept map which is a visual representation of concepts that co-occur, and attract one another or overlap when the map is clustered (Rooney, Gallois, & Cretchley, 2010). The circles in the concept map represent the most salient theme in the cluster of concepts. Each theme is labelled after the most prominent concept in that group.

In applying Leximancer to analyse the data, minimal researcher intervention was applied. A key strength of Leximancer is that in using the automated coding process with minimal manual intervention, researcher bias is eliminated, thus increasing the reliability and validity of the research (Cretchley, Gallois, Chenery, & Smith, 2010). Only three words (impact, island, resort) which appeared both in singular and plural forms were merged as one. Leximancer is increasingly used as an alternative to traditional manual coding. Leximancer program has been demonstrated by Smith and Humphreys (2006) to have face validity, stability, reproducibility, correlative validity and functional validity.

## RESULTS

Key findings of climate change risk perceptions linked to other findings are presented as theme clusters generated by Leximancer (Figure 2).

Figure 2 here

*Risks*

The interviewees identified a range of climate change risks. Although tsunami is a geophysical risk, because of the devastating impacts of the 2004 Indian Ocean tsunami, most respondents expressed that "*tsunami would be perhaps the most significant*" (NGO3) risk which has affected the Maldivian tourism industry in the past, and one which could affect the industry in the future. As the concept map shows the themes of 'risks' and 'tsunami' are highly inter-related. The perceptions on the magnitude of a potential tsunami varied. A government official remarked that due to the geographical spread of the country, "*islands on the Eastern side have more risks of being impacted by a tsunami, as the wave comes from* [Banda] *Acheh*" (GOV4). The risk of earthquake did not emerge in the interviews.

Coastal erosion, coastal flooding and inundation due to storm surge, and water shortage were identified as risks currently impacting the industry and one which will impact in the future (direct lines connecting risk theme to other themes on the concept map). Due to erosion a resort has "*lost the complete beach and some of the vegetation as well. It has already reached the restaurant. It affects their business as well*" (GOV2).

Further, industry managers perceive erosion to affect tourist perceptions of the destination. One manager remarked that "*a lot of guests and tourists are concerned about it* […] *they take photos, go back, complain*" (IND2) and when "*the message goes to the tourists they are taking a different perspective*" (IND3). Several interviewees pointed out that the way tourism in the Maldives positions itself and is marketed relies on the beach, favourable weather, and intact marine ecosystems. "*The Maldives is marketed as offering private beaches, each guest to have an individual private beach that they can see straight out from the bed to the beach*" (GOV3). Generally, industry managers saw loss of business as one climate impact facing the industry.

Several man-made causes of erosion were discussed. For instance it was found that insufficient time is taken to study the environment in which the resorts are being built. "*There is no checking how these stilts and groynes may affect the island*" (GOV3). Extensive use of speed boats creating irregular waves and the construction of hard structures (e.g. sea walls) was also identified. Human interventions were also seen as a cause of erosion because "*we define an area as the beach, it's the building, it's the jetty, and it's the guest services area*" (IND4) and that they are unable to accept the natural processes of the environment.

Although sea level rise is one of the most significant risks facing islands, the interviews produced ambiguous results with respects to this risk. In a way, interviewees downplayed the importance of sea level rise and provided a range of explanations (e.g. a 'relatively lesser rise in equatorial areas', media sensationalism) as to why the risk is not severe. For example, a government official alleged:

> *We have undertaken a number of research in relation to the formation of the islands or impacts to the islands with regards to the existence of the islands. None of them have shown that we have lost any islands in the past five or ten years* (GOV5).

The particular risk of coastal inundation is perceived differently by various stakeholders. While one interviewee believed that inundation is now reaching much further inland than previously, other informants discussed the dynamics of sand deposits and erosion as a natural process. "*Seasonally the sand on island will move from one side to the other, but the total sand budget doesn't decrease*" (GOV3). Due to the small size of the islands, both resort development and locally inhabited islands have vital infrastructure on coastal zones. While this was identified as a risk, the small size of the island was seen as one which restricts adaptation to climate change. "*What we can't really change is the buildings in the islands very near to the beach. Perhaps because there is no other choice, because the island is too small*" (NGO3).

Changing weather patterns was another risk factor linked to climate change. Several interviewees noted that seasons have changed and weather has become less predictable. "*Right now it is April, in the perhaps previous year it would have been a bit more wetter; it is like 34 degrees* [Celsius] *right*

*now, so those things are changing*" (NGO3). Of particular concern was the irregularity of rainfall and long periods of drought, which lead to water shortages. "*We have water issues, shortages because of low rain falls during seasons*" (NGO2). The magnitude of extreme events is also believed to have changed dramatically, with some respondents being quite concerned about storms, while others feeling relatively safe because of the geographic position of the Maldives. "*Those islands on the Northern side are more prone to storminess and high rainfall as there are cyclones moving from the northern top area of the country*" (GOV4). The UNDP (2007, 2009) detailed risk assessment of ten islands notes that there have only been a few cyclonic strength depressions which have tracked through the Maldives, all of which occurred in the northern and central regions.

*Vulnerability*

A clear distinction was found in the interviews to how climate change impacts the local residents and the tourism industry. There was a general belief that tourism operators are better prepared to deal with climate change risks than the local people. As such, the interviews revealed underlying inequalities and differential adaptation capacities to deal with risks.

Lack of regulation was seen by the large majority of interviewees as one which make the industry vulnerable to risks. One official asserted that "*in the government we are very fond of attending conferences; but we don't accept or apply the recommendations. We are signatories to many, but we don't act on these policies*" (GOV3). Specific gaps in the regulations noted include the lack of a building code and a defined standard for setback from the beach into the island.

Lack of enforcement of existing regulations was seen as another policy issue increasing vulnerability. "*The problem is lack of enforceability; resorts operators know that the government cannot enforce these regulations*" (NGO2). For instance, since the 2004 Indian Ocean tsunami, resort operations are required to have an operational Disaster Management Plan [DMP]. However, as a government official disclosed not all operators have a DMP and it is difficult to enforce them to come up with the plans.

> *We inspect every year and if they haven't prepared it [DMP], we ask them to prepare it* […] *it is usually difficult to follow up with the resorts because not all the resorts are cooperative* (GOV1).

In relation to disaster risk reduction, several interviewees stated that preparedness is low and people would not know what to do in the case of a disaster.

> *After seven years of tsunami we are still not ready for any risks* […]. *If there is an emergency no one knows where to call even. There is no evacuation plans* […] *if some large scale emergency were to face us no one knows what to do* (NGO1).

There is also a mixed attitude towards risk communication among industry managers. For example, since the 2004 Indian Ocean tsunami, tour operators require an operational risk management procedure to be in place. To meet this requirement some industry managers "*provide a life jacket in their room*" (IND3). For another, placing life jackets in the rooms was seen as "*a reminder of the fear or the threat, imminent threat, continuously*" (IND4) to the tourist, so a policy to distribute life jackets in case of an emergency is taken.

The role of politics in risk reduction and climate change adaptation in the Maldives is multi-faceted and at the core of its vulnerability. At the highest level, policies and priorities were believed to change constantly, and projects are not completed or implemented as a result.

> *If you look at the Disaster Management Bill, it hasn't been endorsed, it has been in draft form since 2006. Can you believe since 2006? It has not passed the Parliament yet, it hasn't gone*

> *to the Parliament yet. Whenever a new boss comes into MDMC* [Maldives Disaster Management Centre], *he wants to revise it, add new stuff* (NGO2).

Furthermore, policy making appears to happen in distinct silos, missing important opportunities for collaboration and efficiency. One government interviewee noted that "*the normal practice here in the Maldives is for each* [Minister] *to mark their own territories. To get inside the other's territory becomes a challenge*" (GOV3).

A possibly systematic denial of the climate change and disaster risks for tourism in the Maldives can be interpreted as part of the politics to attract international tourism. While this is implicit in some interviews: "*What I am saying is that the Maldives is not affected by climate change as some are talking about*" (GOV3), one interviewee provided a concrete example:

> *We started this tourism related* [climate change adaptation] *project* [...] *but the industry operators did not want to implement the project at all. In one of the meetings they said that they did not want to relate in any form tourism to climate change. They said that it could create fear among visitors* (NGO2).

It was further pointed out that discussion about climate change negatively impacted foreign investment in tourism, and that investor confidence has significantly decreased. "*They don't want to invest 40 million or 60 million to build a resort to see it washed away*" (NGO2). Negative media coverage was also identified as damaging the industry: "*I think the negative media thing is much worse than the real actual climate change*" (IND2).

*Factors which influence adapting to climate change*

Factors which influence adaptation related to knowledge, beliefs, norms, and the role of the government and industry. Several government officials discussed policies they were planning to develop or implement, although some of the statements were vague and lacked clear targets or timelines. Tourism operators were not fully aware of policies and legislations, although the need for an EIA relating to resort development was widely known. However, often local knowledge is not taken into account as consultants who undertake EIAs "*think that the islanders are laymen and they will not know what is going on*" (GOV3). To be useful, information also needs to trickle down to those involved in the industry. When asked about initiatives that tourism policy makers are currently undertaking to help the tourism sector, one resort manager answered: "*To be honest, I have no idea on this question*" (IND1).

While private sector self-regulation was seen as critical for addressing climate change risks, several barriers were put forward. The main one related to costs and the long return periods on the investment of environmental measures. One government official said "*businesses are mostly for profit making sometimes they are not really willing to go investing in mitigating climate change or hazards*" (GOV3); a view shared by several others. At the same time, the long term benefit of disaster risk reduction and proper design was believed to pay off. As one pointed out, climate proofing infrastructure is a competitive advantage.

A number of issues related to knowledge and understanding and their relevance for vulnerability. First of all, there is still a degree of confusion related to natural disasters and climate change. For example, tsunamis are sometimes referred to as climate risks. Further, the differences between climate variability and change are also not fully understood. Environmental risks are often not understood, meaning that issues such as erosion control or waste management are low on people's priority list, compared with other physical infrastructure developments, such as harbours, hospitals or schools.

Several cultural factors influence adaptation. One relates to habits and accepted behaviour (norms) that make the implementation of measures to change behaviour challenging. Changing behaviour was believed to be particularly difficult when economic costs are involved. One informant noted:

> *All their lives they have just been throwing garbage on one side of the island, does not involve a cost. When we say that they have to pay a monthly fee of say MRf 10 they do not want to do that to have their garbage collected and disposed properly* (NGO1).

The second cultural vulnerability factor relates to people's religious beliefs and high levels of fatalism when it comes to future disasters. A belief that "*it's God's will, anything can happen and there is nothing you can do about it* (NGO3)" and the perception that "*in nature sometimes you have to take risks and live with it*" (GOV3) was referred to by most stakeholders. It was also widely accepted that "*we just can't sit here and God will save us without doing anything on our part*" (GOV4).

## DISCUSSION

Individual perceptions about climate change vulnerability and risks are created within the social context, and the landscape in which they occur. For instance while erosion is identified as a significant risk, a psychological bias (Johnson & Levin, 2009) is evident among many interviewees who purely interpret erosion as a natural process. The inability to recognise climate change risks leads to continued development of resort and locally inhabited island's infrastructure in coastal zones. Development of this type of tourism product and positioning it right at the beach has to be seen as an adverse trend in the hazard landscape. Exceptionalism is also evident in the research, where among government officials there is a belief that due to the geographical nature of the country, it will have minor exposure to certain climate change impacts such as frequent cyclones. This view is prevalent because in the past, the country has not had any significant impacts of cyclones. However, as the IPCC (2007) identifies, due to climate change it is *likely* that tropical cyclones will be more frequent and intense.

Further, while man-made causes were identified as aggravating erosion and impacting tourism industry operations, from the perspective of some government officials, erosion and talk about climate change risks facing the country is negatively impacting foreign direct investment. Unfortunately, the motivational process (i.e. prioritising FDI over climate change adaptation) shaping climate change risk perceptions of these government officials can lead to poor policies addressing climate change adaptation. Lack of concrete policies, weak enforcement and bias of policy processes (e.g. EIA) in favour of developers further undermine risk management.

The current political environment of the country impedes the extent to which climate risks can be addressed. Political differences should not affect enforcement of much needed regulations on coastal buffer zones, waste and waste water management, building codes to reflect the current environment, and mandatory evacuation plans. While the tourism industry has the resources to adapt to climate change risks, our research indicates that the local communities do not have the support mechanism to adapt to these risks. Support mechanisms such as appropriate legal frameworks, and climate insurance for local communities and industry operators to adapt to climate change is required.

Fatalism (Mortreux & Barnett, 2009; Wolf & Moser, 2011), and denial (Uzzell, 2000) also appear to influence climate change risk perceptions. However, this leads to maladaptation by individuals. For instance, coral harvesting and sand mining continues in many locally populated islands, despite erosion in many of these islands. The research also found that religious beliefs can work hand in hand with the notion of human adaptation. Fostering such views is vital to avoid fatalism and lack of action.

## CONCLUSION AND IMPLICATIONS

This research indicates that while the impact of climate change risks are recognised by all interviewed, there were differing perspectives concerning the tourism industry's vulnerability. This indicates a need for continued awareness rising amongst the population and tourism stakeholders. Addressing strategic approach to climate change adaptation that integrates policy and industry action, and incorporates local knowledge, would be beneficial. A business case could be made more explicit, for example by promoting that reducing climate risk increases business viability, enhances biodiversity, and increases tourist satisfaction. The role of culture and religion as factors influencing climate change perceptions deserves further attention.

## TABLES AND FIGURES

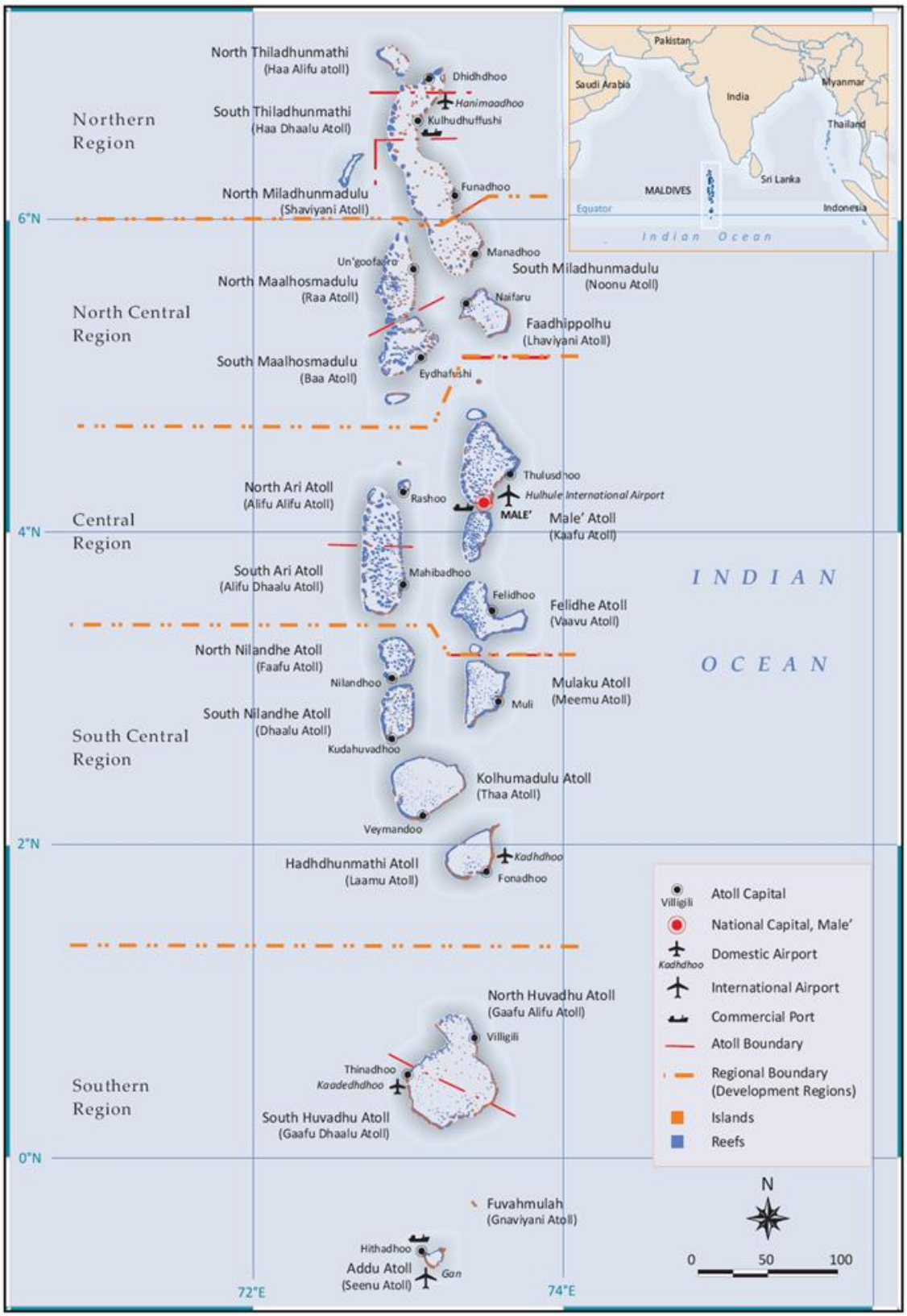


**Figure 1: Map of Maldives**
Source: (Ministry of Planning and National Development [MPND], 2006)

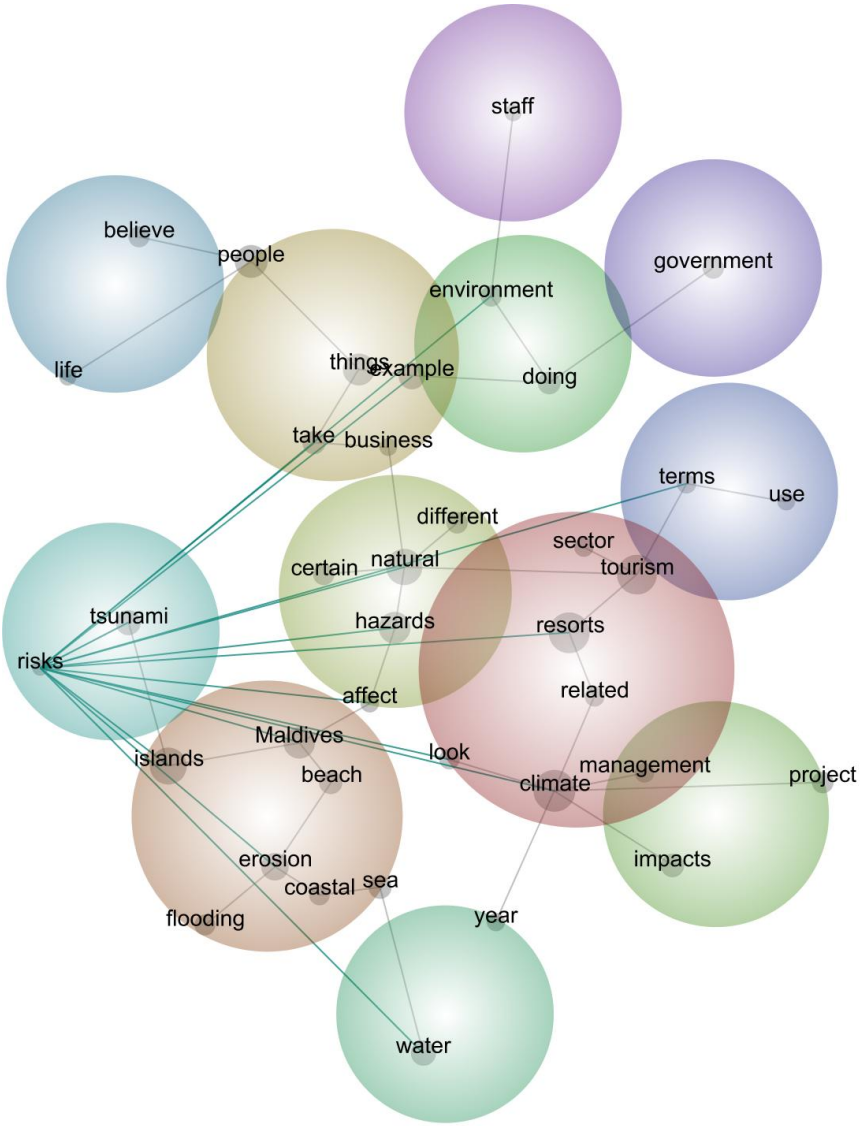


**Figure 2: Perceptions of Risks Linked to Other Themes**

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