Baseline Analysis of Adaptation Capacity and Climate Change Vulnerability Impacts in the Tourism Sector

Increasing Climate Change Resilience of Maldives through Adaptation in the Tourism Sector

TOURISM ADAPTATION PROJECT (TAP)

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BASELINE ANALYSIS OF ADAPTATION CAPACITY AND CLIMATE CHANGE VULNERABILITY IMPACTS IN THE TOURISM SECTOR

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TOURISM ADAPTATION PROJECT (TAP)

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Cover Photo: House reef of Bolifushi Island. Healthy coral reefs are not only crucial to the Maldivian tourism industry but for the very own existence of the islands itself.

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Executive Summary

Science and other physical factors have demonstrated that the earth's climate is changing since the pre-industrial era. The worst hit victims of this change are the small island nations like the Maldives. Climate change has put these nations and their small economies at stake increasing their vulnerability. The economy of Maldives heavily relies on the tourism industry. In 2011, the tourism sector accounted for nearly 34% of Gross Domestic Product (GDP) which is about 75% when counting both direct and indirect contributions to the economy.

Maldives is renowned for its crystal clear waters and white sandy beaches. In the recent history climate change has become the most life threatening and the damage to this industry is no exception. Recent natural disasters such as the tsunami have proven the vulnerability by devastating these island and the natural environment. There was a severe drop in the number of tourist arrival due to the tsunami. In addition to this, the bleaching event of the 1997/1998 El-Nino caused more than 80% coral bleaching in Maldives and the threats on the reefs are increasing ever since. Studies show that in addition to the threat posed by climate change, more than 65% of the reefs in the Indian Ocean are at risks from local threats which further aggravates the vulnerability. In a year, the financial turnover brought by these natural environment could be more than a million US dollar. But, how aware or how prepared are the key players within the tourism sector of Maldives?

The main objective of this baseline analysis is to assess, quantify and document the current adaptive capacity of the tourism sector in Maldives. The three specific objectives of the study are; i) to determine the existing vulnerabilities, existing adaptation responses and gaps in response to climate change, ii) to determine the awareness and vulnerability of the tourism operators, and dependent communities and iii) to determine the readiness of the government institutions to tackle the issues to address the climate change vulnerabilities. Three main key groups were targeted in this study. That is, tourism operators (tours operators, safaris and resorts), associated communities and the policy makers (government institutions and other tourism related associations).

To achieve the objectives, qualitative data was obtained from tourism related published reports, peer reviewed articles, case studies and statistics. Quantitative approach was followed to conduct the baseline study. Pre-structured, pre-tested and fine-tuned questionnaires were used to interview the key major players within the industry. Statistically representative samples were chosen to represent the population sizes. To collect the data resorts, tour operators, safaris and tourism associated communities were surveyed. The data was analyzed using statistical analysis methods and packages.

The assessment of what causes climate change, the general awareness among the tourism operators (resorts, safari operators and tour operators) shows that on average 74% of them relates climate change is due to human interventions and 15% of them said they have no knowledge of what causes climate change but they accept climate is changing. This was reflected in their level of awareness on the local impacts of climate change. The most concerning impacts identified by the tourism operators were beach erosion, coral bleaching and increase in extreme weather events. They explicitly mentioned about the unpredictability of local weather system, the "Nakai" system. According to them, it used to be very predictable in the past and now it has kind of "shifted" or became very erratic in nature and they are unable to inform the tourists about the best season to visit the country. Some of them have expressed concerns about tourist complaining that they provide the wrong information.

Regarding the policy instruments, it showed that more than 60% are aware about the Tourism Act and the Environmental Impact Assessment (EIA) regulations. This was mostly because these are the key regulations which play a major role in issuing the operating licenses. Most of them agreed that they do not know the in-depth of these regulations. This was partly due to the lack of government authorities in making them aware about these regulations. The least awareness about the policy instruments were among the tour operators. Much work needs to be done to increase the awareness and to strengthen the implementation of these guidelines.

More than 65% of the resorts, 62% of the safaris and 50% of the tour operators have insurance coverage in place for climate related hazards. Interestingly a significant amount are insured for storm surges, rainfall induced flooding and storms. 19% of the tourism operators have other types of financial mechanisms (such as tourist donations, environmental fees and revolving funds) in place for addressing climate change and other environmental issues. However, more work needs to be done to make them aware about climate financing and insurance packages relevant to them.

The perspective of how climate change may affect the tourism industry shows that major concern is the damage to the natural environment and decrease in the number of tourist arrival. Although the tourism operators are aware of the climate change and the associated impacts, only 78% of the surveyed population expressed that it is a concern for them. The rest do not foresee that they need to be concerned about the adverse effect of climate change. It was shown that the most impacted tourism activity would be diving and snorkeling.

Among the adaptation and mitigation measures, the foremost priority given by the resorts is for coastal protection followed by beach replenishment. Safari operators pay attention to improving the vessel, repairing the engine and increasing the staff capacity and to insure the assets. Similar was said among the tour operators. More focus was given to address the

climate change adaptation and mitigation in the short term with less focus on the long term adaptive solutions. The highest number of investments made to protect the infrastructure was shown by the resorts and the safari operators. However, they do not have the technical expertise and 30% motioned that there is no appropriate technology and only 20% said that financial restrictions are holding them from investing on the infrastructure. The survey showed that the decisions made on the investments are made most of the time by the top level management and the advice is sought from external experts. 80% of the tourism operators agreed that making future investment into climate change hazards would be beneficial in the future. It was also noted that less consideration is given to quantify any financial loss from the damage as more than 60% said they do not quantify the loss.

The close collaboration with the associated communities and the tourism industry was shown by the 89% of tourism operators who associate with the community in various ways. Resorts interact as part of the corporate social responsibility (CSR) and business. Safari and tour operators interact mainly for business. The main interaction for communities is through creation of job opportunities where it was more than 65%. In addition to this, a significant contribution is given via soft community development and education. With the above interaction, only 76% of the tourism operators stated that their business would have an impact if these communities are affected by climate related hazards. The mutual benefit received from these communities harbour facilities for the safaris and health centre benefits for the resorts. The future benefits expressed by them include better waste management facilities and harbour security in the communities.

Several adaptive measures are being practiced by the tourism operators. Safaris have back-up power and communications systems and desalinated water systems. The most common form of coastal protection practised by the resorts is the use of sea walls. 60% of them accounted for beach replenishment while 20% of them practiced beach revetment. Most of the tourism operators practice sustainable waste management practices such as waste segregation and composting. Almost all the tourism operators raised the concern of non-presences of waste management facilities in several places of the country and waste management is a big concern for them. One of the major concerns raised by the safari operators was the unavailability or lack of a proper harbour to anchor the safaris. The temporary place they use is not a proper shelter especially during the south west monsoon season. They also informed that they have encountered several incidences where vessels were damaged during the said monsoon.

The tourism associated communities identified that beach erosion, drought, rainfall induced flooding and storms are the main impacts of climate change to those communities. The largest loss they have encountered by these impacts are due to the damage on the infrastructure which accounts for 60% among the surveyed. Communities do keep a record of the damage as events and only 70% were able to mention the loss in financial terms. Infrastructure damage has lead to severe financial constraints. In addition, similar to the

safari operators, the associated communities has also noted the change in the weather system.

Education and increasing the awareness were the main action among the communities. The next most priority is given to the coastal protection. The superior technical and financial capabilities of the resorts have helped these associated communities. More than 60% of these communities reported that resorts provide some form of action to protect from the effects of climate change. The majority of this assistance is provided as part of the Cooperate Social Responsibility (CSR) and more than 20% is provided as a part of business interaction and is made towards increasing the resilience of the communities. Management of waste was also raised by these communities as a big issue. Several concerns were raised due to the unavailability of waste management centers. In order to address the climate change, reducing the impact caused by rainfall induced flooding, damage by beach erosion and damage by sea swells were among the main priorities highlighted by the surveyed communities.

Meetings with the government and other relevant stakeholders indicated that there are several measures which need to be addressed. The main concerns by the stakeholders were regarding the management of waste and a proper shelter for the safaris. Furthermore, it is found that the relationship between the government institutions and the other stakeholders need to be strengthened to work in a more cohesive and collaborative environment.

1. Introduction

Changes in climatic patterns are a natural phenomenon. However, there is increasing concern about the impacts of climate change that has been brought about as a result of human activities (such as burning fossil fuels for energy, change of land use, etc.). Human-induced changes in the climate have been acknowledged as a current global reality, and are the subject of significant global attention. Global changes in climate have already been observed that are generally consistent with model projections, and are likely to continue to occur for many decades to come even if mitigation efforts are successful due to lags and inertia in the global biosphere response.

Current climate models predict that Maldives will experience increasing temperatures, changing frequency, intensity and distribution of rainfall events, and sea level rise (MEE, 2012). Such changes will impact on key tourism drivers such as resorts, dive site, business profitability, infrastructure planning and investment. Changes will manifest locally and will uniquely affect individual tourist destinations, communities and businesses.

Climate would be the first thing on a tourist's mind when completing the packing before embarking on to fulfill their dream holiday. Tourists would want to make every penny worth it by spending the most perfect holiday, especially when they visit the "sunny side of life", the Maldives. Maldives is blessed with a gratifying climate throughout the year, making it the most perfect destination for holiday makers. However, climate change could change this. Climate change could have serious impacts on the tourism sector and thereby the economy of the country since tourism is the main economic 'back bone' of the country.

Climate change not only dictates the amount of money being spent, but rather where it is spent. In a climate vulnerable environment like the small low lying islands of Maldives, increasing the resilience of the tourism sector to climate shocks is very crucial. Thus this study focuses on the climate change vulnerability of the tourism sector and the adaptive capacity within the sector to such climate change impacts.

In 2008, Ministry of Environment, Energy and Water (MEEW) with support from United Nations Development Program initiated the project 'Increasing Climate Change Resilience of Maldives through Adaptation in the Tourism Sector (TAP). The objective of the initiation was to ensure that the tourism industry has the capacity to build resilience against the potential impacts of climate change. Later, in 2010, under the patronage of the Ministry of Tourism, Arts and Culture (MTAC) and with financial support from UNDP, the initial draft project document was further developed and revised following broad consultations with relevant stakeholders. The TAP project aims to address the vulnerabilities of the tourism sector by providing the required policy environment, regulatory guidance, technical skills and knowledge. In this regard, the project aims to strengthen the capacity of the MTAC and

tourism businesses to recognize evident climate risk issues in tourism operations, adopt appropriate adaptation measures to address them, and will ensure that climate change-related risks are factored into day-to-day tourism operations.

This project represents the first step towards assisting the tourism industry to build its resilience and capacity to adapt to climate change impacts.

1.1 The Study

This study focuses on the assessment of the vulnerability of tourism operators (resorts, safari operators and tour operators) tourism-associated communities to the adverse effects of climate change adaptive capacity of tourism operators, and tourism-associated communities to reduce risks to climate-induced economic losses; knowledge and use, within the tourism sector, of climate risk financing instruments and solutions; perceptions of tourism operators and tourism-associated communities of the key barriers to adaptation and knowledge within the Government of Maldives of tourism policies and planning frameworks and national policies and laws regulating/relating to tourism operations. The study is mainly divided into 3 main groups:

- tourism operators which includes tours operators, safaris and resorts
- tourism-associated communities and
- policy makers

1.2 Objectives of the Study

The main objective of the baseline analysis is to assess, quantify and document the current adaptive capacity of the tourism sector in Maldives to respond to the impacts of climate change and invest in appropriate, no-regrets adaptation measures. The three specific objectives of the study are; i) to determine the existing vulnerabilities, existing adaptation responses and gaps in response to climate change, ii) to determine the awareness and vulnerability of the tourism operators, and dependent communities and iii) to determine the readiness of the government institutions to tackle the issues to address the climate change vulnerabilities.

The information gathered from this study will be to assess current adaptive capacity within the tourism sector and the motivation for, or barriers to, adaptation.

2. Tourism Sector Overview

2.1 Background

The tourism in Maldives began in 1972 with the launch of the first resorts; Kurumba Village and Bandos Island Resort. The resorts had a bed capacity of 280. Currently there are 343 registered tourist establishments (105 resorts, 20 hotels, 60 Guest houses and 158 safari vessels) with a total bed capacity of 27,538 (Tourism, 2012). As shown in Figure 1, the tourism industry has been growing to become largest economic activity in this small island nation. As of 2011 the total number of tourist to Maldives exceeded 931,000 (Tourism, 2011). As shown in Figure 2 tourist arrival is seasonal with usually over 90% bed occupancies during monsoonal dry period or the winter season in the Northern Hemisphere.

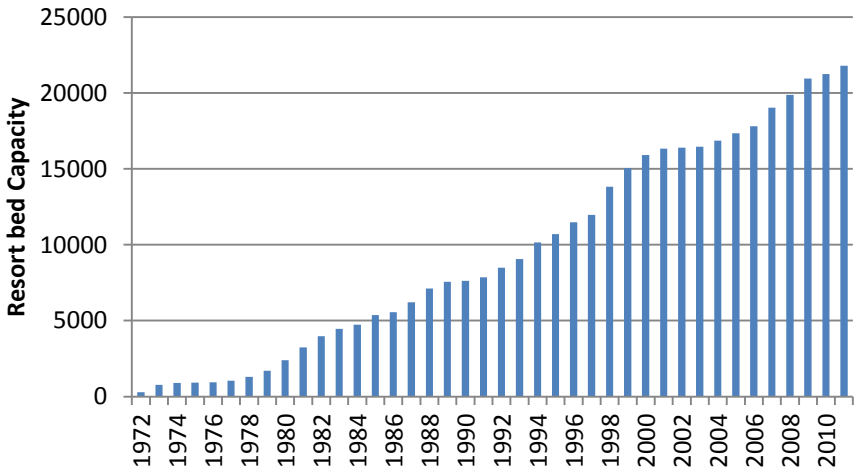


Figure 1: Bed occupancy of resorts Source: Statistical year book archive.

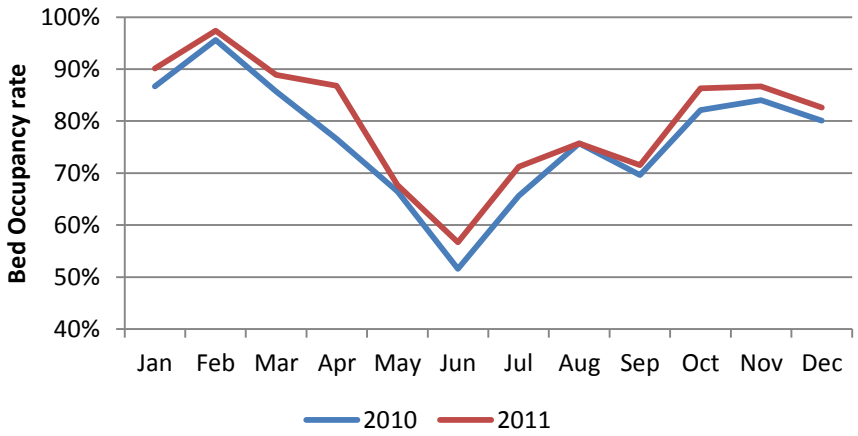


Figure 2: Bed occupancy rate (seasonal fluctuations) Source: Statistical year book archive.

Maldives tourism is famous for being exclusive and therefore targeted to high-end tourism markets. Tourism sector in Maldives has developed around the natural beauty of the islands

like white sandy beaches and the rich coral reef ecosystem. The serene and delicate environment has always been a selling point for the sector.

2.2 General Environmental Issues

The importance of the natural environment cannot be overstated in the context of the tourism development in Maldives. Harmonizing the tourist activities with the environment is a target for many resort developers. Like any other development activity, the tourism sector development has raised some environmental issues. Some of the issues include, waste, damage to coastal environment, poaching of endangered species which is used as souvenirs.

Waste has been an issue for tourist establishments and its surrounding community. It has been estimated that on average a tourist produces 3.5 kg of waste per person per day (MEMP, 2010), which is almost twice as the locals. Given the high influx of visitors the amount of waste the industry could produce is of a national concern. This was reflected in the tourism regulation which mandates the resorts to have an environmentally acceptable way of managing the waste. However, the full implementation of that regulation by the industry is arguable. It is also noted that many resorts, hotels and Live-aboard has complained about the waste from nearby local communities being dumped in to the sea, affecting the tourist activities.

The development of a resort involves a high degree of modifications to the island and the surrounding environment. It involves dredging, reclamations and many other coastal modification activities. This affects the nearby marine and coastal environment adversely. In addition, high levels of tourist activities such as diving, snorkeling causes damage to marine ecosystems due to lack of tourist awareness and enforcement.

The tourism industry also has a demand for exotic souvenirs, like shark jaws, turtle shells etc. During the early days of the industry there was a huge decline on many exotic marine animals. Today, however, these animals have been protected by law; the Fisheries Act of the Maldives (Law No. 5/87) (AGO, 1987) and even somewhat managed by the industry as well.

The environmental standards of resort development and operations are regulated by both tourism regulation and environment regulations. But enforcement of these regulations are not well practiced. For example the tourism regulation states that the built-up area of a resort should be less than 30% of the land area, it is not clear how well this is enforced.

Recently there have been new environmental issues and concerns identified within the industry. Vulnerability of the industry to climate change and natural disasters (storm surges, ENSO events etc.) have been raised as a serious concern (MHAHE, 2001).

3. Climate Change and Tourism

3.1 Introduction

This chapter provides an overview of the climate change and its predictions made for the future. It also outlines the relationship between climate change and tourism in both global and local context and the associated impacts of climate change on tourism.

3.2 Tourism

The World Tourism Organization (WTO) defines tourism as "a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes"(UNWTO, 2013). These visitors who travel to places outside their usual residence undertake different types of activities that can be classified under different types of tourism. The types of activities that they can undertake depend very much on the social, cultural and environmental nature of the destination. In general, the type of tourism carried out in Maldives can be classified as beach tourism (UNWTO, 2008) as most tourists visit Maldives for its natural beauty especially the white sandy beaches and the marine environment.

The tourism industry of Maldives took off in early 1970s. The first two tourist resorts opened in 1972 with the capacity of just 280 beds. In its first year of tourism, 1000 visitors came to Maldives (MTAC, 2011). Today, this number has increased tremendously making tourism the largest economic sector of Maldivian economy. In 2011, 930,000 visitors came to Maldives while the tourism industry expanded from 280 beds in 1972 to 26,800 beds in 2011 (MTAC, 2012). In 2011, the tourism sector accounted for nearly 34% of direct Gross Domestic Product (GDP) and an astounding 75% when counting both direct and indirect contributions to the economy (MTAC, 2012).

The Maldivian tourism industry has been relatively resilient as it has experienced downturns only on two occasions (the 2004 tsunami and the 2009 global recession) which it managed to climb out of within relatively a small period of time (MTAC, 2012). The Maldivian tourism is most vulnerable to environmental changes and natural disasters. This is reflected in the decline of visitors following the Tsunami in 2004 that devastated many of the Maldivian islands and its natural environment as depicted in Figure 3. Another downturn was marked in 2009 due to the global financial recession.

International tourist arrivals to Maldives hit a new record registering an impressive 4.4% growth in 2011 with a healthy 930 thousand arrivals (MTAC, 2012). This huge arrival rate of tourists, could be used as a platform to raise awareness globally about the vulnerability of Maldives and at the same time, the causes, impacts and measures to mitigate and adapt to climate change globally.

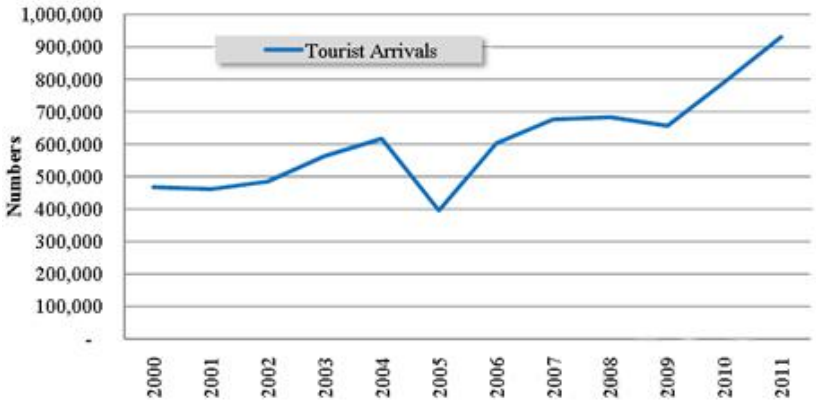


Figure 3: Trend of tourist arrival. Source (Ministry of Tourism, Arts and Culture 2012).

Following the tsunami of 2004, there was a staggering 33% decrease in the number of tourists who came to Maldives. This was the largest downturn that Maldivian tourism industry has experienced since its inception proving that the Maldivian tourism industry is most vulnerable to disasters and similar environmental activities. As the decline of tourists after the tsunami lasted for more than a year, it is likely that the degradation of natural environment caused by tsunami contributed to the decline. Hence, anything that can prevent the tourists who visit Maldives from experiencing the natural beauty of Maldivian environment which they pay a fortune to experience, can greatly impact the tourism industry of Maldives.

3.3 Climate Change

Science and other physical factors have demonstrated that the Earth's climate has changed and is changing since the pre-industrial era. Recent findings by the Fourth Assessment Report of the Inter-governmental Panel on Climate Change (IPCC), (IPCC, 2007a) estimates the global temperatures to rise by 1.8 ^{o}C to 4 ^{o}C by the mid-21st century. Hot extremes, heat waves, heavy precipitation events and storm surges will become more frequent. With the increase in sea surface temperatures, tropical cyclones would become more violent with strong winds and heavy precipitation. IPCC projects a sea level rise of 18 to 59 centimeters between 1990 and 2095 as shown in Figure 4 (IPCC, 2007b). The recent world bank's report (WorldBank, 2012) further corroborates these results concluding that a global warming of 4^{o}C could be seen as early as 2060 and a rise of sea level below 2 meters could be maintained if the warming is kept below 1.5 ^{o}C. These results indicate that if climate change is not accounted for, it could have a devastating impact especially on small island nations like Maldives.

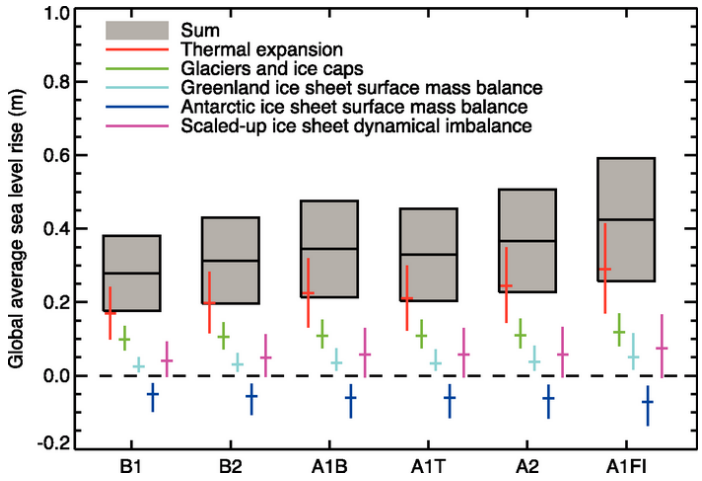


Figure 4: Projections and uncertainties of global average sea level rise and its components in 2090 to 2099 (relative to 1980 to 1999) under the IPCC six SRES scenarios (Adopted from (IPCC, 2007b)).

Downscaled global climate change scenarios onto the local domain also revealed similar results (MEE, 2012). It showed that there would be an increase in temperature and rainfall over the entire country by 2100 (Figure 5) and a greater increase within the central Maldives. Associated with this, extreme events of rainfall are to increase over the entire country which could lead to high levels of flooding.

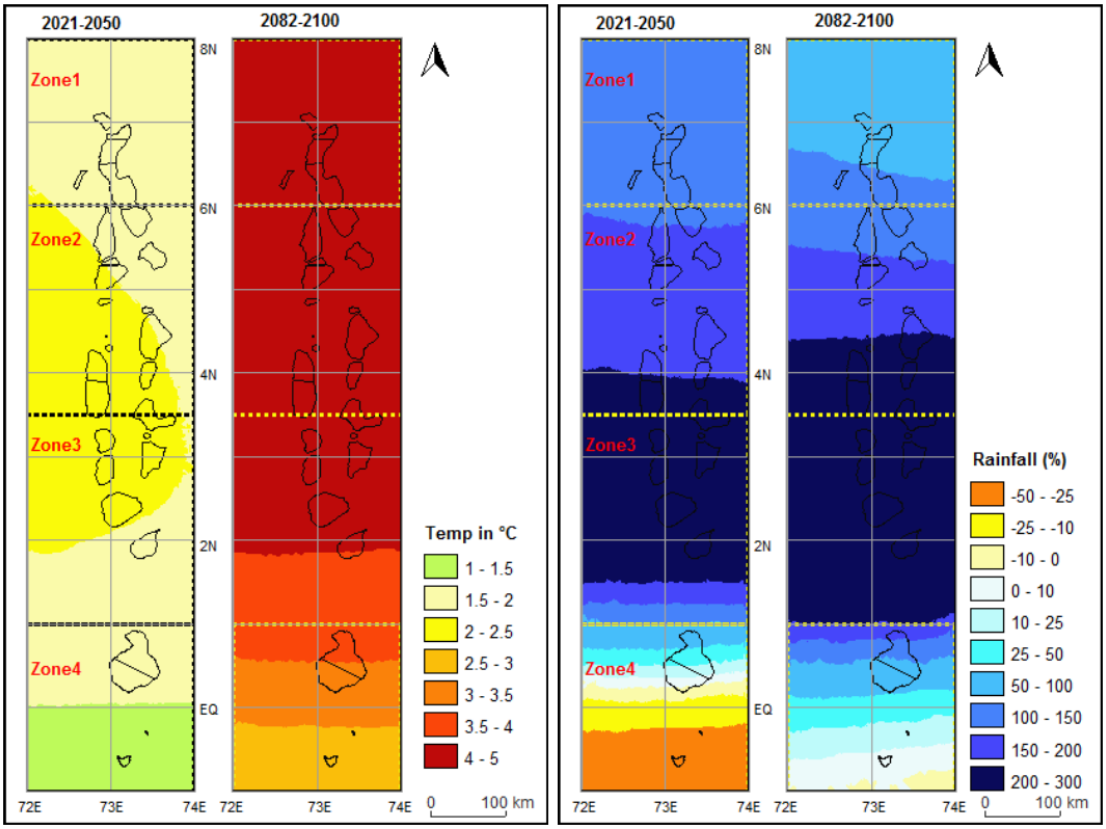


Figure 5: Downscaled future projections of temperature and rainfall for Maldives (Adopted from (MEE, 2012)).

Furthermore, similar to the increase in air temperature, an increase in the sea surface temperature is also predicted, which could have a huge impact on the marine environment. In addition to this, projected change in the maximum sea surface heights indicate that there could be a change as high as 8.2 to 9.5 cm by 2080 from the time frame 1961 to 1990 (MEE, 2012).

3.4 Vulnerabilities of Tourism and Impacts of Climate Change

Climate change has become a global event and a cross-cutting factor in all disciplines of life and tourism is no exception. Since there is a strong relationship between climate change and tourism, it is anticipated that there would be a huge impact on the tourism sector due to the current and future trends of climate change (Nielsen, 2010). Among the tourists, climate has been considered as an important factor in choosing the destination (Hamilton and Lau, 2006). Although tourism has been the economic backbone of especially the small island nations (WTTC, 2007), the linkage between climate change and tourism has been investigated in few studies (Nielsen, 2008, 2010). Due to climate change, there are many factors which could have an impact on the tourism sector.

One critical factor is the low elevation making the islands vulnerable to sea level rise (Abegg et al., (1998) , Agnew and Viner, 2001). Maldives being a low lying nation all the tourist resorts are found on low lying islands. Sea level rise becomes a threat to these investments increasing their vulnerability. Rise in sea level makes these islands prone to beach erosion, salt water intrusion into aquifers. This would lead to loss of land and damage to the fresh water lens of these islands. One of the most important and critical assets of a tourist resort in Maldives is the beach. Approximately 70% of the tourists visit Maldives to enjoy the beaches (MEEW, 2007). A study by Nielsen (2010), to study the vulnerability of beach tourism to climate change shows that the small island nations have a higher vulnerability. United Nations World Tourism Organization (2008) reports that more than 60% of the beaches are facing erosion and encroachment. Since beaches are one of the main reasons why tourists visit Maldives, loss of beach would have a huge impact on this industry. Currently beach erosion is one of the biggest environmental issues in Maldives and this was well iterated by the industry as well.

Sea level rise can also contribute to frequent flooding. MEE (2012) reports that one of the long term risks for the Maldives is the rise in sea surface heights in combination with high tide conditions. Inundated area due to rise in sea surface heights in 2080 during high tide conditions could be between 0.9 to 11.57% over different atolls. Development of a resort would cost several million dollars. A modern resort with a bed capacity of 200 beds would cost a capital investment of more than 43 million dollars (MEEW, 2007). The emerging trend in resort development is that, the modern designs are built with water bungalows and some with underwater facilities within the lagoons. Moreover, due to the small size of the islands

the resort infrastructure is close to the shoreline, usually within 5 meters from the vegetation line. Close proximity to shoreline and some infrastructure within the lagoon subjects them to the risk of sea level rise and high wave action. Ignorance of such risks posed by climate change could lead to severe financial loss.

Other than the sandy beaches of Maldives, the most valuable assets are the reefs. Among the tourists, Maldives is renowned for its beaches and the rich bio-diversity associated with the reef system. Snorkeling and diving are the two main activities among the tourists visiting Maldives. 25 to 35% of the tourists visiting Maldives do visit for snorkeling and diving (Westmacott and Rijsberman, 1996). Since the coral reef environment is very sensitive to the changes in water temperature, any changes in the sea surface temperature would pose a great threat to the reef environment. Due to climate change, bleaching of coral reefs in the diving destinations and sea level rise are known to be the most eminent threats in the tourism dependent small low lying destinations (Nielsen, 2008). The bleaching event of the 1997/1998 El-Nino caused more than 80% coral bleaching in Maldives (Edwards et al., 2001, Sheppard et al., 2002, Spencer et al., 2000) . This bleaching event affected almost all coral species and had a devastating impact on the reef environment of the Maldives. In addition to the threat posed by climate change, more than 65% of the reefs in the Indian Ocean are at risks from local threats. The threats over the Maldivian reefs have shown to increase since the 1998 coral bleaching event (Lauretta Burke et al., 2011). The financial resources brought by snorkeling and diving alone in a year could be more than a million US dollar (MEEW, 2007).

In Maldives, the historic satellite data has suggested an increasing trend in Maldives and the downscaled projections shows and overall increase of SST by 1.27 to 3.4 degrees in the time frame of 2080s (MEE, 2012).

The other threat to coral reefs from climate change is also ocean acidification. It is a phenomenon which leads to decrease in pH in the oceanic water. This hinders the calcification process of shell and coral formation in marine animals leading to incomplete and weak structure. Since this science is new, the detail information specific Maldives in non-existent. But the threat is imminent (IPCC, 2007a).

Despite the obvious vulnerabilities of coral reefs, the impact to the tourism industry might not be that apparent. It is mostly due to the lack of knowledge of the tourist of marine crustaceans. In a perception study it has indicated that 68% of the tourist who visited Maldives in 1998-99 were unaware of coral bleaching event in Maldives that season (Susie Westmacott et al., 2000). The estimated economic loss was around 3 million USD for that year. Thus the impacts of coral bleaching would not affect the industry on a noticeable scale (Susie Westmacott et al., 2000). However the increasing events of El-Nino and increasing overall SST coupled with ocean acidification could lead to an overall devastation to Maldives marine ecosystems in the medium to long term. This would have an impact on larger and

higher profile marine animals which depend on coral reefs (e.g. turtle, sharks and rays) and their population. The effects of this on tourism could be very high. This was demonstrated in 1995 to 1996, the damaged coral reefs of a popular shark diving points which lead to a reduction of revenue of USD 500,000 in a single year (Anderson, 1997). This shows how vulnerable the coral reef environment is and the significance of the impact it can have on the tourism industry and the economy.

Another non-climate related damage is the human interventions with the natural environments. These interventions would offset the natural balance and would exacerbate the impacts caused by climate change. Some of these interventions include careless coastal development, overfishing and destructive fishing and marine pollution. Lauretta Burke et al. (2011) reports that more than 65% of the reefs in the Indian Ocean are due to local activities and nearly 35% of them are under high or very high threat. However, Maldives is classified to be under low threat among the reefs in the Indian Ocean.

In addition to the above, another crucial part of the industry is the scheduling of trips and transportation. Tourism industry in Maldives usually operates on a seasonal basis with peak season running from late October till March and off season from May till August. This is highly corresponding with the general climate trend of dry season and rainy season of Maldives respectively. Since the prevalent mode of transport in Maldives is sea transport, resort transfers and safari activity will be at a higher demand during this season. Usually these transports and transfers are scheduled based on the “Nakai” climate predictions which is the traditional way of weather predictions.

4. Methodology

This chapter presents the methodologies used to assess the vulnerabilities, existing adaptive capacities and gaps in response of the tourism operators and tourism associated communities to the impacts of climate change.

4.1 General Approach

Qualitative data was collected from tourism related published reports, peer reviewed articles, case studies and statistics. Quantitative approach was followed to conduct the baseline study. To collect data statistically representative resorts, tour operators, safaris and tourism associated communities were surveyed using a pre-structured questionnaire. Findings from the surveys were triangulated to obtain the results presented in this report.

4.2 Quantitative Approach

Separate questionnaires were designed for the tourist resorts, tour operators, safaris, tourism associated communities, tourism operators and tourism related policy making bodies. The all four questionnaires were pre-tested with relevant stakeholders prior to actual surveying. Based on the inputs received from the interviewees the questionnaires were fine-tuned to make it more focused and to achieve the objective of the assignment.

Interviews were conducted face-to-face with the stakeholders each lasting between 0.5 to 1.5 hours. Interviews were conducted with managers, technical heads, Island Council and individuals which served in obtaining a holistic view on climate change issues in the tourism sector. Interviews conducted were recorded and transcribed.

4.3 Sample Size

If more than 10% of the target population is covered then the sample size is considered as a statistically significant sample. In this study out of 97 resorts 15 resorts were selected randomly. In addition, safari operators (n=8) and tour operators (n=4) were also selected randomly. Hence the total sample size of the tourism operators is 27.

The second target group was the tourism associated communities. The scope of the study was to understand the impact on tourism associated communities. Hence the sample was only focused to those islands which were near to a resort. Thus, 10 island communities with some form of interaction which are near to the selected resorts were taken randomly.

4.4 Survey Tools

Data was collected through structured questionnaires. The design of the questionnaire was focused on the following areas:

Resort

- Awareness about climate change and vulnerability
- Awareness about policy instruments
- Awareness about financial instruments
- Associated communities
- Existing Adaptation measures

Safari

- Awareness about climate change and vulnerability
- Awareness about policy instruments
- Awareness about financial instruments
- Associated communities
- Existing Adaptation measures

Tour operators

- Awareness about climate change and vulnerability
- Awareness about policy instruments
- Awareness about financial instruments
- Associated communities
- Existing Adaptation measures

Tourism associated communities

- Awareness about climate change and vulnerability
- Financial instruments

Using the field survey a proper understanding of the climate change and adaptive capacity within the tourism sector was studied. This field survey helped to assess the in-depth of following key aspects:

- The general awareness about climate change.
- What kind of threats they consider as climate change related threats and why they consider it as a threat.
- If given a hierarchy, how would they classify the threats?
- How they foresee climate change related hazards would impact their business.

- Have they experienced any of the climate change related hazards and what kind of loss have they have experienced (in physical and financial terms).
- Do they keep a track record or what kind of mechanisms are there if any to record the impacts due to damages
- What kinds of actions they have undertaken if any and what other actions they can undertake to minimize the impacts.
- How would they rank the necessary actions, based on what factors (technical advice, effectiveness, cost etc…)
- If there are no efforts made to address the climate related impacts, what have been the barriers
- Depending on the actions taken (be it physical action or plans) what kind of positive and negative feedbacks have they encountered (for example changes in physical dynamics around the island due to breakwater construction, impact on human and financial resources due to implementation of monitoring plans etc..)
- The awareness about the existing policy instruments (environment, infrastructure tourism laws and regulations building codes etc…)
- What hinders to abide by these laws and regulations and what are their recommendations to the policy makers
- What kinds of financial guarantees (insurance policies, taxes, revolving funds, donations etc…) are in place to tackle climate related impacts.
- How effective are they and about the possibilities for improvement.

In addition to the general view on climate change and its impacts, the tourism dependent communities would be assessed about the relationship they have with the tourism industry, how much dependent they are (social and economic benefits) and what kind of impacts they foresee for the community should there be impacts on the tourism sector due to climate change.

4.5 Quality Control of Field Data

The following measures were taken to ensure the quality of data:

- Training for data collectors and supervisors on ethics and method of data collection,
- Probing techniques to ascertain the relevance and consistency of the answers and wherever necessary elaboration of answers,
- Close supervision of the work, and
- Feedback by supervisors and solution to problems, as and when arisen.

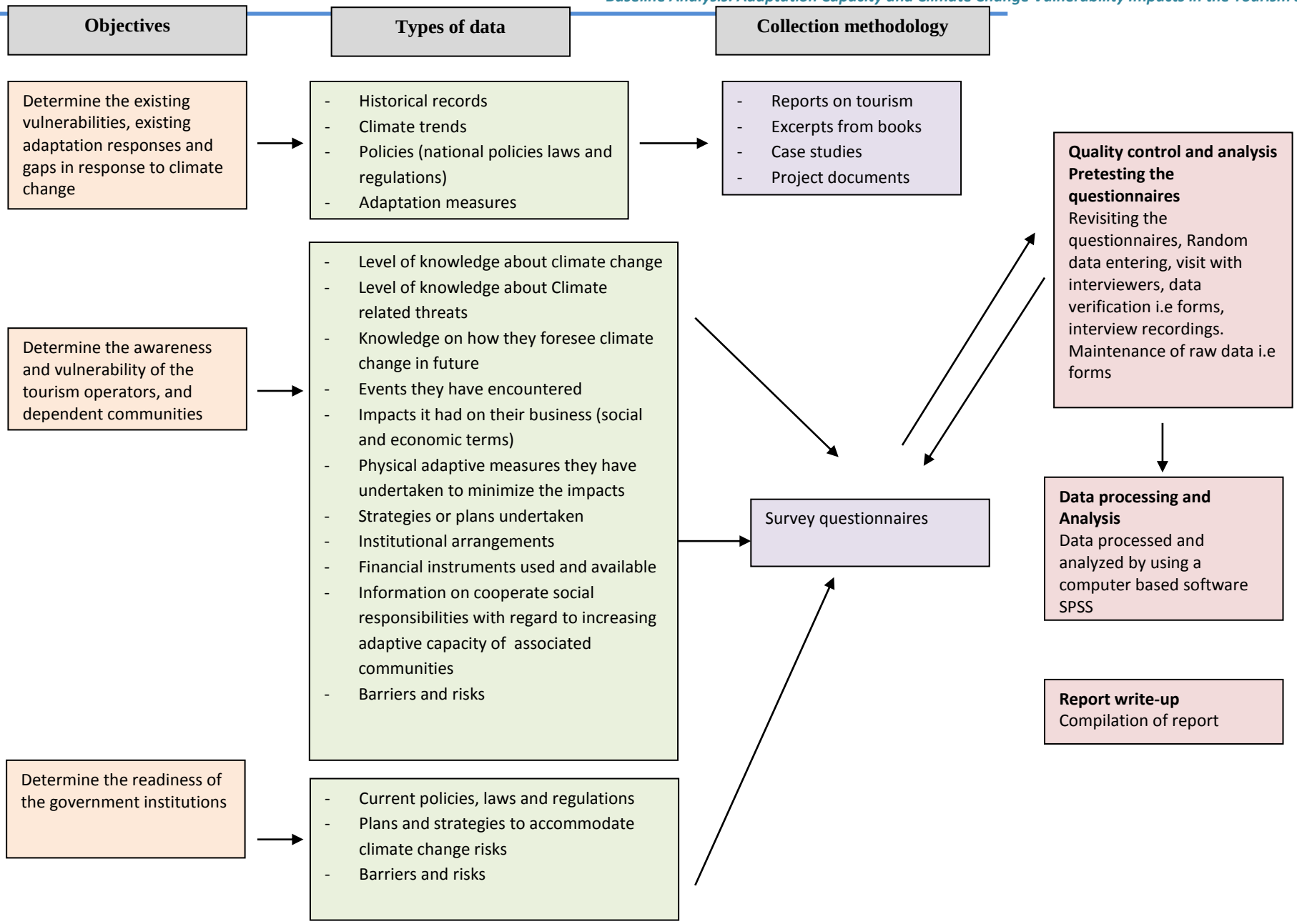
4.5.1 Data Accumulation and Management

Appropriate follow-up mechanisms were put in place to ensure that the data was collected, verified and submitted according to the agreed schedule and sample. After data collection all the completed questionnaires were checked and the data was coded and processed for entry into the computers under strict supervision.

4.5.2 Data Entry, Process and Analysis

A user friendly data entry program was designed using SPSS statistical software following validity, skip and range rules. All the processed data was analyzed to describe the current situation of the targeted groups based on the objectives of the study.

The following schematic shows a summary of the approach undertaken to complete the study.


Objectives
Types of data
Collection methodology
Determine the existing vulnerabilities, existing adaptation responses and gaps in response to climate change
- Historical records
- Climate trends
- Policies (national policies laws and regulations)
- Adaptation measures
- Reports on tourism
- Excerpts from books
- Case studies
- Project documents
Determine the awareness and vulnerability of the tourism operators, and dependent communities
- Level of knowledge about climate change
- Level of knowledge about Climate related threats
- Knowledge on how they foresee climate change in future
- Events they have encountered
- Impacts it had on their business (social and economic terms)
- Physical adaptive measures they have undertaken to minimize the impacts
- Strategies or plans undertaken
- Institutional arrangements
- Financial instruments used and available
- Information on cooperate social responsibilities with regard to increasing adaptive capacity of associated communities
- Barriers and risks
Survey questionnaires
Determine the readiness of the government institutions
- Current policies, laws and regulations
- Plans and strategies to accommodate climate change risks
- Barriers and risks
Quality control and analysis
Pretesting the questionnaires
Revisiting the questionnaires, Random data entering, visit with interviewers, data verification i.e forms, interview recordings. Maintenance of raw data i.e forms
Data processing and Analysis
Data processed and analyzed by using a computer based software SPSS
Report write-up
Compilation of report

4.6 Challenges Faced During the Study

There were several challenges faced in undertaking this study. Every effort was taken to minimize the delay which might have caused due to these challenges.

The unavoidable challenge faced was the timing of the study. The duration allocated for the entire assignment was 2 months and this concern was raised at the inception meeting and it was mentioned that the allocated time is too short for this kind of study. Unfortunately the timing of the field surveys also fell into the last quarter of the year which is the beginning of the tourist season in Maldives. As a result, getting an appointment with the tourist resorts and the safaris was very difficult. When approached to get an appointment, some of the stakeholders mentioned that this is not the best timing for such a study as most of them are very busy trying to make the best use of the season. Therefore provision of a time for such a survey was the lowest priority for them. Especially some safari owners mentioned that they would not be able to give a time unless after 2 or 3 months since they are fully occupied during the season.

Another challenge was made by the associations. All most all of them pointed out that although they have been approached several times for such surveys and interviews that they have not seen any results. They have made many recommendations during such studies and they haven't seen any changes within the tourism sector. Therefore it was very difficult to convince them to give an appointment to have an interview.

Some of the operators were not willing to participate as they think climate change is not a concern for them.

5. Results of the Survey

This chapter discusses about the survey results on climate change awareness among the major players in the tourism sector in Maldives. As discussed by Nielsen (2010), Hamilton and Lau (2006) climate has been considered as important factor and can have huge impacts on the tourism sector. Change in climate and weather pattern can significantly disrupt their tourism activities. Similar to some other small island developing states, tourism is our main economic driving factor. The key components contributing to this factor are the various kinds of tourism operators. The key tourism operators in Maldives are the tourist resorts, tour operators and the live-a-boards/safaris. Since these are the main tourism operators, it is crucial to understand the awareness about climate change and its associated risks among them.

5.1 Group 1: Tourism Operators (Resorts, Safari Operators and Tour Operators)

5.1.1 Awareness

To gauge the awareness level of the tourism operators, they were asked about the causes of climate change. On average 74% (Table 1) of the operators identified that open pit burning and fossil fuel burning as the main causes for climate change. Although they were not very sure of the science behind climate change, they were able to associate global warming with some form of human intervention. However, 15% of them stated that they have no knowledge of the causes of climate change and a considerable amount of tour operators are not aware of basic science behind climate change

Table 1: Causes for climate change by type of tourism operators

Type of establishment	Causes for climate change				
	Open pit burning, fossil fuel burning (%)	Deforestation (%)	Natural Causes (%)	Don't Know (%)	Others (%)
Safari	75	25	0	25	0
Resort	80	33	33	7	13
Tour Operators	50	0	25	25	0
Weighted average	74	26	22	15	7

To get a broader understanding about the level of awareness among the tourism operators, they were asked about the impacts of climate change. As shown in Figure 6, these tourism operators are well versed of the impact of climate change. The most concerning impact identified by the operators was beach and road erosion. This was mostly stated by the tourist resorts. They mentioned that beach erosion has become a severe problem and they do understand that this problem is aggravated by human interventions. The main concern is

due to the fact that beaches of the resorts are one of the main assets to attracting the tourists to the resort. Coral bleaching and increase in extreme events are the next most threatening impacts identified among these key operators.

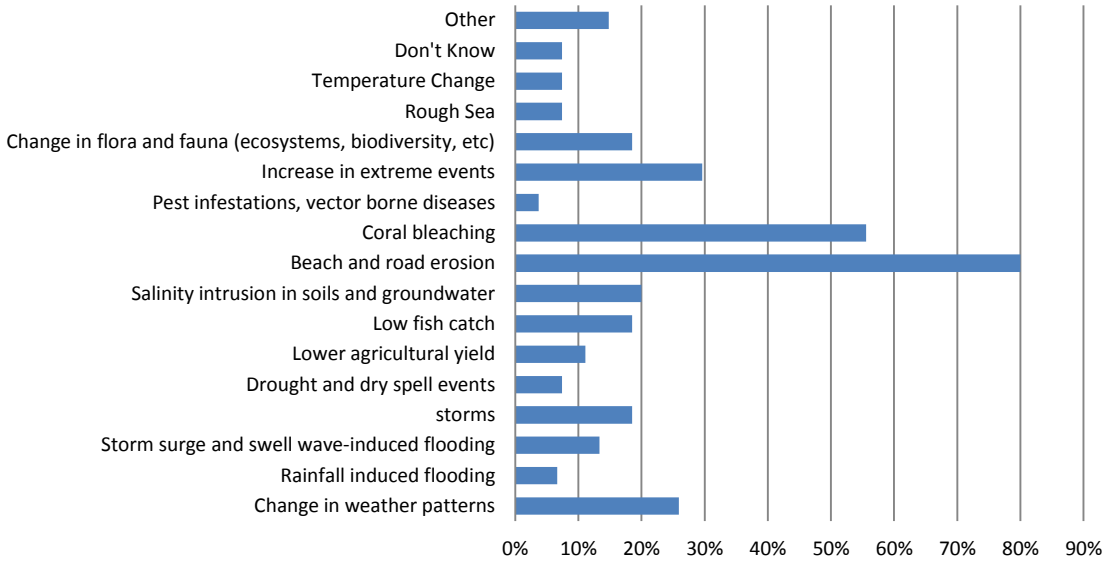


Figure 6: Impacts of climate change among tourism operators

The respondents also stated the above mentioned events as the most commonly observed local effects of climate change. It can be seen from Figure 7 the impact of beach and road erosion and coral bleaching are severely faced by the tourist resorts. They were also able to associate coral bleaching with the rise in ocean temperatures. Change in weather patterns and increase in extreme weather events are the major concerns among the safari operators and tour operators as well. According to the safari operators, the local system of weather or the "Nakai" system used to be very accurate and they were able to predict the weather by then. The changes in the wave and current pattern were predictable and they could locate the fishing and dive spots with reasonable accuracy. They noted that in recent times, the "Nakai" system has failed and predicting the weather has never been easy. The easy to predict June to August rainy season have "shifted" and sometimes it becomes difficult to keep their promises to the tourists. They relate this to a change in climate. This shows that the respective tourism operators are reasonably aware of the effect of climate change related to their concerned economic activities.

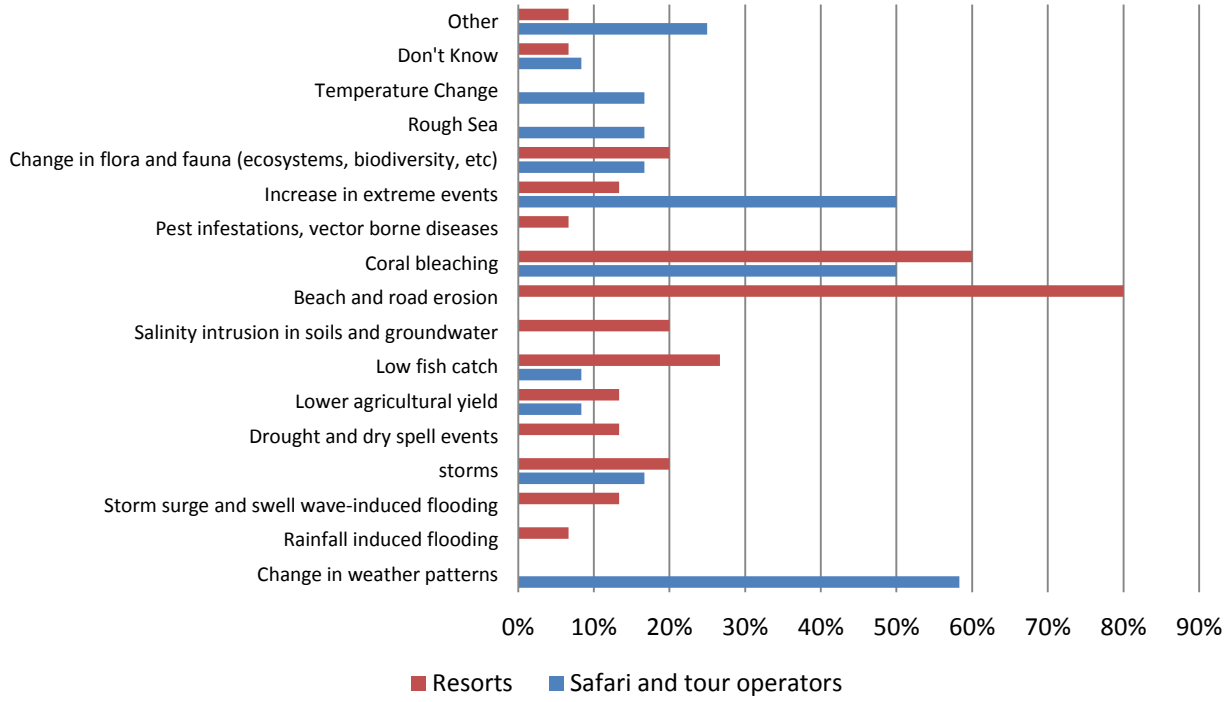


Figure 7: Observed impacts of Climate Change among tourism operators

Subsequently 85% of the tourism operators are aware of how climate change may affect the tourism industry. The tourist resorts are well versed in the adverse effect of climate change while limited knowledge is among safari and tour operators. Notably, a significant amount of tourism operators (15%) still lack knowledge with this regard.

Awareness about policy instruments:

They were also tested about the awareness on policy instruments. As shown in Figure 8, more than 60% of the tourism operators are aware about the existence of Environmental Impact Regulation (EIA) regulations and Tourism Act. This could be due to the fact that compliance with the regulations of Tourism Act are checked by the Ministry of Tourism, Arts and Culture prior to issuing operating license to new resorts, safaris and tour operators while EIA is an integral part of the Tourism Act. However, 2011 statistics of powerhouse registrations from Ministry of Environment and Energy reveal that there were 48 out of 92 operating resorts with unregistered power houses suggesting that although the tourism operators are aware about the existence of the regulations they do not comply with them. This could be due to lack of diligent enforcement (MEA, 2013).

The least popular regulation among the tourism operators appear to be environmental liability regulation likely because it came in to existence in 2011 and it's enforcement was initiated without adequate awareness and media campaigns.

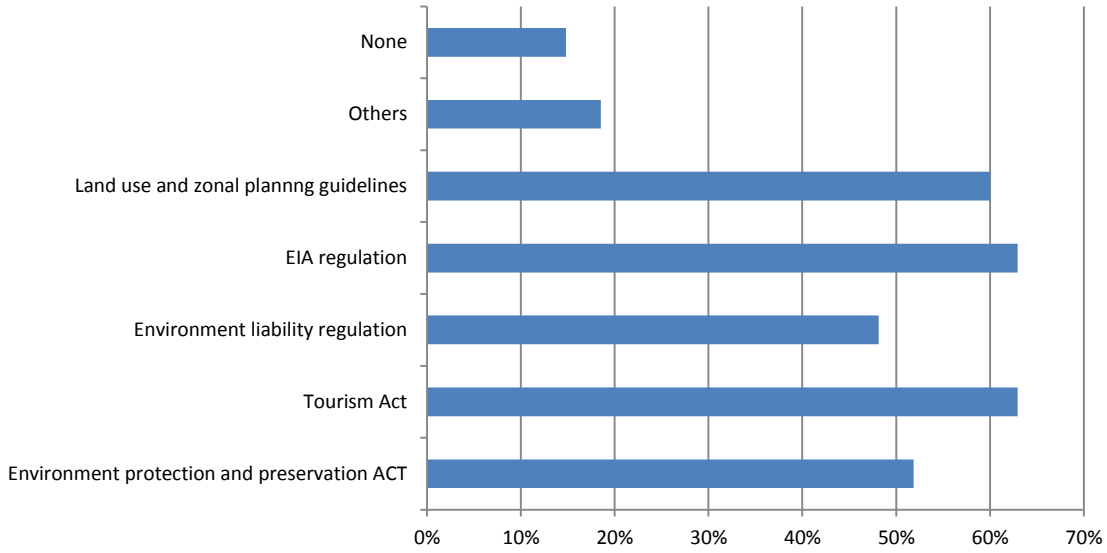


Figure 8: Awareness about environment related regulations related to tourism operators

Among the 3 groups, resorts are generally most aware about the regulations while the tour operators are least aware about the regulations. This is probably because the resorts and safaris are monitored by the ministry while the tour operators are not part of this monitoring process.

While there is varying knowledge of these regulations among different tourism operators, there are some policies which they tend to find difficulty in complying. Most of the tourist resorts stated that they have difficulty in complying with the land use and zonal planning guideline partly because these guidelines came after some resorts were developed. Others stated that they face difficulty in complying with regulations related to employment such as Employment and labor Act.

Since there are no local building codes for development of resorts, the majority of them have complied with international building codes and standards for near shore or underwater infrastructure.

It can be acknowledged that the awareness on policy instruments related to environment and tourism industry is limited. Much work needs to be done to increase the awareness for strengthening the implementation of these guidelines.

Awareness about financial instruments:

Financial instrument is a key component in adapting to the adverse effects of climate change. The survey looked at various types of insurance available for tourism sector in relation to climate change and how aware the different tourism operators are about these types of insurance products available to them.

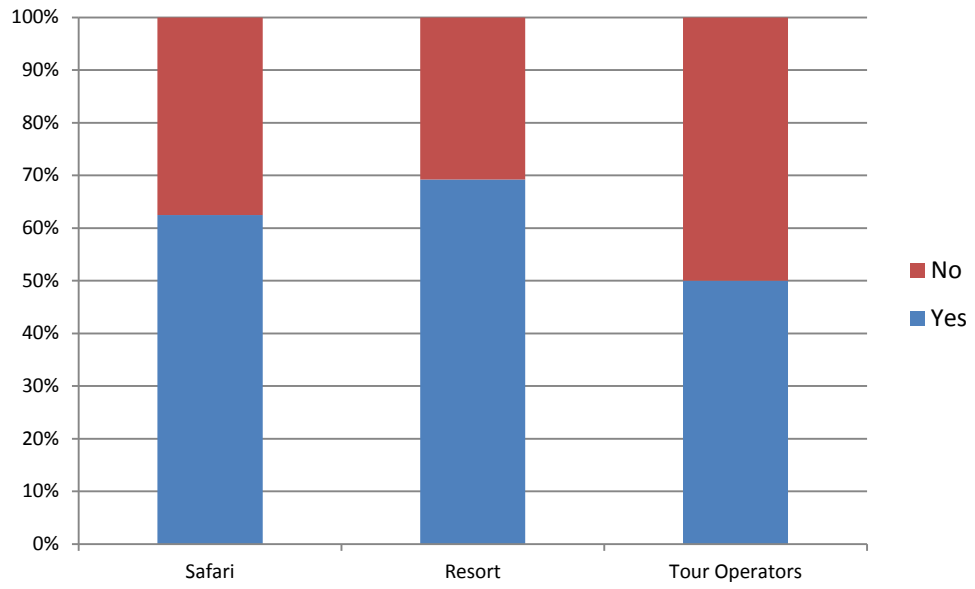


Figure 9: Insurance coverage of tourism operators against climate hazards

As shown in Figure 9, about 69% of resorts have insurance coverage, while 62% of Safaris and 50% of tour operators have insurance schemes already in place. The most popular insurance instrument used by the tourism operators are fire and medical insurance. Interestingly, a significant amount are insured for storm surges, rainfall induced flooding and storms. Since insurance is a form of climate financing and although they are using insurance, some of them fail to recognize that insurance is a form of climate financing and they are already using it. Tourism operators need to be made aware of the types of climate financing and insurance packages relevant to them.

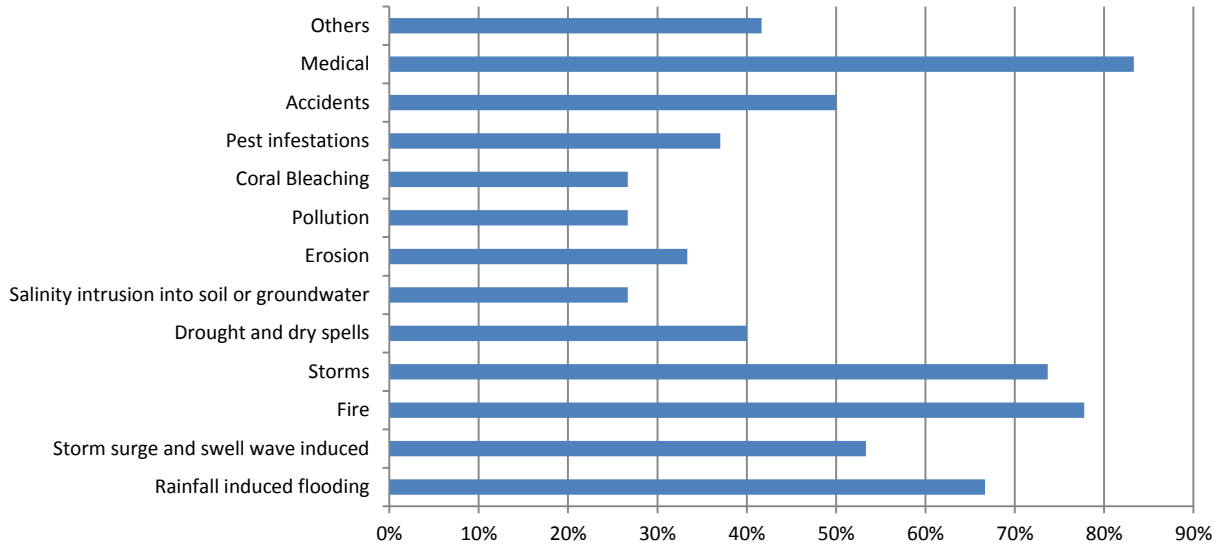


Figure 10: Type of insurance coverage at present among tourism operators

In the tourist resorts, key infrastructures are insured against fire, storm and rainfall induced flooding. Among safaris, the vessels have been mostly insured against fire, medical and pest infestations. All the tour operators have provided medical insurance for their staffs.

Similarly, in the resorts, transport services and on-land tourist infrastructure are mostly insured. Desalinated plant, power and engine are insured in the safaris. Tour operators have paid particulars to insure staff, office premises and transport vehicles.

Insurance against the climate catastrophic event requires availability and affordability of insurance on a long term. In light of this, most of the tourism operators agreed that more insurance products for climate risk should be available in the Maldivian market. 75% stated that there are preferences for certain risk insurance for which currently there aren't insurance products available in Maldives. Among the resort sector, this includes insurance for mostly erosion and pest infestations. Safaris look forward to have insurance for pollution, coral bleaching and storms.

Surprisingly a substantial number of participants stated that they have no other mechanism in place or planned to address the risks of climate change apart from insurance. It was found that only 19% of the tourism operators have other types of financial mechanisms in place for addressing climate change and other environmental issues. These include tourist donations, environmental fees and revolving funds.

5.1.2 Impacts and Vulnerabilities

Tourism in Maldives heavily depends on its natural beauty. The natural environment is the main asset attracting tourists to Maldives. With the change in climate, the dynamical changes brought to the beach environment, the rise in sea surface temperatures damaging the reefs and extreme weather events would make the industry to face the consequences of climate change. In this regard, the survey also looked into how climate change can affect Maldivian tourism industry.

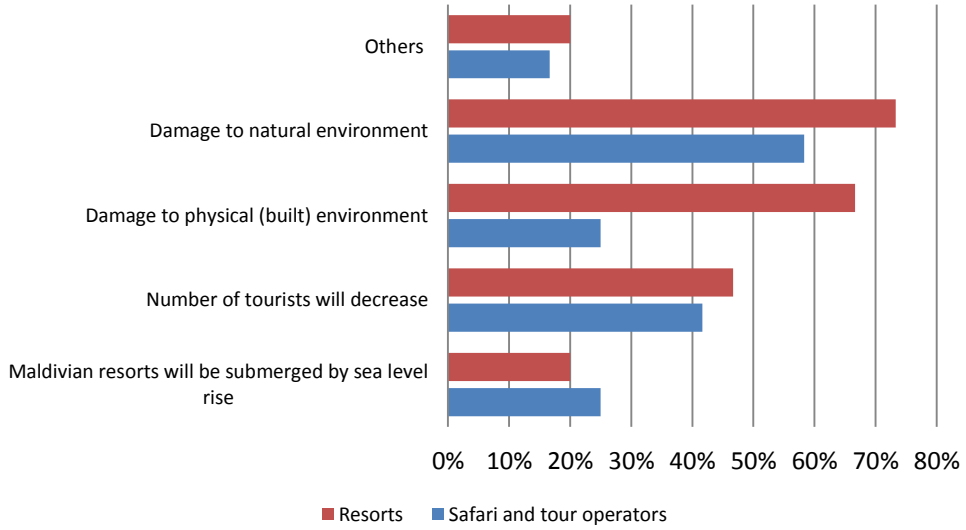


Figure 11: Perspective of how climate change may affect tourism industry among tourism operators

According to Figure 11, damage to natural environment is the highest concern among safari's and tourist resorts. Another major concern among the tour operators is that climate change can decrease the number of tourist arrivals. One of the arguments put forward by them is that most of the tourist arrivals to Maldives are from Europe and that they are more aware about climate change and degradation of the natural environment might prevent them from repeating their visits to the Maldives. Thus, this might have an effect on the number of tourist arrivals.

Although the tourism operators are aware of the climate change and the associated impacts, only 78% of the surveyed population expressed that it is a concern for them. The rest do not foresee that they need to be concerned about the adverse effect of climate change. In light of this, the tourism operators were also asked whether they were aware of actions that can be taken to protect their business from effects of climate change. Interestingly, 78% of the respondents stated that they are aware of actions to adapt to climate change. This indicates that those concerned with climate change are the ones who know how to adapt to climate change. It is also seen that only a relatively small percent of the tourism operators see that the resorts will be submerged by sea level rise. Although

most of the tourism operators are aware about climate change, they might not be aware of the scale and magnitude of the impact.

The survey also looked into how climate change can impact tourism activities among those who stated that climate change is a concern. Figure 12 shows that majority of the resorts and safaris are concerned with impact on tourist activities like diving and snorkeling followed by the impact on bed occupancy. This is closely associated with the foreseen damage to natural environment as shown in Figure 11.

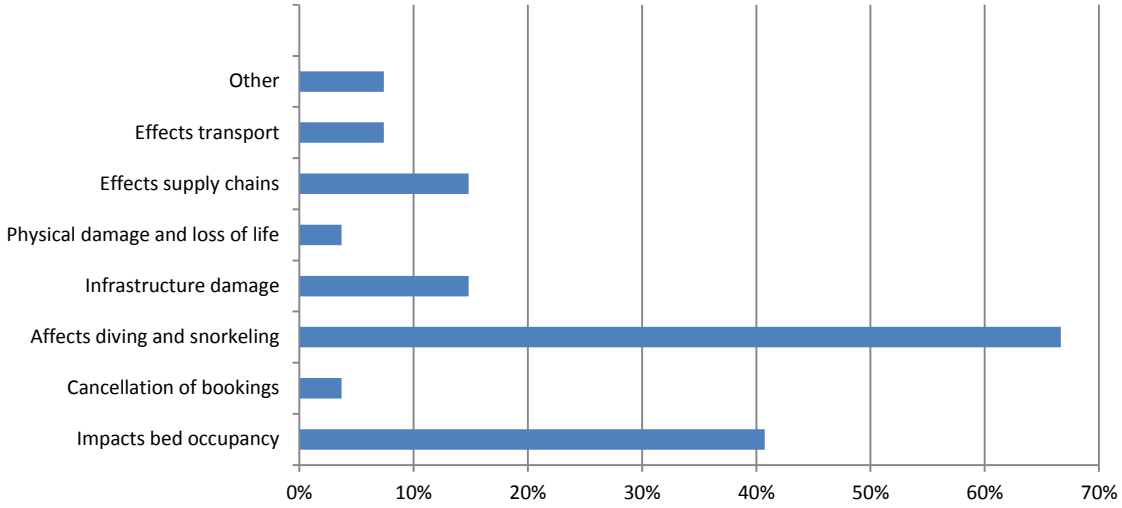


Figure 12: Impact of climate change on tourist activities among tourism operators

Climate defines the length and quality of tourism season (UNWTO, 2008). In this context different adaptation and mitigation measures needs to be taken by tourism operators to contend with this challenge. Among resorts, the first and foremost priority measure is coastal protection followed by beach replenishment. Safaris have paid particulars to improving and repairing engine and vessels, increasing staff capacity and to insure their assets. Similarly among tour operators, increasing staff capacity and insurance ranked high. Overall less priority was given to development of disaster standards of procedures (SOPs) and redevelopment/ upgrading of existing infrastructure to adapt to climate change among all. This indicates that tourism operators have prioritized to address climate change effects in the immediate short term while for long term sustainable adaptive measures are given less priority.

One of the most important measures of tourism adaptation to climate change should be oriented towards investment in protecting key infrastructure and other assets. Strikingly, only a few of the tourism operators have made any investments to protect their key infrastructures from climatic hazards. Figure 13 shows that highest number of investment for climate adaptation is from the resorts followed by safaris.

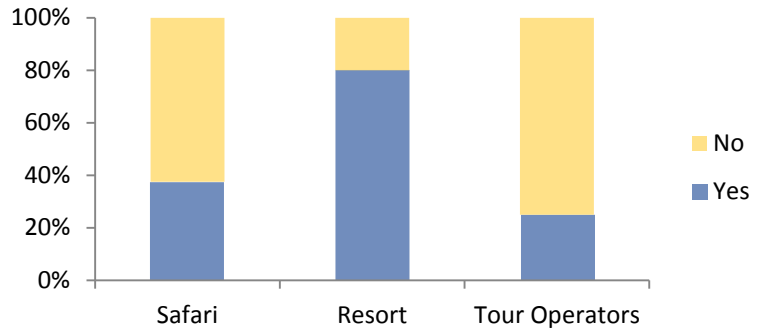


Figure 13: Investment on protection of key infrastructure from Climate Change among tourism operators

The reasons owing to this are many. Majority of these tourism operators do not have the technical expertise or know-how on addressing climate change. 30% of the tourism operators stated that there is a lack of appropriate technology to invest on. Financial constraints accounted for only a relatively small amount of 20%.

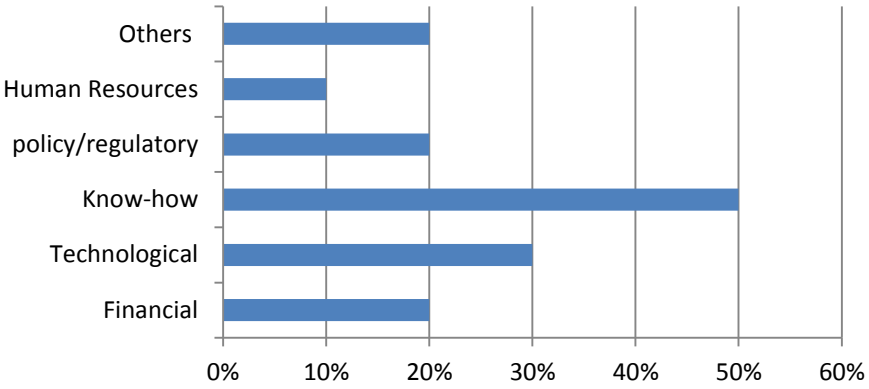


Figure 14: Barriers for climate adaptation investment among tourism operators

Among those who have made investments to protect key infrastructure from climate hazards, 67% carry out investments regularly while others feel that, such investments is necessary only once. This might partly attribute to the fact that the tourism operators do not have the necessary knowledge to carry out investments on a regular basis.

Investment for protecting any infrastructure involves decision made within the organization. The baseline survey showed that investment decisions are mostly taken at top level, usually by the owner. In the resort sector, a few times the decisions are left with General Managers. Among tour operators decisions are made by the local partners. In rare instances, resort engineer has been engaged in such decision making.

These decisions often rely on the guidance provided by external expertise. This is most common in the tourist resorts, as most of the resorts are managed by foreign investors. For safaris and tour operators, the decisions are taken based on the guidance provided by the internal management.

The sustainability of an investment refers to its ability to continue generating benefits into the future. Consequently the crucial role of additional investments taken against climatic hazards determines the viability of tourism industry. The safaris totally agreed that this would be a viable investment for the business. There was a semblance of consensus among resorts and tour operators as 88% saw it as viable while the others stated that it would incur loss for the business.

The economic losses from vulnerabilities often related to climate hazards need also to be considered. According to Figure 15, over 60% of the losses incurred due to climate hazards have not been quantified by any of the tourism operators.

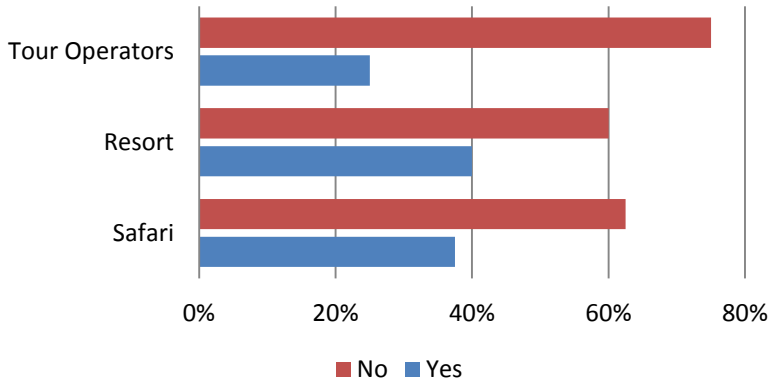


Figure 15: Quantifying aggregate losses in financial terms for tourism operators

5.1.3 Associated Communities

Tourism operations are usually carried out with a close collaboration with the neighboring communities. 89% of the surveyed tourism operators interact with the nearby communities for various purposes.

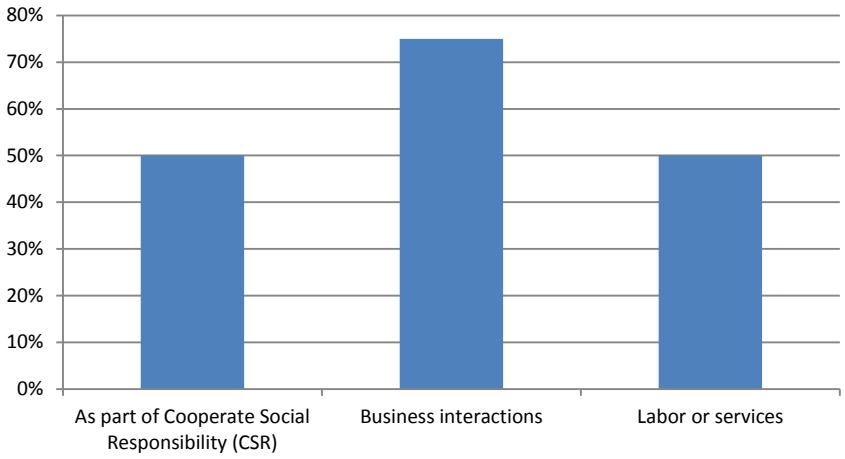


Figure 16: Interaction between tourism operators and the communities

As shown in Figure 16, most of the tourism operators interact with the nearby communities for business. Results show that resorts associate with these islands as part of CSR as well as for business interests.

The contribution from tourism operators to the islands takes place in various forms. Among it the most popular type of interaction is the job opportunity created for the local community as illustrated in Figure 17. Resorts in particular also give priority to soft community development and educational activities for the islands. Similarly, safaris assist the island in the same way. They also contribute a substantial amount to celebrations of special days where the tourists can visit and experience the cultural and community life of the people.

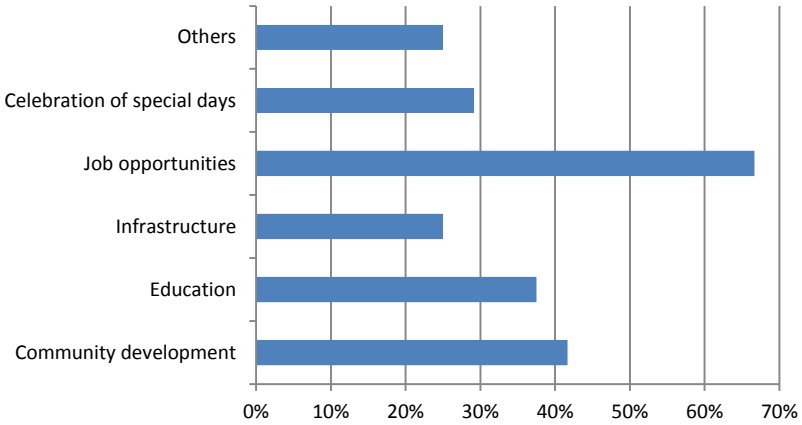


Figure 17: Types of interactions between island communities and tourism operators

In Maldives, the island communities are dependent on the nearby resorts for jobs and other community activities. Communities have also highlighted that two third of assistance received by resorts in relation to climate change is part of their CSR aid. It is thus important for these resorts to be also aware of climatic hazards related with these islands. According

to survey results, 85% of the tourism operators are aware of climate change implications on the communities. And 76% stated that if a nearby community is affected by climate related hazards, it would impact their business as well. However, most of the safaris do not believe that the impact on nearby communities would impact their business activities.

According to the results health hazards would pose a problem for the resorts as well as for the safaris. An outbreak of vector borne diseases (e.g. dengue) in nearby community would affect the staff turnover as well as tourist excursions.

The resorts play a huge participatory role in the development of these island communities and vice-versa. Among many benefits which they derive from these communities include health care benefits followed by agricultural supplies, staff accommodation and transport sharing. As shown in Figure 18, over 80% of the safaris mainly use the harbor and docking facilities for their vessels where else resorts rely on the health center benefits associated with these communities.

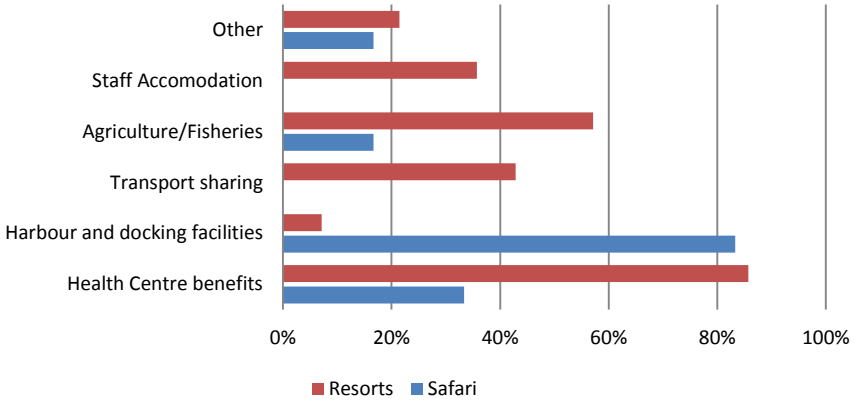


Figure 18: Benefits derived from island community among tourism operators

The survey also asked the tourism sector what further benefits they would like to derive from these communities. Among the stated options, all the tourism operators looked forward for improvement in medical facilities and staff accommodation. Interestingly, the number which stated 'others' was highest. This included better waste management, harbor security, island hopping and visits to agricultural wetlands. Some also looked forward for trained capable staff from the island community.

5.1.4 Adaptive Capacity

This section discusses the assessment of the adaptive capacity of the tourism operators based on the impacts and vulnerabilities discussed in previous sub-sections.

Figure 19 shows the existing different contingency measures among the safari and tour operators. These measures are also classified as some adaptive measures taken to address

the climate related hazards. It shows that among the safari operators three crucial climate change adaptive measures, which are the backup navigation system, communication facilities and backup power systems, are ensured.

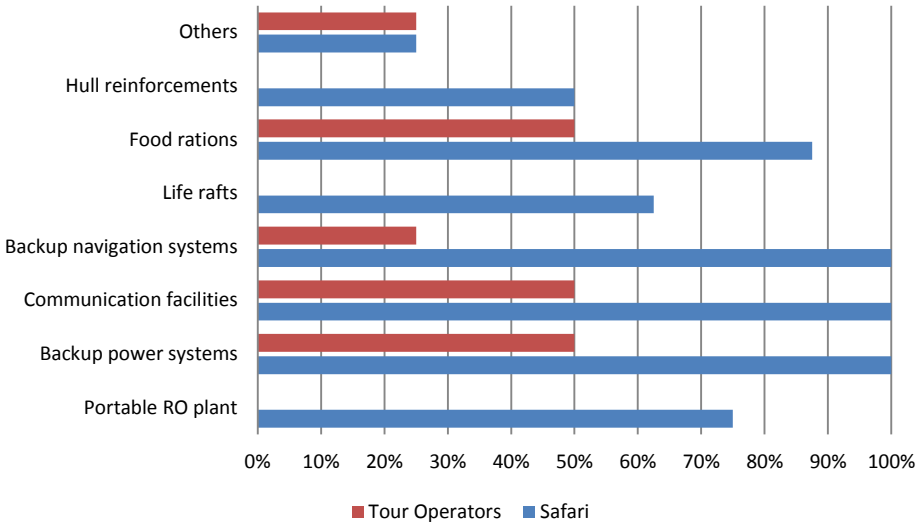


Figure 19: Existing contingency measures for different types of risks among tourism operators.

In safaris the resource management is a key part of their daily operations. In this respect the survey also looked into how some of the resources were managed on the safaris. Table 2 below illustrates the different sources and uses of water in safaris.

Table 2: Water resource utilization on safaris

Type of water	Purpose of use			
	Drinking (%)	Washing (%)	Flushing (%)	Others (%)
Rainwater	0	38	0	Shower & cooking
Desalinated water	0	75	50	-
Bottled water	100	0	0	-
Sea water	0	0	38	-
Not stated	0	0	13	-

It is interesting to note that on all the safaris only bottled water is used for drinking. Although desalination plant is available on all the safaris it was revealed that only 25 % of them test the quality of the water. This could be one of the reasons why desalinated water is not used for drinking. As bottled water is carried onboard in limited quantity, it could get exhausted during an event leading to a shortage of potable water thus increasing their vulnerability.

There are aspects, which could increase the resilience or the adaptive capacity of safaris to the impacts of climate change. These include hull reinforcement, provision of proper life rafts and water quality testing. However this has not been implemented among most of the safaris, probably because these measures are not mandatory under the current set of rules and regulations. Comparative to the tour operators the number of adaptive measures taken by safaris are more. However, due to high exposure of safaris to the impacts of climate change, the overall vulnerability of safaris are high.

In resorts, the most popular climate change adaptation measure is coastal protection. As shown in Figure 20, seawall is the most common coastal protection measure existing in the resorts. Beach replenishment accounted for 60% while only 20% account for beach revetments.

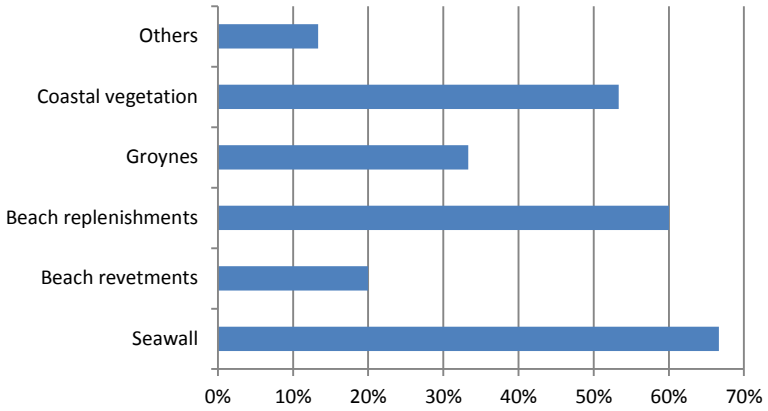


Figure 20: Coastal protection measures taken in resorts.

The types of seawall mainly consist of corals, rocks, cement bags and concrete. The different types of revetments used in the resorts include sand cement bags and concrete. In resorts where beach replenishment is carried out, it is mostly done on a daily basis while in others it ranges from once in every three months to being carried out annually.

Where beach replenishment is carried out, the sand is taken from either resort lagoon or from nearby sand bank/lagoon. In few instances, the sand is taken from nearby Community Island. Results indicate that 29% of the resorts see their coastal protection measures ineffective.

Groundwater is used for gardening and washing. The main source of drinking water is desalinated and bottled water. Desalinated water is more common and used for gardening, washing and for toilet flushing.

Table 3: Water resources in resort

Water resource	Drinking (%)	Gardening (%)	Washing (%)	Others(%)
Rain water	27	27	20	27
Ground Water	0	7	7	0
Desalinated Water	80	47	93	27
Bottled Water	80	0	0	0
Recycled Water	0	27	0	7

In resorts where desalinated water is used, the brine is usually discharged outside house reef. There are some resorts where the brine is discharged into the lagoon. None of the resorts used the brine for any another purposes. However recycled water from the sewerage systems is being used in some of the resort. It is limited to gardening and flushing.

Further information was gathered on the type of sewerage system and the level sewerage treatment that exists in the resorts. Figure 21 shows that more than 85% of the resorts uses some sort of Sewerage treatment plant (STP). Majority of the resorts had gravity system while few had soak pit in place. And 2/3 of the resorts use secondary or a higher level of treatment. This level of treatment allows the resort to utilize the water for other non-potable purposes as highlighted in Table 3. The sludge from STP is mainly composed and used for agricultural purposes from the resorts.

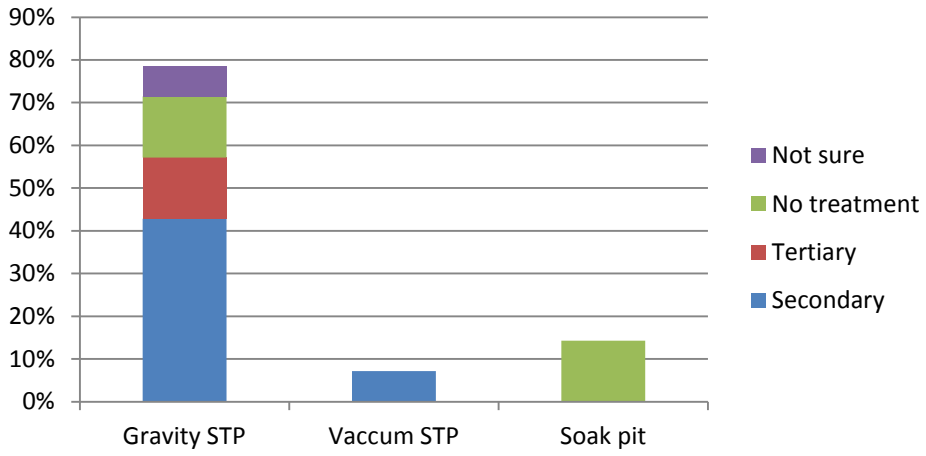


Figure 21: Sewerage system in resorts

Overall water resource management in resorts appear to be good and low consumption and reliance of ground water makes the resort very resilient against salt water intrusion or any other ground water related impact. Also the presence of desalination plants in all resorts eliminates the risk of water shortages on these resorts.

The survey also looked into the waste management practice used in resorts and safaris. Establishing waste management across the country is an ongoing process. Most islands have waste areas that vary in quantity and have no means of processing or removing trash from

the garbage area. The type of waste management facilities are much established in the tourism sector as shown Figure 22.

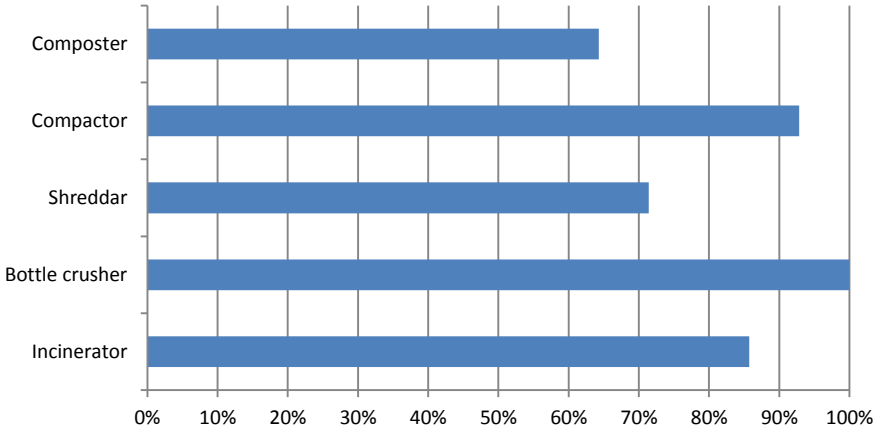


Figure 22: Waste management facilities in resorts

Most resorts have number of facilities established for waste management but the usage is limited by the operation cost. This was well expressed by the resorts as well as safaris when asked about different waste management practices. As shown in Figure 23 most operators practice sustainable waste management and waste reduction practices like waste segregation, composting. It also shows that they do attempt to reduce the amount of waste by managing most of the waste as much as possible on the resort with composting and incineration. But ultimately nearly all of resorts and safaris end up carrying much of their waste to a waste management center. Much frustration was expressed by tourism operators on the delay of setting up additional waste management centers distributed throughout the archipelago.

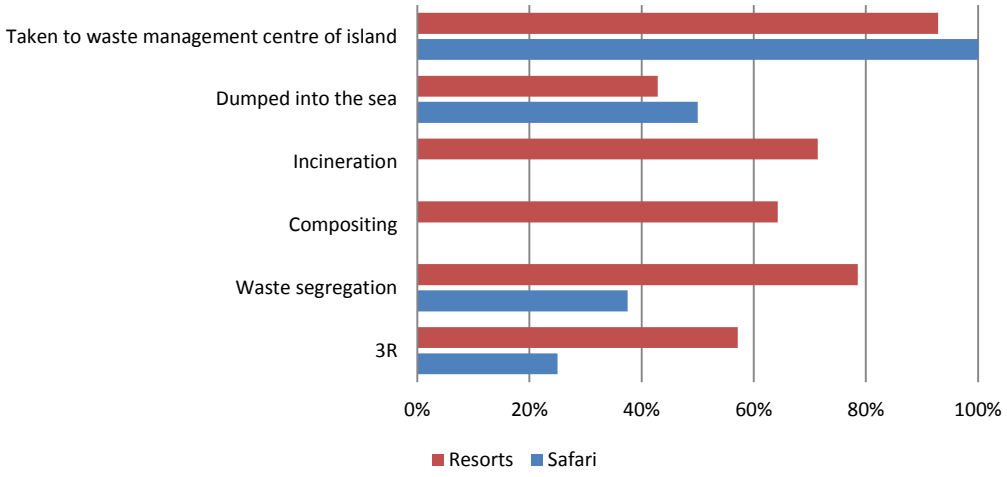


Figure 23: Waste management practices in resorts

Since the impact of climate change will vary depending on land management and resource use the survey also explored this among the tourism operators. This means that long-term planning policies and decisions about land use need to take climate change into account to ensure that impacts and conflicts are minimized and the opportunities maximized. As such the resorts were asked if they have taken into account the climate vulnerabilities of the island in the development or redevelopment of the resort. 53% said that they have and 27% said otherwise. 20% of the population was unsure whether the vulnerabilities were taken into consideration at the time of development.

Based on this and previous discussions in this subsection, it can be drawn that most tourism operators are equipped with tools for proper climate change adaptation. Although some of it are unintentional. But the proper practice and application of these tools are not 100% effective. For example almost all tourism operators do have a Standard Operations Procedure (SOP) for disaster incident but it is practiced at a regular basis by most operators.

In order to determine the reliance of local climate services the results showed that over 80% of tourism operators sought the service of local weather services from Maldives Meteorological Services. There were some who used other weather prediction services as well as own experience. And many used multiple sources of weather prediction services to improve reliance as well. In the survey attempt was also made to determine the reliance of MMS prediction and the results are illustrated in Figure 24. The reason for tourism operators to use other sources of weather prediction is obvious when nearly 44% of the tourism operators do not find the services reliable enough.

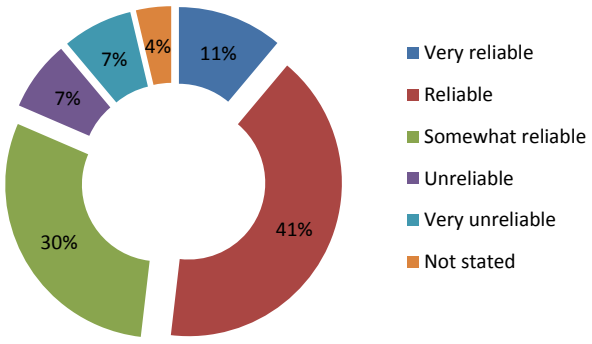


Figure 24: Reliability of Local weather prediction services of MMS

In order to explore further the adaptive capacity of tourism operators the survey also looked into the power generation in the industry as it is the driving force behind many important adaptive measures such as desalination plants. Safaris and resorts are all equipped with its own power generation facilities with complimentary backup systems. Thus making these operations of resorts and safaris self-sustained with proper supply of fuel. With rising

electricity and fuel prices, there is vested demand to invest in other sources of energy. Wind, solar and wave energy are some of our most promising options.

The survey revealed that 64% of the resorts do indeed use solar energy while the rest still used current method of energy sources. Solar energy is mainly used for electricity and water heating. Only 13% of the safaris use renewable energy (RE). This is again mainly used for water heating. None of the tour operator have yet invested in RE.

Looking at the future plans for RE investments, the tour operators are most keen to invest in this type of energy. 64% of the resorts have additional plans for RE while among safaris 71% stated that they have plans for RE investments. This is a good sign as diversifying sources of energy decreases the vulnerabilities of the tourism operators.

The sustainability of investments depends on good environment practices. This requires continuous environmental activities within the tourist industry. The survey revealed that some monitoring checks are in place among the resorts as shown in Figure 25. Most of these activities are carried out on a daily basis with the use of internal dedicated staff. Some specific monitoring which is required (like monitoring required for Green globe award or EIA monitoring report) is done mostly with the assistance from external consultants.

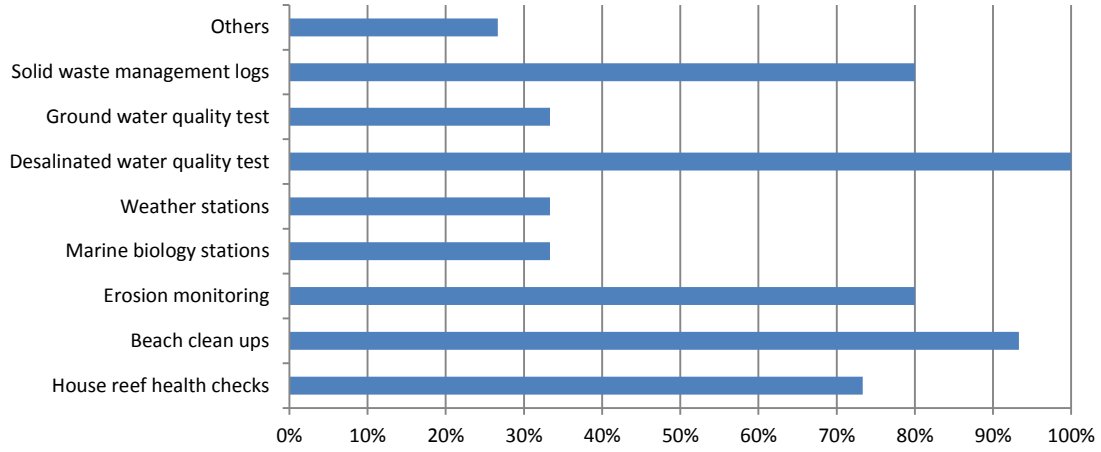


Figure 25: Environment Monitoring and conservation activities in place for resorts

5.2 Group 2: Tourism Dependent Communities

Tourism is a phenomenon that has implications on the environment, tourists and the local population of the destination (UNWTO, 2013). Hence, any impact on one of the stakeholders of tourism is shared by all its stakeholders. Impacts of climate change on tourist resorts are very likely to affect the associated communities that depend heavily on these resorts for economical and other benefits. Similarly, vulnerabilities of these associated

communities are very likely to disrupt the operation of the tourist resorts and other tourism operators.

To gain a holistic understanding of impacts of climate change on the tourism sector, it is crucial to understand how climate change impacts the tourism associated communities. Hence, the survey aimed to understand the awareness level, impacts, vulnerabilities and adaptive capacities of the tourism associated communities of Maldives.

5.2.1 Awareness

The survey showed that, in general, all the tourism associated communities of Maldives are aware of climate change. However, this understanding is likely to be at a very basic and a superficial level mostly thought the hype of climate change on media.

When asked to identify the impacts of climate change experienced by the communities, 60 percent of the communities stated rainfall induced flooding, drought and erosion of beaches. As seen in Figure 26, the communities were able to identify the commonly discussed impacts of climate change as the impacts are experienced by them. However, impacts that are less common and seldom discussed in the local media, such as coral bleaching, and salinity intrusion of groundwater was not identified as an observed impact of climate change. What makes this further interesting is that most of these communities are facing salinization of ground water but most of them are able to relate this only to population increase and improper sewerage systems.

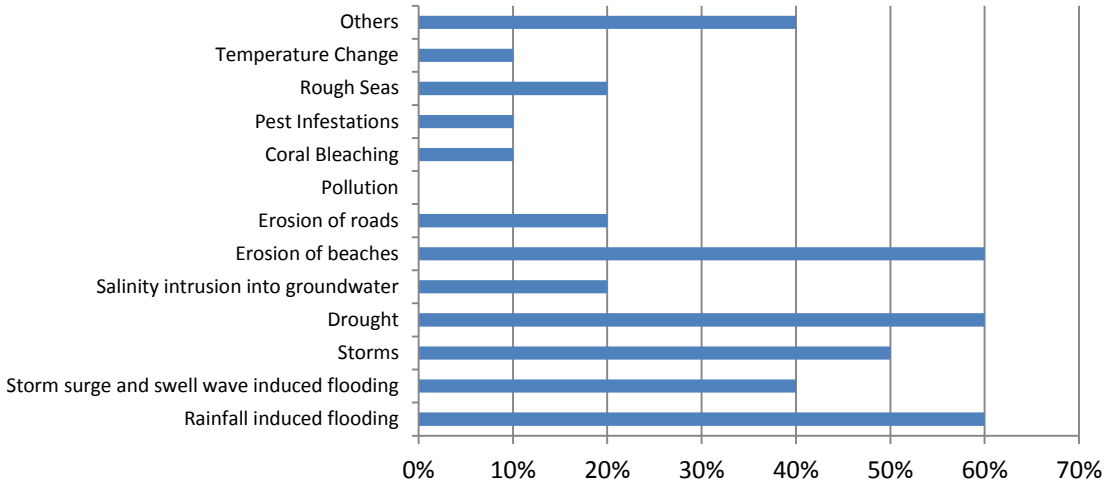


Figure 26: Observed impacts of climate change among tourism associated communities

5.2.2 Vulnerabilities

As shown in Figure 26, rainfall induced flooding, storms, droughts and beach erosion are faced by more than 50% of the tourism associated communities. These are impacts of climate change that can have devastating effects on the communities. According to the communities, the most devastating impact of climate change faced by the communities is rainfall induced flooding. This is expected as most of the households and infrastructure in the communities are not built with adaptive capabilities to flooding. As seen in Figure 27, rainwater induced flooding also causes loss of income. This loss is likely to be most crucial in the farming communities as many farming islands have reported damages to farms and crops caused by rainwater induced flooding (IFAD). The second most devastating impact of climate change on the communities is storms. Storms are a great threat to the households and other infrastructure of the island communities as they are not built with resilience to withstand the strong winds caused by storms.

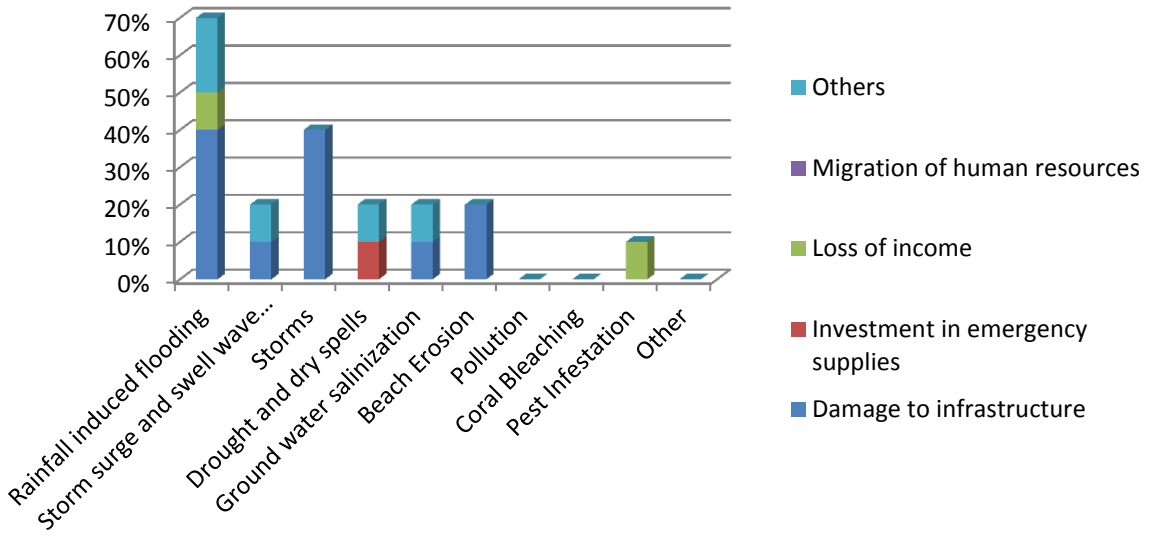


Figure 27: Loss by impacts of Climate Change among tourism associated communities

The largest loss to the communities by impacts of climate change is caused in the form of damages to the infrastructure, which constitutes 60% of the all the losses identified by the communities (Figure 28). This further highlight the lack of adaptive techniques built in to households and infrastructure of the communities. Loss of income is also identified as a crucial loss. This is likely due to the fact that the most common livelihood activities of the communities such as farming and fishing are greatly affected by impacts of climate change such as intensified storms and other extreme events. It is important to note that the impacts of climate change have not escalated to the level where the communities had to migrate elsewhere.

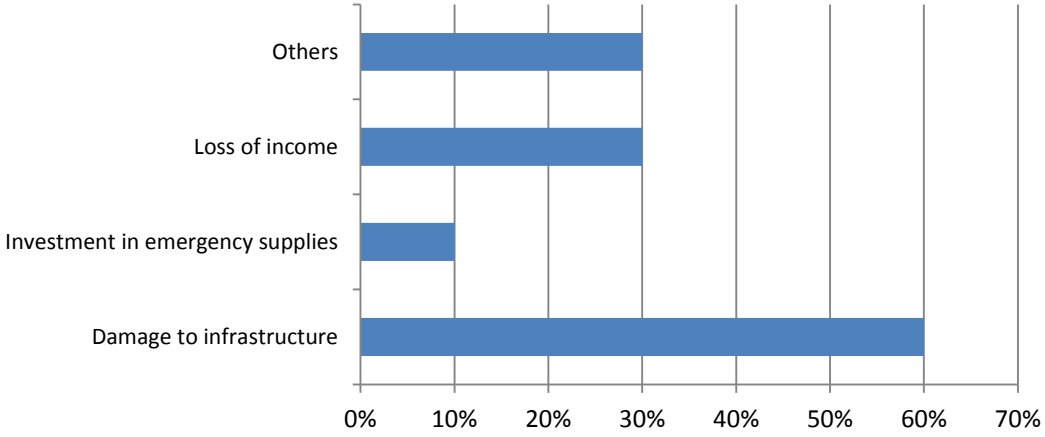


Figure 28: Types of losses among tourism associated communities

It is evident that the communities are keeping track of losses caused by impacts of climate change. However, to effectively and proportionately address the issue of climate change at a national and policy level, it is important that these losses are translated in to financial figures. It is encouraging to learn that 70% of the communities are keeping track of their financial losses due to impacts of climate change.

According to the communities, damage to property puts the biggest constrain on their income (Figure 29). As previously noted, 60% of the losses to the communities by the impacts of climate change are due to damages to infrastructure. Although on some occasions these infrastructure that are damaged are not owned by individual community members, on many occasions, it is the households that are damaged. Repairing the damages to the households cannot be a financially easy task to these communities who do not earn exorbitant incomes. Losses to agriculture and fishing caused by climate change are expected to put a stifle on the less than average incomes most of the community members earn as most of them are fishermen and farmers. Also, the needs for extra expenditure such as water and hospital charges that arise after climate change induced extreme events tend to squeeze the little savings that the community members possess.

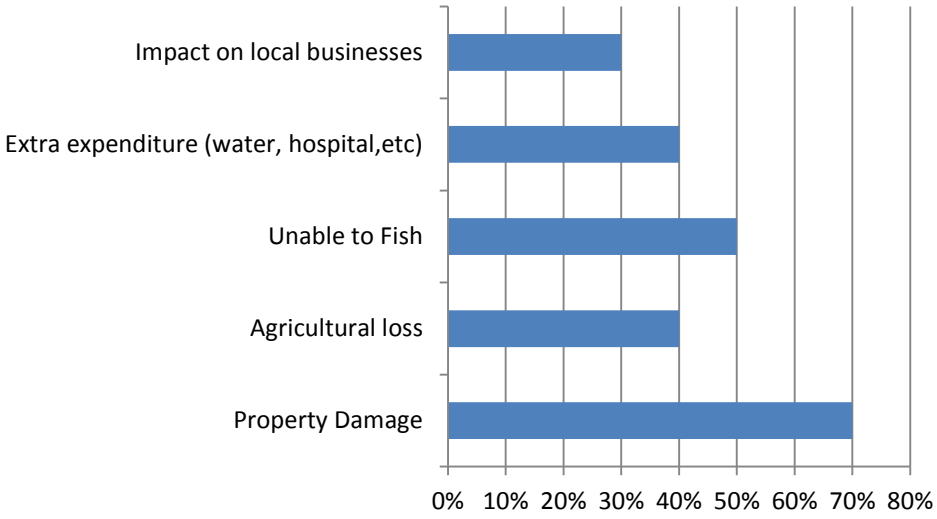


Figure 29: Affect on income among tourism associated communities

To convince the communities to adopt more robust adaptive measure to combat the impacts of climate change and to reduce the losses they face, it is important to find out whether they believe the issue of climate change is going to exacerbate in the future or not. As expected, all the communities stated that the intensity of damage caused will become more frequent and stronger in the years to come. They have recognized that the traditionally well-known June-July months of rainy season or the local "Nakai" system have been disturbed and are unpredictable. They also acknowledge that they have started to experience extreme events more frequently and expect it to become more frequent and dangerous.

5.2.3 Adaptive Capacity

As shown in Figure 30, communities have mostly taken action in the area of education to cope with the impacts of climate. These actions are most likely to be in the form of awareness programs and educational classes. Recently, awareness campaigns organized in the communities by NGOs and knowledge activities carried out in school for students have played a huge role in addressing climate change at the local level.

The second most popular action against impacts of climate change is investment in coastal protection, agriculture and utilities. Investing in coastal protection has been a priority for Maldivian communities for a very long time.

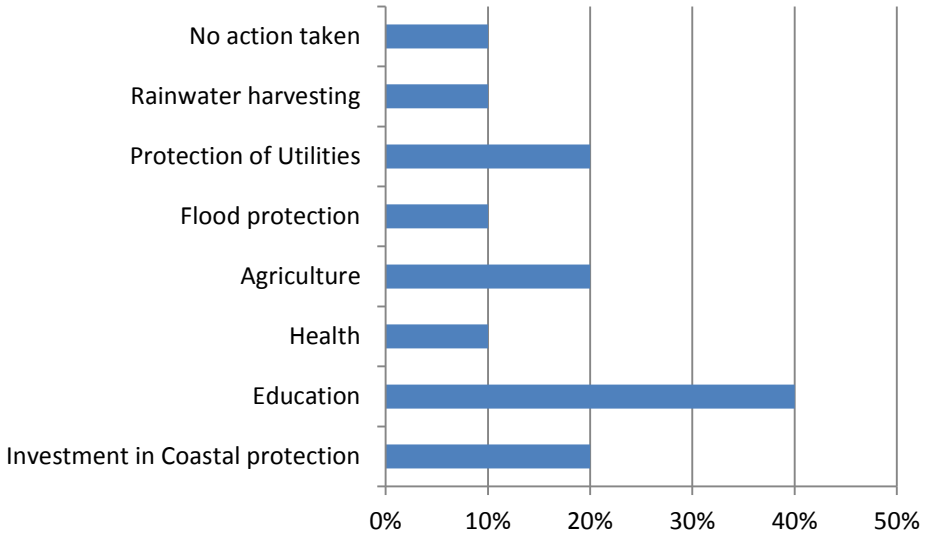


Figure 30: Action taken by community to cope with the impacts of climate changes

As mentioned previously, tourism is a broad phenomenon with intertwining implications on its stakeholders. These stakeholders are connected to each other with mutually beneficial activities. Hence, they have the opportunity to contribute to the protection of each other from adverse impacts of climate change. The adaptation capabilities of these parties are very much dependent on each other. Hence, it is unfortunate that, most of the Maldivian tourism associated communities have not taken any actions to protect the resorts nearby from anticipated impacts of climate change. While 30% of the communities believe that climate change impacts on the neighboring resorts will not have any impact on the communities, this may partly be due to the fact that these islands themselves lack the financial and technical capability to cope with the adverse effects of climate change and is not equipped with knowledge on how they can contribute to the adaption and protection of the resorts nearby. This might also be because that communities might feel that the resorts are not directly contributing to their wellbeing to the extent that their lives would be significantly affected in the absence of the resorts.

With the superior technical and financial capabilities of the resorts, they have taken the initiative to include the nearby communities in their adaptation initiatives. As a result 60% of the island communities reported that resorts have taken some form of action to protect the island communities from the impacts of climate change. The resorts provide their assistance to the communities in many different forms.

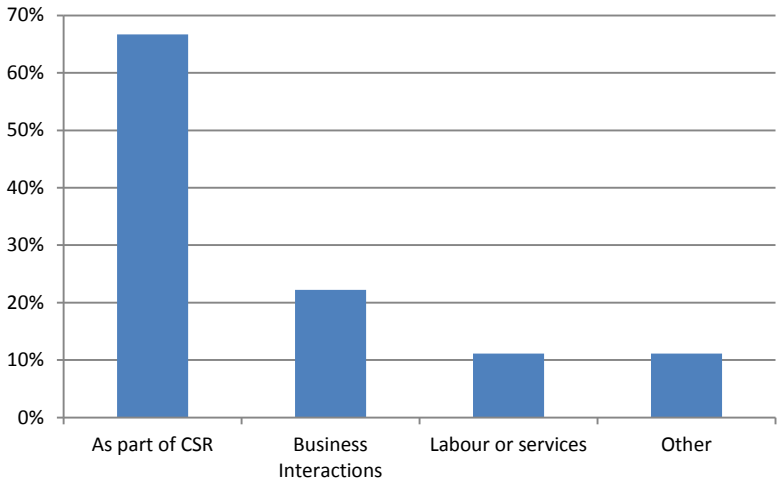


Figure 31: Types of assistance from resorts for climate/environment

As seen in Figure 31, the most popular method of providing assistance to the communities is as part of the CSR program of the resorts. Though the CSR program the resorts are likely to provide assistance to the communities to build infrastructure that will increase the adaptive capabilities of the communities. Also, it is very common for the resorts to assist to increase the awareness level of the communities.

Business interactions between resorts and the communities are increasing in the recent times. This has contributed to the formation of mutually beneficial business relationships between the resorts and the communities. Hence, it is encouraging that more than 20% of the assistance provided by the resorts for increasing the resilience of the communities is provided through business interactions.

Through these assistance programs, the resorts have positively impacted the communities in many different areas. As seen in Figure 32, the largest area of assistance by resorts is in the area of waste management. The waste management techniques of the communities can directly affect the resorts. Burning of waste and disposal of waste in to the sea by the communities can have great implications on the resorts. Hence, by investing in improving the waste management facilities in the communities, the resorts are not only increasing the resilience of the communities, but they are also protecting the operation of their business. Similarly, by promoting environmental issues, the communities are more likely to protect the natural biodiversity around the islands on which the business of the resorts depend heavily on. As the resorts begin to develop more and more business relations with the communities, their dependence on the communities are increasing which is cultivating a more healthy business environment. Investment of the resorts in agriculture and environmental protection areas in the islands is an encouraging sign of the mutually beneficial relations that are fostering between the resorts and the communities.

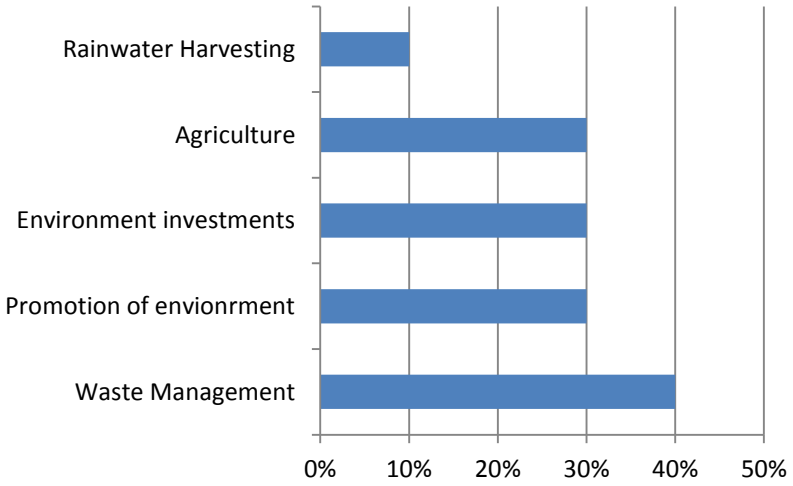


Figure 32: Positive impacts by resorts among tourism associated communities

It is very evident that through the assistance programs, the resorts are increasing the resilience of the communities against climate change. By strengthening the financial capabilities of the communities through investment in mutually beneficial business links, the resorts are reducing the vulnerabilities of the communities to the impacts of climate change and increasing their capability to become more resilient. Investments in waste management issues and awareness programs will directly translate into more adaptation capabilities in the communities. However, the resorts are not without their share of negative impacts on the communities as well.

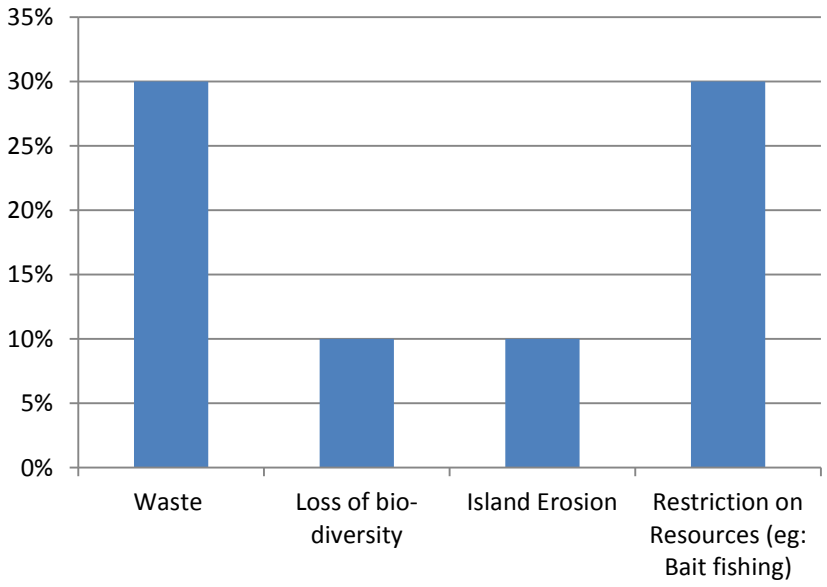


Figure 33: Negative impacts by the resorts among tourism associated communities

According to the communities, the largest negative impact by resorts is on waste issues (almost 30%) and restriction of resources such as bait fishing (almost 30%) as shown in Figure 33. The resorts produce three times more waste than the communities. If these

wastes are not addressed most effectively, it can become a huge burden on the neighboring communities. Improper waste disposal by the resorts can cause eutrophication in the lagoons of the islands nearby and cause wide spread health issues in the communities. As the resorts depend on the natural resources of the resorts and the marine environment surrounding it, the communities and the resorts have to come up with a mechanism to use the common resources fairly and sustainably. Most likely, the communities view restriction of resources as a negative impact of resorts because of absence of a mutually agreed mechanism for the use of common resources.

Impacts of tourism activities are so intertwined that it probably isn't possible to carry them out without one stakeholder having an impact on the other. The key to sustainability is to keep the negative impacts to a minimal and increase the mutually beneficial positive impacts. Hence, the fact that only 30% of the communities view resorts as having mostly negative impacts (Figure 34), shows that Maldivian tourism is headed in the right direction but requires further investment in building mutually beneficial links that can increase the resilience of the resorts and the communities.

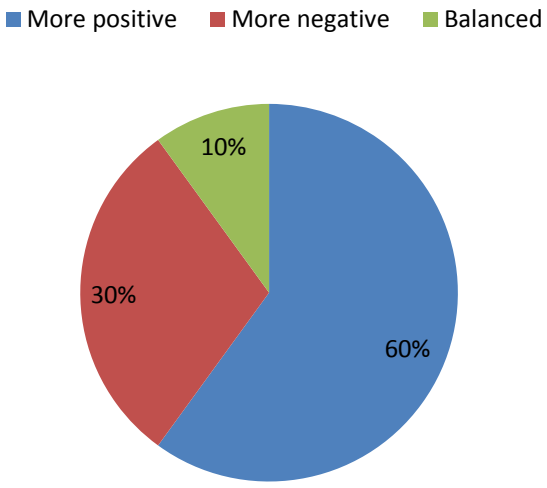


Figure 34: Assessment of effects of resorts among tourism associated communities

Adaptation to climate change requires that communities work to protect and conserve their own environment. So, it is unfortunate that about 40% of the tourism associated communities of Maldives have not engaged in any form of environmental protection or conservation activities. This could be due to lack of awareness and technical capability to carry out such activities. In either case, this is an area that can be greatly improved with minimal investment.

More than 60% of the communities, who engage in environmental protection and conservation activities, carry out beach cleanup and environmental awareness campaigns. It is interesting that the communities stated that waste management is the area where the least amount of work is done while beach cleanup is stated as the most commonly done activity. It is likely that these communities lack proper waste managed facilities. Thus even though they clean up the beach, they are unable to properly dispose and manage the waste collected from the beaches.

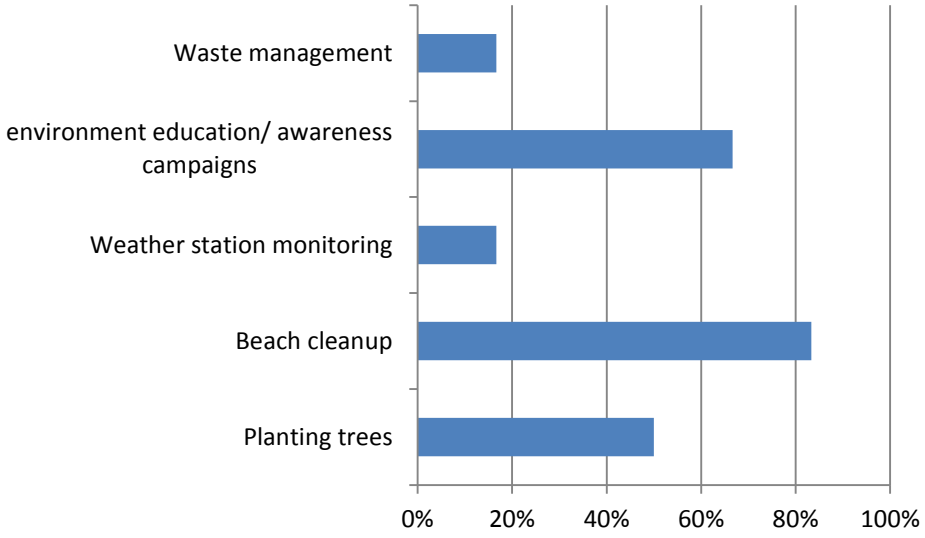


Figure 35: Types of engagement by the communities

According to the survey, all the Maldivian tourism associated communities are interested to work with the tourism operators to reduce climate related risks. The communities are most interested in working to address the issue of rain induced flooding (Figure 36). This is expected as in an earlier question, the communities identified rain induced flooding as the most damaging impact of climate change. It is interesting that even though storms were identified as the second most devastating impact of climate change, the communities view addressing it as the 5th most important issue. This could be because, by building households that are resilient to rain induced flooding, the major threat by the storms (i.e. damage to infrastructure) will be minimized.

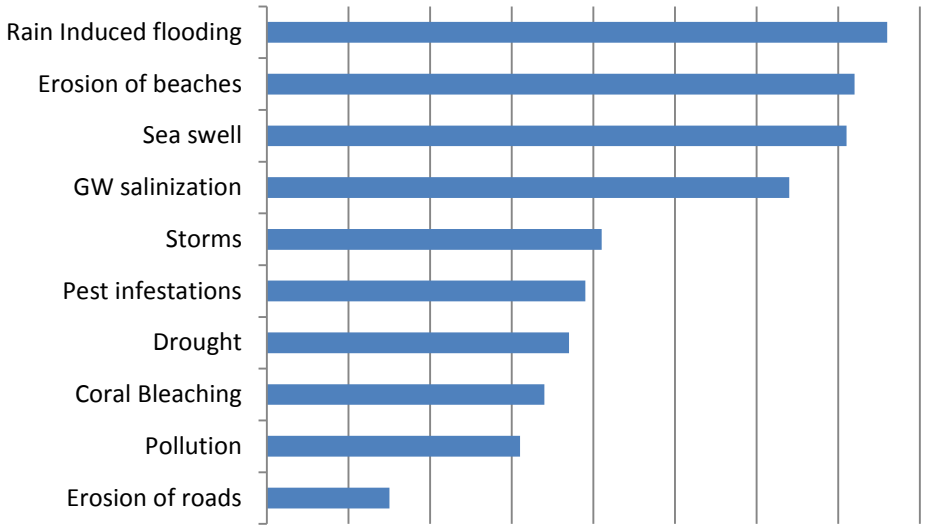


Figure 36: Problems communities would like to address

5.3 Government Institutions and Other Stakeholders

A review of the government policies, rules and regulations were made to study how climate change has been integrated into the policy framework of the government so that climate change could be mainstreamed. In addition to this, other key stakeholders within the tourism industry were asked about the robustness of the various policies, rules, regulations and incentives provided by the government for them to address the issues relating to climate change. In this respect, some of the key government institutions and other key stakeholders within the tourism industry were met. Following provides a list of the government institutions and other key stakeholders interviewed in this study.

1. Ministry of Tourism Arts and Culture
2. Ministry of Environment and Energy
3. Environment Protection Agency
4. Maldives Energy Authority
5. Maldives Association of Travel Agents and Tour Operators (MATATO)
6. Live-a-board Association of Maldives (LAM)
7. Maldives Association of Tourism Industry (MATI)
8. Maldives Tourism Promotion Board (MTPB)

The discussion here is divided into two parts, government institutions and other stakeholders.

Government institutions

Government institutions were asked about the policy instruments (law, regulations and subsidies) and guidance materials provided to the tourism industry to minimize the damage caused to the environment and to protect the tourism industry from any environment or climate change related hazard. They were also asked about how they measure the implementation of the policy instruments and how effective it has been and what are the barriers faced from implementing these policy instruments.

The Ministry of Tourism Arts and Culture

The Ministry of Tourism Arts and Culture is the Government's main focal ministry with the tourism portfolio. They highlighted that management of waste is the main issue brought forward by the tourism industry. However, no proper solution has been sought to this problem till today and that aggravates the problem with waste. As a light incentive, during the late 1990's, some waste incinerators were provided to the developing resorts. Incinerators were provided by either Norwegian or Swedish government and they were provided to the resorts under a loan scheme. However, that was a short lived scheme after the provision by the counterpart was stopped. But the assurance that waste is somewhat managed, is given by the tourism regulation that every resort should have an incinerator and bottle crusher before an operating license is issued.

It was specifically mentioned that they do not foresee that the tourism policies as of till today and now do provide any incentives as such to minimize the environmental damage or effects due to climate change. However, some of the policy measures were taken which could aid in that direction but they were not specifically to address the environmental problems. Until end of 1996, all the material brought for resort development was duty exempted until the inauguration of the resort. However, this was brought to a halt since there was complains from the other sectors arguing that there is no reason why the most rich industry should be duty exempted.

As to address any damages caused by any climate hazards, there are no specific rules or regulations. However, during significant crisis times such as the tsunami in 2004, some leniency was shown towards the industry. Loan payments and fee payments were deferred until they have completely recovered. These are temporary arrangements based on the status at that particular time and not taken as a policy measure and these kinds of arrangements could take place in the future in such kinds of events.

Indirect measures are enforced through the resort agreements, tourism regulation and the EIA regulation. For example, the tourism regulations ensure that when the resorts are designed, the infrastructure towards the beach should be made at least 5 m from the vegetation line. By regulation, a disaster SOP has to be in place and a waste management facility should be established in each resort. In addition to this, every resort should have an

insurance covering the entire resort for at least for one year and this is made as part of the agreement.

Since Ministry of Tourism is involved in selection of the island for resort development, they were asked if any consideration was given to the environment when island selections are made. An island selection criterion was established in early 1990's and they were followed until very recent times. The criterion was based on the following parameters.

1. Proximity of the resort to transport (how the transportation of tourist will be arranged)
2. Size of the island
3. The number of beds that needs to be out on the market
4. Beach quality
5. Ease of harbour construction
6. Proximity to large communities providing jobs for the islands

However, the latest island selections do not consider these criteria's. This shows that there is no environmental concern considered. During the recent times more importance was given to the corporate social responsibility (CSR). Therefore holistically it could be said that environment or climate change is not considered in island selection process for resort development.

Ministry of Environment and Energy

Ministry of Environment and Energy holds the environment and climate change portfolio and realizes that there should be a close coordination between the Ministry of Environment and Ministry of tourism for proper regulation. Ministry of Environment and Energy stated that there is currently no climate change policy as such in the government. However, necessary policies are being streamlined in various documents and they are already under implementation. As a process of mainstreaming climate change into various sectors, Ministry of Environment and Energy has always provided the necessary policy and technical guidance in formulating various strategies and programs. This project, the Tourism Adaptation Project itself was initiated and formulated within the Ministry of Environment and Energy and every effort was made to address the climate change and to tackle those issues in the tourism sector.

In the tourism regulation, a specific section is dedicated to the environment. Guidance from the Ministry of Environment was drawn on several occasions when formulating the tourism regulation. However, the context of environment and any hazards are brought in a very general context. The Ministry of Environment and Energy also agrees that there are no incentives towards the tourism sector to minimize the damage to the environment or to address the issues relating to climate change. They also mentioned that there is no criteria

regarding environment in selection of the island for resort development and the Ministry of Environment should have a role in island selection. Since the natural environment is the pillar of the whole tourism industry, environment should have a venue in the island selection decision making process to minimize the damage to the environment. A recent sector policy such as resort development by land reclamation is inconsistent with environmental policies. The technical advice provided from respective stakeholders should be seriously considered by political/senior level staff within the Ministry of Tourism. However, the recent development of the Maldives Green Fund is considered as a positive leap step towards addressing the environment and climate change problems in the public and private sectors.

Other arms of the Ministry of Environment in regulating the environment are the Environment Protection Agency (EPA) and the Maldives Energy Authority (MEA), whom are the two regulatory bodies. According to EPA, their involvement is mainly restricted to the EIA process since they are a regulator. Any development needs the environmental clearance and this is ensured by the EIA process. The EIA regulation, biosphere reserve and protected areas guidelines are the key instruments ensuring the environmental protection, safe guard and sustainability. The role of MEA is only through the registration of the power systems and licensing of the engineers working in the tourism sector. However, they foresee that they could play a key role to incentivize the tourism sector by implementing an energy audit program which could only be done in close collaboration with the tourism industry. Results from energy audits would an indirect incentive for the tourism sector. They also have future plans to include use of low carbon or renewable energy or energy efficiency technologies in their regulations so that this would be implemented by the resorts developed in the future and this will help in the efforts to mitigate the effects of climate change.

All the government institutions mentioned that the biggest challenge to them is the issues with the human resource and financial constraints. Although there are several policies or regulatory measures needed to be enforced, proper monitoring programs are currently under a halt due to these restrictions. Another issue is the weak coordination between the various government institutions. Unless a proper discussion is made between the key stakeholders, it would be difficult to formulate policies, strategies or guidelines which could be easily followed and implemented by all the stakeholders.

Other stakeholders

In addition to the government institutions and the MTPB, the main driving force for the Maldives tourism sector is the associations within the tourism sector. These associations are mostly formed by the various tour operators, safari owners and resort owners. The collective concerns, arguments and message put forward by these associations are similar. All of them agreed that there are no incentives provided by the government to them to minimize the damage to the environment and most importantly to themselves.

The main concern raised is the detachment between the government and these associations. The linkage between the government and these associations are weak and that needs to be strengthened. There have been occasions that the government has announced formulated policies rules and regulations without a participation of these associations within the industry. Their view is that, since these associations or parties within these associations are the main key players upholding the industry, a comment from them should be drawn while formulating such policies and regulations.

Live-a-board Association of Maldives mentioned that they have been requesting the government to provide them a proper shelter for the safaris to be anchored. A harbour slot allocation also has been made for fishing vessels in Male' harbour. However, till today the government has not been able to find a solution for this. The only place for them to anchor the safaris are the harbour near the Hulhumale'. This harbour is a very open area with no breakwaters. Therefore during the rough monsoon periods, they have encountered several incidences of property damage which has caused them financially for major repairs. Moreover, this has caused severe threats to the life of the crews who are onboard.

One important concern raised was that the current government regulations do not enforce the industry to use environment friendly technologies and the regulations do not provide any incentives for bringing in the technologies. A simple example shown was regarding the import of bio-degradable engine oil. Even though bio-degradable oil is expensive, an attempt was made to import it. However, it was rejected by the government. The government should establish a mechanism to certify these products and provide some incentives or enforce through regulations or guidelines to bring in such products if we are really serious about conserving the environment. A suggestion made by them is to increase tax on non-environment friendly products and introduce a small tax on the environment friendly products.

Another concern raised by the associations is the waste management issue. The current practice of managing the waste is not a sustainable way. Especially for the resorts to transport the waste to Thilafushi Island is not a sustainable solution in long term. Regional waste management centers have to be established for proper management of waste.

All the associations foresee that the main obstacle for the implementation of policies and regulations is that, proper awareness has not been created among them regarding the government policies and regulations. Some of the stakeholders do not know about certain policies rules and regulations. This was also shown by the individual result surveys too. The interviews mentioned that they are aware of the name of the policies but they are not aware of what the policy or the regulation is concerned of. The second recommendation made by the associations is that the government institutions need to have firm feet in monitoring and implementation of the regulations. Proper enforcement of the existing

regulations has to be made. In addition to this, concerns were raised due to the level of corruption within the industry especially in allocation of land for resort development.

6. Conclusions and Recommendations

6.1 Conclusions

This chapter discusses about the conclusions drawn from the results discussed in previous chapters. Climate change and its related impacts can significantly disrupt tourism activities in Maldives. Maldivian economy depends significantly on tourism. Thus any impact of climate change on this sector is of great economic importance. In this exercise vulnerability and coping potential of the industry was assessed through literature reviews and the survey. It is interesting to note that although tourism industry shares the low lying islands with the communities, their vulnerabilities and adaptive capacities are significantly different.

Table 4: Qualitative conclusions

Stakeholders	Awareness	Vulnerabilities	Adaptive Capacity
Resorts	Medium	High	Medium
Safari	Medium	High	Low
Tour operators	Low	Medium	Low
Associated Communities	Medium	High	Low

Table 4 shows the qualitative representation of the outcomes with regards to different stakeholders of the tourism industry based on the results summarized in Appendix A. The basic awareness among the stakeholders about climate change is good. But the how those impacts translate to impacts on their business is not well understood.

Table 5: Level of awareness among stakeholders

Stakeholders	Vulnerabilities / Impacts	Policy / Regulations	Financial Instruments	Overall
Resorts	High	Medium	Medium	Medium
Safari	Medium	Low	Medium	Medium
Tour operators	Low	Low	Low	Low
Associated Communities	Medium	N/A	N/A	Medium

As shown in Table 5 awareness on policies and regulations that ensures environmental integrity of tourism industry seems overall low among tourism operators. Here also the resorts have most knowledge about it because most of the regulations have targeted chapters for resort development where as other tourism operators do not have too many regulations to comply with. One other reason is that when developing environmental or related regulations the involvement of tourism operators are not adequate. This has lead to unprecedented financial issues and well as non-compliance issues of the regulation. Also the awareness raising activities for these regulations have been minimalistic (limited to government gazette announcement).

The types of financial mechanisms that are needed to improve their environmental integrity are also available. But unfortunately the tourism operators find it difficult to connect these financial mechanisms with climate change. All resorts have insurance cover for most risks, but it's difficult for them to relate those risks with climate change or environment.

Referring to the discussions under the previous sections, it is clear that there are number of different types of impacts and vulnerabilities spread across different stakeholders. But the level of awareness on causes of climate change, impacts and vulnerabilities among the tourism operators is less than satisfactory. The highest awareness is among the resorts and lowest in tour operators. Mainly because tourist resorts usually have to deal with immediate impacts of climate change which has financial consequences of large scale. However the resorts also have difficulty understanding the impacts of slow on set events like sea level rise and increasing Sea Surface Temperature. There were cases where some tourism operators acknowledged that there could be heavy damages due to slow-onset events. However they found it difficult to convince the resort owners or the decision makers of the resort to take protective/preventive measures against those impacts.

In case of adaptive capacity, resorts are equipped with the most tools and mechanisms. However, these tools and mechanisms are developed just to comply with the regulations. The most prime example would be the disaster SOPs. Although all resorts have developed disaster SOPs they do not conduct the necessary drills and staff awareness. And some confessed that disaster SOPs were developed for the interest of complying with the regulations. However, in safaris and tour operators there are some physical restrictions which make it difficult to implement adaptation measures on their own. For safaris, the lack of safe anchoring and maintenance harbor leaves them exposed to forces of nature. The solution lies with a joint effort with the government and the industry to resolve this issue. Similarly, it is also important to work to improve and produce more specific weather prediction information for tour and safari operators.

It is well known that resort and safaris contribute a significant level to the development of island communities and have spent in millions to improve infrastructure and education. But currently these activities are not acknowledged and are done only on good-will. The inability of the government to mandate concrete corporate social responsibility (CSR) actions and poor monitoring has left an untapped potential development opportunity for the communities. The fact that a criterion for island selection for resort development is non-existent is one of the main reasons for the questionable environmental integrity of the sector. The lack of coordination with inter-related ministry and organizations has spawned miscommunication and misconception within the industry.

In summary, a climate resilient tourism sector will pave the way for a climate resilient country. There is a lot of potential in the tourism industry

6.2 Recommendations

The survey also asked these tourism operators to put forward recommendation for the Government to improve legislations. Some of these recommendations are summarized below:

- Government to put forward a better implementation mechanism including monitoring of the rules and regulations.
- Develop and enforce proper waste management regulations.
- Increase awareness both on regulations and environment among all stakeholders of tourism industry.
- Establish standards for tour operators.
- Develop and enforce building codes for sea vessels including safaris.
- Provide proper waste management facility
- Provide training to local staff
- Develop more transparent polices for leasing resorts and city hotels in the Maldives

In addition to the above recommendations based on current state of affairs in the industry the following actions are recommended.

- Increase coordination between line institutions and organization
- Include all industry stakeholders in development of policy/law/regulation or guidelines which the industry would be a part of.
- Increase outreach on the regulations before implementation period
- Include more inputs from environment sector for tourism planning and decision making process to streamline the environmental issues faces the industry..
- Increase awareness among the executive level of the industry on climate change issues.
- Develop a sound criterion in selecting islands for resort development which considers the specific climate vulnerabilities of the islands.
- Improve the current monitoring practices to include indicators for climate change
- Develop and enforce guidelines for climate proof tourism developments
- Study options on applying mandatory climate risk insurance coverage on tourism sector
- Establish a mechanism between resorts and the Maldives Meteorological Services for sharing of local weather data obtained at the resorts, so that it could be used in provision of a better forecast and weather information.

Areas for further study

In order to better understand the situation on the ground in tourism industry with regards to climate change readiness, following analyses are also recommended. These

recommendations for further studies have been suggested keeping in mind the objectives of Tourism adaptation projects and how to improve its outcomes within their scope.

- Detail assessment on how community social responsibility is treated in the tourism industry
- Detail analysis on gaps and overlaps between environmental rules, regulations and guidelines and tourism industry regulations
- Development of communication plan for outreach regarding climate change and related regulations and guidelines
- Detailed assessment on current insurance packages in use by the industry
- Detailed quantitative assessment of effectiveness of current adaptation measures
- Development of mutually agreed mechanism for use of common resources between resorts and local communities.

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Appendix A – Results Framework

Tourism Operators
Awareness

Indicator/Criteria	Baseline/List
Percentage of tourism operators who do not know the causes of climate change	15%
Top 5 most threatening impacts of climate change as perceived by the tourism operators	1. Beach and Road Erosion 2. Coral Bleaching 3. Increase in extreme events 4. Rainwater induced flooding 5. Storms 5. Storm surge and swell wave induced flooding
Top 5 most threatening impacts of climate change currently observed by the tourism operators	1. Coral Bleaching 2. Beach and Road Erosion 3. Increase in extreme events 4. Change in weather patterns 5. Storms 5. Low fish catch 5. Change in flora and fauna
Percentage of tourism operators aware about how climate change may affect the tourism industry	85%
Most aware tourism operator group about climate change (Ascending)	1. Resorts 2. Safaris 3. Tour Operators
Most popular environment regulations related to tourism operators (Ascending)	1. EIA Regulation & Tourism Act 2. land Use and Zonal Planning guidelines (resorts only) 3. Environment protection and preservation act 4. Environment liability regulation
Most aware tourism operator group about environment regulations (Ascending)	1. Resorts 2. Safaris 3. Tour Operators
Level of awareness on policy instruments related to environment and tourism industry	Limited
Percentage of resorts using insurance against climate hazards	70%
Percentage of safaris using insurance against climate hazards	62.5%
Percentage of tour operators using insurance against climate hazards	50%
Top 5 most popular insurance instrument used by tourism operators	1. Medical 2. Fire 3. Storms 4. Rain fall induced flooding 5. Storm surge and swell wave induced flooding
Percentage of tourism operators favourable to having more local insurance products for climate risks	75%

Impacts and Vulnerabilities

Indicator/Criteria	Baseline/List
Top 3 most threatening vulnerabilities of tourism industry caused by climate change as perceived by the tourism operators	1. Damage to natural environment 2. Decrease in number of tourists 3. Damage to physical (built) environment
Percentage of tourism operators who are concerned about climate change	78%
Percentage of tourism operators who are aware about how to protect their business from effects of climate change	78%
Top 3 tourism related activities that will be negatively affected by climate change as perceived by tourism operators	1. Diving and Snorkelling 2. Bed occupancy 3. Supply Chan and Infrastructure
Percentage of tourism operators who have invested in protecting their infrastructure from climate hazards	50%
Tourism operator group who has invested most in protecting infrastructure from climate hazards (ascending	1. Resorts 2. Safaris 3. Tour operators
Top 3 barriers to implementation of climate adaptation measures by tourism operators	1. Know – how 2. Technology 3. Finance 3. Policy/regulations
Percentage of resorts who have not quantified losses due to climate hazards	60%
Percentage of safaris who have not quantified losses due to climate hazards	63%
Percentage of tour operators who have not quantified losses due to climate hazards	75%

Associated Communities

Indicator/Category	Baseline/List
Percentage of tourism operators who interact with nearby island communities	89%
Top 3 Types of interactions with the tourism related communities	1. Business interactions 2. As part of CSR 3. Labor
Top 3 contributions to the associated communities by the tourism operators	1. Job Opportunities 2. Community Development 3. Education
Percentage of tourism operators who are aware of climate change implications on the communities	85%
Percentage of tourism operators who believe that impacts of climate change on the communities will affect the business of tourism operators	76%
Top 3 benefits from the communities to the resorts	1. Health centre in the island 2. Agriculture/fishing 3. Sharing of transport
Top 3 benefits from the communities to the safaris	1. Harbour and docking facilities 2. Health centre in the island 3. Agriculture/fishing

Adaptive capacities

Indicator/Category	Baseline/List
Top 3 contingency measures in place by Safaris	1. Backup power systems 2. Communication facilities 3. Backup navigation system
Percentage of Safari's with a portable RO plant	75%
Top 3 contingency measures in place by tour operators	1. Backup power systems 2. Communication system 3. Food rations
Percentage of Safaris harvesting rainwater	38%
Percentage of Safaris using desalinated water for flushing	50%
Top 5 Coastal protection measures taken by resorts	1. Sea wall 2. Beach replenishment 3. Coastal Vegetation 4. Groynes 5. Beach revetment
Percentage of resorts who view their current costal protection measures as ineffective	29%
Percentage of resorts using desalinated water for drinking	80%
Percentage of resorts using rainwater for drinking	27%
Percentage of resorts using secondary or higher level of sewerage treatment	64%
Percentage of resorts with an incinerator	86%
Percentage of resorts who does composting	64%
Percentage of resort who dump waste in to the sea	43%
Percentage of Safari's who dump waste in to the sea	50%
Percentage of resorts who are sure that climate change vulnerabilities have been taken in development and redevelopment of the resort	53%
Percentage of tourism operators who relies on services from Maldives Meteorological Services for weather predictions	80%
Percentage of tourism operators who perceive services by MMS to be reliable or very reliable	52%
Percentage of resorts using solar energy	64%
Percentage of Safaris using renewable energy	13%
Percentage of Safaris planning to invest in RE	71%
Percentage of resorts conducting house reef health checkups	73%
Percentage of resorts who conduct erosion monitoring	80%
Percentage of resorts conduct ground water quality checks	33%

Tourism Associated Communities

Indicator/Criteria	Baseline/List
Top 3 impacts of climate change observed by most tourism associated communities	1. Rainfall induced flooding 2. Storms 3. Beach Erosion
Top 3 most devastating losses caused by impacts of climate change to tourism associated communities (Ascending)	1. Damage to infrastructure 2. Loss of income 3. Emergency supplies
Percentage of communities keeping track of financial losses due to impacts of climate change	70%
Most devastating impacts of climate change as perceived by the communities (Ascending)	Rainfall induced flooding
Top actions most widely taken by the communities against impacts of climate change	1. Education 2. Investment in coastal protection 3. Agriculture 4. Health
Percentage of communities who believe that climate change impacts on the neighboring resorts will not have any impact on the communities	30%
Percentage of resorts who has taken some form of action to protect the island communities from the impacts of climate change.	60%
Most popular method of providing assistance to the communities (Ascending)	1. CSR 2. Business interactions 3. Labor
Positive impacts of resorts on associated communities	1. Waste management 2. Promotion of Environment 3. Environmental Investments 4. Agriculture
Negative impacts of the resorts on the communities	1. Waste 2. Restriction of resources 3. Loss of biodiversity 4. Island Erosion
Percentage of communities who view resorts as having mostly negative impacts	30%
Percentage of communities who has not engaged in protection or conservation activities	40%
Most popular types of environmental activities carried out by the communities	1. Beach clean up 2. Awareness campaigns 3. Planting trees
Areas the communities most want to work with the tourism operators (Ascending)	1. Rain induced flooding 2. Erosion of beaches 3. Sea swell 4. Ground water Salinization 5. Storms

Appendix B – Tourism Operators, Government and other stakeholders list

Government Institutions

- Ministry of Tourism Arts and Culture
- Ministry of Environment and Energy
- Environment Protection Agency
- Maldives Energy Authority
- Maldives Association of Travel Agents and Tour Operators (MATATO)
- Liveaboard Association of Maldives (LAM)
- Maldives Association of Tourism Industry (MATI)
- Maldives Tourism Promotion Board (MTPB)

Resorts

- Kurumba village
- Sonevafushi
- Villigilli - Shangrilla
- Holiday Island
- Six senses (Laamu)
- Meedhuparu
- Komandoo
- Kuramathi
- Four seasons kuda huraa
- Chayaa Dhonveli Island resort
- Clubmed kani
- Adhaaran Hudhuranfushi
- Dhonakulhi Maldives
- Equator Village
- Club Faru

Associated Island Communities

- K. Huraa
- ADh. Maamigili
- Lh. Naifaru
- L. Maamendhoo
- B. Eydhafushi
- Addu City
- AA. Rasdhoo
- Hdh. Hanimaadhoo
- Lh. Hinnavaru
- B. Dharavandhoo

Safaris

- Maha
- Swell by Private Cruise
- Nooranee
- Kandi Hibaru - Mabaaz Travels
- Manta Cruise
- TLM Cruiser - TLM Pvt Ltd
- Anastasia
- Good travels of Maldives

Tour Operators

- Trip concept Pvt Ltd
- Lets go Maldives Pvt Ltd
- Secret Paradise Pvt Ltd
- Island Voyages

Appendix C – Questionnaires

Questionnaires - Resorts

This Survey is carried out to collect information required for a baseline analysis to assess, quantify and document the current adaptive capacity of the tourism sector in Maldives to respond to the impacts of climate change.

Atoll: _____
Resort name: _____
Date: _____
Interviewee: _____
Job title: _____
Role and responsibilities: _____

Awareness about climate change and vulnerability

1. What are the causes for climate change?
    a. Open pit burning, fossil fuel burning
    b. Deforestation
    c. Natural causes
    d. Don't know
    e. Others (specify) ……

2. In your knowledge, what are the impacts of climate change?
    a. Rainfall induced flooding
    b. Storm surge and swell wave-induced flooding
    c. Storms
    d. Drought and dry spell events
    e. Lower agricultural yield
    f. Low fish catch
    g. Salinity intrusion in soils and groundwater
    h. Beach and road erosion
    i. Coral bleaching
    j. Pest infestations, vector borne diseases
    k. Increase in extreme events
    l. Change in flora and fauna (ecosystems, biodiversity, etc…)
    m. Rough seas
    n. Temperature change
    o. Don't know
    p. Others (specify) ……

3. Are you aware of how climate change may affect the tourism industry?
    a. Yes
    b. No (skip toQ5)

4. How do you think climate change will affect the Maldivian tourism Industry?
    a. Maldivian resorts will be submerged by sea level rise
    b. Number of tourists will decrease
    c. Damage to physical (built) environment
    d. Damage to natural environment
    e. Others (specify)……

5. What are your observed local effects of climate change?
    a. Rainfall induced flooding
    b. Storm surge and swell wave-induced flooding
    c. Storms
    d. Drought and dry spell events
    e. Lower agricultural yield
    f. Low fish catch
    g. Salinity intrusion in soils and groundwater
    h. Beach and road erosion
    i. Coral bleaching
    j. Pest infestations, vector borne diseases
    k. Increase in extreme events
    l. Change in flora and fauna (ecosystems, biodiversity, etc…)
    m. Rough seas
    n. Don't know
    o. Others (specify) ……

6. Is climate change impacts a concern for your establishment?
    a. Yes
    b. No (Skip to Q8)

7. How would climate change impact your resort/tourism activity?
    a. Impacts bed occupancy
    b. Affects tourist activities like diving and snorkeling
    c. Infrastructure damage
    d. Effects resort supply chains
    e. Others (specify) ……..

8. Are you aware of actions you can take to protect your business from effects of climate change?
    a. Yes
    b. No (Skip to Q 11)

9. Which measures would you prioritize? Please prioritize by a number
    a. ….. Coastal Protection
    b. ….. Beach replenishment
    c. ….. Coral reef plantation and rehabilitation
    d. ….. Drainage systems
    e. ….. Sewage systems
    f. ….. Insurance
    g. ….. Upgrade/redevelop resort infrastructures to adapt to climate hazards
    h. ….. Disaster SOP

10. Have you made any investments to protect key infrastructure from climate hazards?
    a. Yes (Skip to Q12)
    b. No

11. Which barriers have prevented you from taking such investments?
    a. Financial,
    b. Technological
    c. Know-how
    d. Policy / regulatory
    e. Human resources
    f. Others (specify) ……..

    } Skip to Q 16

12. Do these investments happen regularly, or once-off?
    a. Regular
    b. Once off

13. Who in your organization is making these investment decisions?
    a. Resort Owner
    b. Resort General Manager
    c. Resort Engineer
    d. Financier/investor
    e. Management contractor

14. What guidance did you draw on when deciding upon specific investments?
    a. A friend recommendation
    b. In-house expert advise
    c. External expert advise
    d. Financial institution's recommendations
    e. Government Institutions' recommendations
    f. Internal management decisions
    g. Others (specify)

15. Do you think additional investments to protect key infrastructure from climate hazards would be an economically viable and beneficial investment for your business?
    a. Yes
    b. No

16. Can you quantify the aggregate losses from climate hazard events in financial terms?
    a. Yes
    b. No

17. What kind of environmental monitoring activities are carried out on your resort (specify the frequency)

	(✓)	Daily	Weekly	Monthly	Biannually	Annually	Other
House reef health checks							
Beach clean ups							
Erosion monitoring							
Marine biology stations							
Weather stations							
Desalinated water quality test							
Ground water quality test							
Solid waste management logs							
Others (specify) ……							
None							

18. How do you carry out these monitoring activities
    a. In-house with dedicated staff
    b. Hiring a consultant

Awareness about policy instruments

19. Which of the regulations are you aware of
    a. Environment protection and preservation ACT
    b. Tourism Act
    c. Environment liability regulation
    d. EIA regulation
    e. Land use and zonal planning guidelines
    f. Others (specify)…….
    g. None (Skip to Q 21)

20. Which of the above environmental policies do you find difficult to comply with, and why (give a reason(s))?
    a. Environment protection and preservation ACT
       ……
    b. Tourism Act
       ……
    c. Environment liability regulation
       ……
    d. EIA regulation
       ……
    e. Others (specify) ……..

21. Have you applied or are you applying any specific building codes for near shore or underwater infrastructure?
    a. Yes
    b. No

22. Do you have any recommendations for the Government of the Maldives on how they can improve environmental legislation and or guidance?

    _____

    _____

Awareness about financial instruments

23. Are you aware of any insurance products to cover climate-related risks?
    a. Yes
    b. No

24. Is your business or specific infrastructure insured against any of the risks mentioned below?
    a. Rainfall induced flooding
    b. Storm surge and swell wave induced
    c. Fire
    d. Storms
    e. Drought and dry spells
    f. Salinity intrusion into soil or groundwater
    g. Erosion
    h. Pollution
    i. Coral bleaching
    j. Pest infestations

25. Which infrastructures are insured?
    a. Off shore infrastructures
    b. Utility services (water, power)
    c. Transport services
    d. On land tourist infrastructure

26. Which company or companies provide this insurance?
    a. Local
    b. International

27. Do you think more insurance products for climate risks should be available for tourism operators on the Maldivian market?
    a. Yes
    b. No

28. What other financial mechanism have you got in place or planning?
    a. Environment fee
    b. Donations
    c. Revolving funds
    d. Other (specify) …….

29. Are there any risks you would like to insure for but currently cannot?
    a. Yes
    b. No (Skip to Q 31)

30. Which are these risks?
    a. Rainfall induced Flooding
    b. Storm surge and swell wave induced
    c. Fire
    d. Storms
    e. Drought and dry spells
    f. Salinity intrusion into soil or groundwater
    g. Erosion
    h. Pollution
    i. Coral bleaching
    j. Pest infestations

31. If the Government were to create an investment scheme for climate risk reduction would you be interested in participating?
    a. Yes
    b. No (please specify a reason)

    _____

    _____

Associated communities

32. Does the resort interact with the nearby communities?
    a. Yes
    b. No

33. What is the nature of the interaction
    a. As part of Cooperate Social Responsibility (CSR)
    b. Business interactions
    c. Labor or services
    d. Others (Specify) ……

34. What type of activities are carried out
    a. Community development
    b. Education
    c. Infrastructure
    d. Job opportunities
    e. Celebrations of special occasions
    f. Promote local businesses

35. Are you aware of how climate change impacts can affect these communities?
    a. Yes
    b. No

36. If a nearby community is affected by climate-related hazards, such as flooding, drought, erosion or salinisation, do you think it would have an impact on your business?
    a. Yes
    b. No

37. If there is a disease outbreak (e.g. Malaria etc…)in the associated community, have you noticed any impact on the resort due to that?
    a. Yes (specify) ……
    b. No

38. What benefits do you derive from the communities
    a. Health center benefits
    b. Transport sharing
    c. Agriculture /Fisheries
    d. Staff accommodation
    e. Other (specify) ……
    f. None

39. What benefits do you like derive further from the communities
    a. Health center benefits
    b. Transport sharing
    c. Agriculture /Fisheries
    d. Staff accommodation
    e. Other
    f. None

Existing Adaptation measures

40. What are the existing coastal protection measures on the resort?
    a. Seawall
    b. Beach revetments
    c. Beach replenishments
    d. Groynes
    e. Coastal vegetation
    f. Others (specify)

41. If a is selected, type of seawall …….

42. If b is selected, type of revetment ……..

43. If c is selected, interval of replenishment……

44. Where is the sand taken from for beach replenishment?
    a. From the resort lagoon
    b. Nearby sand bank/lagoon
    c. Nearby island
45. In your view is the coastal protection effective
    a. Yes
    b. No

46. What type of water sources does the resort uses?

		Purpose of use			
	(✓)	Drinking	Gardening	Washing	Other (specify)
Rain water					
Ground water					
Desalinated water					
Bottled water					
Recycled water					

47. If desalinated water is used, how is the brine treated
    a. Discharged into lagoon
    b. Discharged into ground
    c. Discharged outside house reef
    d. Used for another purpose (specify) ……..

48. What type of sewerage system does the resort have
    a. Gravity system
    b. Vacuum system
    c. Small bore system
    d. Soak pit

49. Which level of sewerage treatment do you have
    a. Primary
    b. Secondary
    c. Tertiary
    d. No treatment

50. How is sludge treated
    a. Composed
    b. Used for agricultural purposes
    c. Other (specify) ……..

51. How is waste water treated
    a. Discharged into lagoon
    b. Discharged into ground
    c. Discharged outside house reef
    d. Used for another purpose (specify) ……..

52. Does your resort uses renewable sources of energy
    a. Yes
    b. No (Skip to Q55)

53. What are the renewable sources of energy
    a. Solar
    b. Wind
    c. Current
    d. Others (Specify) ……..

54. Which of the following is it used for
    a. Electricity
    b. Water heating
    c. Others (specify) ……..

55. Do you have plans/additional plans for RE investments
    a. Yes
    b. No

56. Which of the following waste management facilities are available at the resort
    a. Incinerator
    b. Bottle crusher
    c. Shredder
    d. Compactor
    e. Composter

57. What waste management practice is used in the resort
    a. 3R (Reduce, Recycle, Reuse)
    b. Waste segregation
    c. Composting
    d. Incineration
    e. Dumped into the sea (clarify: all waste or just biodegradable waste)
    f. Taken to waste management center or island

58. Was the climate vulnerabilities of the island considered in the development or redevelopment of the resort
    a. Yes
    b. No

59. What are the measures taken in response to the hazards
    a. Drainage system established
    b. Breakwater established
    c. Water pumped out mechanism established
    d. Disaster SOP established

e. Others (Specify) ……

60. Which weather services do you use MOST for planning your trips?

a. Local weather services
b. Non local weather services
c. Own experience

61. How reliable do you think is the local weather services?

a. Very reliable
b. Reliable
c. Somewhat reliable
d. Unreliable
e. Very unreliable

*** * * * * * ***

Questionnaires - Safaris

This Survey is carried out to collect information required for a baseline analysis to assess, quantify and document the current adaptive capacity of the tourism sector in Maldives to respond to the impacts of climate change.

Atoll: _____
Safari name: _____
Date: _____
Interviewee: _____
Job title: _____
Role and responsibilities: _____

Awareness about climate change and vulnerability

1. What are the causes for climate change?
    a. Open pit burning, fossil fuel burning
    b. Deforestation
    c. Natural causes
    d. Don't know
    e. Others (specify) ……

2. In your knowledge, what are the impacts of climate change?
    a. Rainfall induced flooding
    b. Storm surge and swell wave-induced flooding
    c. Storms
    d. Drought and dry spell events
    e. Lower agricultural yield
    f. Low fish catch
    g. Salinity intrusion in soils and groundwater
    h. Beach and road erosion
    i. Coral bleaching
    j. Pest infestations, vector borne diseases
    k. Increase in extreme events
    l. Change in flora and fauna (ecosystems, biodiversity, etc…)
    m. Rough seas
    n. Temperature change
    o. Don't know
    p. Others (specify) ……

3. Are you aware of how climate change may affect the tourism industry?
    a. Yes
    b. No (skip toQ5)

4. How do you think climate change will affect the Maldivian tourism Industry?
    a. Maldivian resorts will be submerged by sea level rise
    b. Number of tourists will decrease
    c. Damage to physical (built) environment
    d. Damage to natural environment
    e. Others (specify)……

5. What are your observed local effects of climate change?
    a. Changes in weather patterns
    b. Storms
    c. Drought and dry spell events(water shortage)
    d. Lower agricultural yield
    e. Low fish catch
    f. Coral bleaching
    g. Pest infestations, vector borne diseases
    h. Increase in extreme events (rough seas/ high winds)
    i. Change in flora and fauna (ecosystems, biodiversity, etc…)
    j. Rough seas
    k. Temperature change
    l. Don't know
    m. Others (specify) ……

6. Is climate change impacts a concern for your establishment?
    a. Yes
    b. No (Skip to Q8)

7. How would climate change impact your safari/tourism activity?
    a. Impacts bed occupancy
    b. Affects tourist activities like diving and snorkeling
    c. Physical damage& loss of life
    d. Effects supply chains
    e. Others (specify) ……..

8. Are you aware of actions you can take to protect your business from effects of climate change?
    a. Yes
    b. No (Skip to Q11)

9. Which measures wouldyou prioritize? Please prioritize by a number
    a. ….. Upgrade and maintenance of desalination system
    b. ….. Upgrade and maintenance of Power system
    c. ….. Improve the Navigation systems
    d. ….. Improve and repair engine and vessel
    e. ….. Increase crew's handling capacity
    f. ….. Insurance
    g. ….. Disaster SOP

10. Have you made any investments to protect key infrastructure from climate hazards?
    a. Yes (Skip to Q12)
    b. No

11. Which barriers have prevented you from taking such investments?
    a. Financial,
    b. Technological
    c. Know-how
    d. Policy / regulatory
    e. Human resources
    f. Others (specify) ……..

    } Skip to Q 16

12. Do these investments happen regularly, or once-off?
    a. Regular
    b. Once off

13. Who in your organization is making these investment decisions?
    a. Safari Owner
    b. Boat Captain
    c. Chief Engineer or chief technician
    d. Financier/investor
    e. Management contractor

14. What guidance did you draw on when deciding upon specific investments?
    a. A friend recommendation
    b. In-house expert advise
    c. External expert advise
    d. Financial institution's recommendations
    e. Government Institutions' recommendations
    f. Internal management decisions
    g. Others (specify) …….

15. Do you think additional investments to protect your business from climate hazards would be an economically viable and beneficial?
    a. Yes
    b. No

16. Can you quantify the aggregate losses from such events in financial terms?
    a. Yes
    b. No

17. What kind of environmental monitoring activities are carried out on your safari (specify the frequency)

	(✓)	Daily	Weekly	Monthly	Biannually	Annually	Other
Weather monitoring equipment							
Desalinated water quality tests							
Solid waste management logs							
Others (specify) …….							
None (Skip to Q 18)							

18. How do you carry out these monitoring activities
    a. In-house with dedicated staff
    b. Hiring a consultant

Awareness about policy instruments

19. Which of the regulations are you aware of
    a. Environment protection and preservation ACT
    b. Tourism Act
    c. Environment liability regulation
    d. EIA regulation
    e. Others (specify) ……..
    f. None (Skip to Q 21)

20. Which of the above environmental policies do you find difficult to comply with, and why (give a reason(s))?
    a. Environment protection and preservation ACT
       ……
    b. Tourism Act
       ……
    c. Environment liability regulation
       ……
    d. EIA regulation
       ……
    e. Others (specify) ……..

21. Have you applied or are you applying any specific boat building codes for your safari?
    a. Yes (specify)
    b. No

22. Do you have any recommendations for the Government of the Maldives on how they can improve environmental legislation and or guidance?

    _____

    _____

Awareness about financial instruments

23. Are you aware of any insurance products to cover climate-related risks?
    a. Yes
    b. No

24. Is your business or specific infrastructure insured against any of the risks mentioned below?
    a. Fire
    b. Storms
    c. Pest infestations
    d. Accidents
    e. Medical (for crew or tourist)
    f. Others (specify)……..

25. Which of the following are insured?
    a. Desalination plant
    b. Power plant
    c. Engine
    d. Hull
    e. Life Raft

26. Which company or companies provide this insurance?
    a. Local
    b. International
    c. All of the above

27. Are there any risks you would like to insure for but currently cannot?
    a. Yes
    b. No (Skip to Q 29)

28. Which are these risks?
    a. Storm surge and swell wave
    b. Fire
    c. Storms
    d. Erosion
    e. Pollution
    f. Coral bleaching
    g. Pest infestations
    h. Others (specify)…….

29. Do you think more insurance products for climate risks should be available for tourism industry on the Maldivian market?
    a. Yes
    b. No

30. What other financial mechanism have you got in place or planning?
    a. Environment fee
    b. Donations
    c. Revolving funds
    d. Other (specify)…….

31. If the Government were to create an investment scheme for climate risk reduction would you be interested in participating?
    a. Yes
    b. No (specify reason)…….

_____

_____

Associated communities

32. Does the safari interact with the local communities?
    a. Yes
    b. No (Skip to Q35)

33. What is the nature of the interaction
    a. As part of Cooperate Social Responsibility (CSR)
    b. Business interactions
    c. Labor or services
    d. Other

34. Type of activity are carried out
    a. Community development
    b. Education
    c. Infrastructure
    d. Job opportunities
    e. Celebration of special events
    f. Others (specify) ……..

35. Are you aware of how climate change impacts can affect these communities?
    a. Yes
    b. No

36. If a nearby community is affected by climate-related hazards, such as flooding, drought, erosion or salinization, do you think it would have an impact on your business?
    a. Yes (specify)
    b. No

37. If there is a disease outbreak (e.g. Malaria etc…)in the associated community, have you noticed any impact on your business due to that?
    a. Yes (specify)
    b. No

38. What benefits do you derive from the communities
    a. Health center benefits
    b. Harbor and docking facilities
    c. Agriculture /Fisheries
    d. Staff accommodation
    e. Other (Specify) ……

39. What benefits do you like to derive further from the communities
    a. Health center benefits
    b. Harbor and docking facilities
    c. Agriculture /Fisheries
    d. Staff accommodation
    e. Other (Specify) ……

Existing Adaptation measures

40. What are the existing adaptation measures on the vessel?
    a. Portable RO plants
    b. Backup power systems
    c. Communication facilities
    d. Backup navigation systems
    e. Life rafts
    f. Food rations
    g. Hull reinforcements
    h. Others (specify) ……..

41. What type of water sources does the safari use?

		Purpose of use			
	(✓)	Drinking	Washing	Flushing	Other (specify)
Rain water					
Desalinated water					
Bottled water					
Other (Specify) ……					

42. Which level of sewerage treatment do you have
    a. Primary
    b. Secondary
    c. Tertiary
    d. No treatment

43. Does your safari uses renewable sources of energy
    a. Yes
    b. No (Skip to Q46)

44. What are the renewable sources of energy
    a. Solar
    b. Wind
    c. Current
    d. Others (Specify) …….

45. Which of the following is it used for
    a. Electricity
    b. Water heating
    c. Others(specify)……

46. Do you have plans/additional plans for RE investments
    a. Yes
    b. No

47. What waste management practice is used on the safari
    a. 3R (Reduce, Recycle, Reuse)
    b. Waste segregation
    c. Dumped into the sea (clarify: all waste or just biodegradable waste)
    d. Taken to waste management center/island

48. Which weather services do you use MOST for planning your trips?
    e. Local weather services
    f. Non local weather services
    g. Own experience

49. How reliable do you think is the local weather services?
    a. Very reliable
    b. Reliable
    c. Somewhat reliable
    d. Unreliable
    e. Very unreliable

*** * * * * * ***

Questionnaires - Tour Operators

This Survey is carried out to collect information required for a baseline analysis to assess, quantify and document the current adaptive capacity of the tourism sector in Maldives to respond to the impacts of climate change.

Atoll: _____
Tour operator name: _____
Date: _____
Interviewee: _____
Job title: _____
Role and responsibilities: _____

Awareness about climate change and vulnerability

1. What are the causes for climate change?
    a. Open pit burning, fossil fuel burning
    b. Deforestation
    c. Natural causes
    d. Don't know
    e. Others (specify) ……

2. In your knowledge, what are the impacts of climate change?
    a. Rainfall induced flooding
    b. Storm surge and swell wave-induced flooding
    c. Storms
    d. Drought and dry spell events
    e. Lower agricultural yield
    f. Low fish catch
    g. Salinity intrusion in soils and groundwater
    h. Beach and road erosion
    i. Coral bleaching
    j. Pest infestations, vector borne diseases
    k. Increase in extreme events
    l. Change in flora and fauna (ecosystems, biodiversity, etc…)
    m. Rough seas
    n. Temperature change
    o. Don't know
    p. Others (specify) ……

3. Are you aware of how climate change may affect the tourism industry?
    a. Yes
    b. No (skip toQ5)

4. How do you think climate change will affect the Maldivian tourism Industry?
    a. Maldivian resorts will be submerged by sea level rise
    b. Number of tourists will decrease
    c. Damage to physical (built) environment
    d. Damage to natural environment
    e. Others (specify)……

5. What are your observed local effects of climate change?
    a. Changes in weather patterns
    b. Storms
    c. Drought and dry spell events(water shortage)
    d. Lower agricultural yield
    e. Low fish catch
    f. Coral bleaching
    g. Pest infestations, vector borne diseases
    h. Increase in extreme events (rough seas/ high winds)
    i. Change in flora and fauna (ecosystems, biodiversity, etc…)
    j. Rough seas
    k. Don't know
    l. Others (specify) ……

6. Is climate change impacts a concern for your establishment?
    a. Yes
    b. No (Skip to Q8)

7. How would climate change impact your tour operator activity?
    a. Impacts bed occupancy/reduced number of staff
    b. Cancellation of bookings
    c. Effects supply chains
    d. Effects transport
    e. Others (specify) ……..

8. Are you aware of actions you can take to protect your business from effects of climate change?
    a. Yes
    b. No (Skip to Q11)

9. Which measures wouldyou prioritize? Please prioritize by a number
    a. ….. Upgrade/improve the communications systems
    b. ….. Upgrade/improve transport network
    c. ….. Increase staff's handling capacity
    d. ….. Insurance
    e. ….. Disaster SOP

10. Have you made any investments to protect your business from climate hazards?
    a. Yes (Skip to Q12)
    b. No

11. Which barriers have prevented you from taking such investments?
    a. Financial,
    b. Technological
    c. Know-how
    d. Policy / regulatory
    e. Human resources
    f. Others (specify) ……..

    } Skip to Q 16

12. Do these investments happen regularly, or once-off?
    a. Regular
    b. Once off

13. Who in your organization is making these investment decisions?
    a. Overseas partner
    b. Local partner
    c. General Manager
    d. Financier/investor

14. What guidance did you draw on when deciding upon specific investments?
    a. A friend recommendation
    b. In-house expert advise
    c. External expert advise
    d. Financial institution's recommendations
    e. Government Institutions' recommendations
    f. Internal management decisions
    g. Others (specify) …….

15. Do you think additional investments to protect your business from climate hazards would be an economically viable and beneficial?
    a. Yes
    b. No

16. Can you quantify the aggregate losses from climate related events in financial terms?
    a. Yes
    b. No

17. What kind of environmental monitoring activities are carried out by your agency (specify the frequency)

	(✓)	Daily	Weekly	Monthly	Biannually	Annually	Other
Weather monitoring							
Any environmental disasters							
Others (specify) …….							
None (Skip to Q 18)							

Awareness about policy instruments

18. Which of the regulations are you aware of
    a. Environment protection and preservation ACT
    b. Tourism Act
    c. Environment liability regulation
    d. EIA regulation
    e. Others (specify) ……..
    f. None (Skip to Q 21)

19. Which of the above environmental policies do you find difficult to comply with, and why (give a reason(s))?
    a. Environment protection and preservation ACT
       ……
    b. Tourism Act
       ……
    c. Environment liability regulation
       ……
    d. EIA regulation
       ……
    e. Others (specify) ……..

20. Do you have any recommendations for the Government of the Maldives on how they can improve environmental legislation and or guidance?

_____

_____

Awareness about financial instruments

21. Are you aware of any insurance products to cover climate-related risks?
    a. Yes
    b. No

22. Is your business or specific infrastructure insured against any of the risks mentioned below?
    a. Fire
    b. Storms
    c. Pest infestations
    d. Accidents
    e. Medical (for staffs or tourist)
    f. Others (specify)……..

23. Which of the following are insured?
    a. Office premises / appliances
    b. Transport vehicles and vessels
    c. Crew insurance
    d. Special Travel insurance for tourist
    e. Other (specify) ……..

24. Which company or companies provide this insurance?
    a. Local
    b. International
    c. All of the above

25. Are there any risks you would like to insure for but currently cannot?
    a. Yes
    b. No (Skip to Q 27)

26. Which are these risks?
    a. Storm surge and swell wave
    b. Fire
    c. Storms
    d. Erosion
    e. Pollution
    f. Pest infestations
    g. Others (specify)…….

27. Do you think more insurance products for climate risks should be available for tourism industry on the Maldivian market?
    a. Yes
    b. No

28. What other financial mechanism have you got in place or planning?
    a. Environment fee
    b. Donations
    c. Revolving funds
    d. Other (specify)…….

29. If the Government were to create an investment scheme for climate risk reduction would you be interested in participating?
    a. Yes
    b. No (specify reason)…….

_____

_____

Associated communities

30. Does your tour operator/agency interact with the local communities?
    a. Yes
    b. No (Skip to Q34)

31. What is the nature of the interaction
    a. As part of Cooperate Social Responsibility (CSR)
    b. Business interactions
    c. Labor or services
    d. Other

32. Type of activity are carried out
    a. Community development
    b. Education
    c. Infrastructure
    d. Job opportunities
    e. Celebration of special events
    f. Others (specify) ……..

33. What benefits do you derive from the communities
    a. Health center benefits
    b. Harbor and docking facilities
    c. Agriculture /Fisheries
    d. Staff accommodation
    e. Tourist accommodation
    f. Other (Specify) ……

34. Are you aware of how climate change impacts can affect these communities?
    a. Yes
    b. No

35. What benefits do you like to derive further from the communities
    a. Health center benefits
    b. Harbor and docking facilities
    c. Agriculture /Fisheries
    d. Staff and tourist accommodation
    e. Other (Specify) ……

36. If a nearby community is affected by climate-related hazards, such as flooding, drought, erosion or salinization, do you think it would have an impact on your business?
    a. Yes (specify)
    b. No

37. If there is a disease outbreak (e.g. Malaria etc…)in the associated community, have you noticed any impact on your business due to that?
    a. Yes (specify)
    b. No

Existing Adaptation measures

38. What are the existing adaptation measures taken by your tour operator?
    a. Backup power systems
    b. Backup communication facilities
    c. Backup navigation systems
    d. Backup transport networks
    e. Food rations
    f. Others (specify) ……..

39. Does your operator/agency uses renewable sources of energy
    a. Yes
    b. No (Skip to Q42)

40. What are the renewable sources of energy
    a. Solar
    b. Wind
    c. Current
    d. Others (Specify) ……..

41. Which of the following is it used for
    a. Electricity
    b. Water heating
    c. Others(specify)……

42. Do you have plans/additional plans for RE investments
    a. Yes
    b. No

43. Which weather services are mostly used by your operator/agency?
    a. Local weather services
    b. Non local weather services
    c. Own experience

44. How reliable do you think is the local weather services?
    a. Very reliable
    b. Reliable
    c. Somewhat reliable
    d. Unreliable
    e. Very unreliable

*** * * * * * ***

Questionnaires - Associated Communities

This Survey is carried out to collect information required for a baseline analysis to assess, quantify and document the current adaptive capacity of the tourism sector in Maldives to respond to the impacts of climate change.

Atoll: _____
Island name: _____
Date: _____
Interviewee: _____
Job title: _____
Role and responsibilities: _____

Tourism-associated communities

1. Are you aware of climate change?
    a. Yes
    b. No

2. Which of the following impacts of climate change has the community experienced
    a. Rainfall induced Flooding
    b. Storm surge and swell wave induced Flooding
    c. Storms
    d. Drought and dry spells
    e. Salinity intrusion into groundwater
    f. Erosion of beaches
    g. Erosion of roads
    h. Pollution
    i. Coral bleaching
    j. Pest infestations
    k. Rough seas
    l. Temperature change
    m. Others (Specify) ……

3. Which of the following financial losses/damages were caused by the above impacts (please specify events):

	(✓)	Damage of infrastructure	Investment in emergency supplies	Loss of income	Migration of human resources	Others (specify) …….
Rainfall induced Flooding						
Storm surge and swell wave induced Flooding						
Storms						
Drought and dry spells						
Ground water salinization						
Beach erosion						
Pollution						
Coral bleaching						
Pest infestation						
Other (specify) …..						

4. Has the aggregate losses from such events been qualified in financial terms?
    a. Yes (if possible please specify)
    b. No

5. Do you think that damaging events will be stronger in the years to come?
    a. Yes
    b. No

6. Do you think the events will be more frequent in the years to come?
    a. Yes
    b. No

7. In what way do these affect your income?
    a. Property damage
    b. Unable to commute
    c. Agricultural loss
    d. Unable to fish
    e. Extra expenditure (water, hospital etc…)
    f. Impact on local businesses

8. Are you taking any actions to help your community cope with some of these impacts?
    a. Yes
    b. No

9. Is the community taking any actions to protect the resort from the impacts of climate change?
    a. Yes (please specify…)
    b. No

10. Is the nearby resort taking any actions to protect the community from the impacts of climate change?
    a. Yes
    b. No (Skip to Q 13)

11. If yes to 6, in which of the following ways?
    a. Investment in coastal protection
    b. Education
    c. Health
    d. Agriculture
    e. Flood protection
    f. Protection of utilities
    g. Rainwater harvesting
    h. Others (specify)

12. What is the nature of the assistance received from the resort?
    a. As part of CSR
    b. Business interactions
    c. Labor or services
    d. Other

13. What are the positive effects of the tourism operations on the natural environment of your island/atoll?
    a. Waste management
    b. Coral reef rehabilitation
    c. Enhance of bio-diversity
    d. Agriculture
    e. Rainwater harvesting
    f. Other (specify) ……

14. What are the negative effects of the tourism operations on the natural environment of your island/atoll?
    a. Waste
    b. Coral reef damage
    c. Loss of bio-diversity
    d. Island erosion
    e. Restriction on resources (eg: bait fishing/reef fishing)
    f. Other (specify) ……

15. How do you weigh the effects of operation
    a. More positive
    b. More negative
    c. balanced

16. Is your community engaged in any form of environmental monitoring or conservation activities?
    a. Yes
    b. No

17. Which of the following monitoring/conservation activities is community engaged in?
    a. Reef check,
    b. beach clean-up,
    c. biological monitoring,
    d. weather station monitoring,
    e. beach measurements,
    f. environmental education/awareness campaigns,
    g. Other (specify) ……

18. Would your community be interested in working with a local tourism operator on climate risk reduction projects?
    a. Yes
    b. No (Skip to Q 20)

19. If yes, prioritize the problem/risk your community would like to address:
    a. ……. Rainfall induced Flooding
    b. ……. Storm surge and swell wave induced Flooding
    c. ……. Storms
    d. ……. Drought and dry spells
    e. ……. Salinity intrusion into groundwater
    f. ……. Erosion of beaches
    g. ……. Erosion of roads
    h. ……. Pollution
    i. ……. Coral bleaching
    j. ……. Pest infestations

20. If a nearby resort is affected by climate-related hazards, such as flooding, drought, erosion or salinisation, do you think it would have an impact on your community?
    a. Yes (specify)
    b. No

Questionnaires - Government Institutions, Other Stakeholders

This Survey is carried out to collect information required for a baseline analysis to assess, quantify and document the current adaptive capacity of the tourism sector in Maldives to respond to the impacts of climate change.

Ministry: _____
Date: _____
Interviewee: _____
Job title: _____
Role and responsibilities: _____

Government institutions

1. Which policy instruments (law, regulations and subsidies) are you aware of that currently provide tourism related businesses with incentives to:
    a. Minimize damage to the environment;
    b. Protect infrastructure and assets from climate hazards such as flooding (both rainfall induced and storm surge and swell wave induced); storms; drought and dry spells; salinity intrusion; erosion; coral bleaching and pest infestations.

2. What guidance material are you aware of that helps tourism related businesses make decisions that:
    a. Minimize damage to the environment and;
    b. Protect infrastructure and assets from climate hazards such as flooding (both rainfall induced and storm surge and swell wave induced); storms; drought and dry spells; salinity intrusion; erosion; coral bleaching; and pest infestations.

3. Which of these policy instruments/ guidance materials are most effective? Why?

4. What prevents particular policy instruments from achieving their objectives?

5. What criteria are considered in choosing islands for resort development?
    a. Political
    b. Coordination between institutions
    c. Financial restrictions
    d. Human resource/capacity
    e. Others (specify) ……..

Increasing Climate Change Resilience of Maldives through Adaptation in the Tourism Sector, also referred to as the Tourism Adaptation Project (TAP) is a project implemented by the Ministry of Tourism (MoT) with the support of the United Nations Development Programme (UNDP) and financial support of the Global Environment Facility (GEF) least developed country fund (LDCF).

The project is intended to provide the tourism sector in Maldives with the required policy environment, regulatory guidance, technical skills and knowledge to ensure that climate change-related risks can be systematically factored into day-to-day tourism operations and in the tourism dependent communities.

Since 2011, TAP has undertaken activities to strengthen the capacity of the Ministry of Tourism and tourism businesses to recognize evident climate risk issues in tourism operations and adopt appropriate adaptation measures to address them.

Similarly, tourism-dependent communities benefit from the project by cooperating with associated tourism operations and the government to plan and implement joint adaptation activities which address shared vulnerabilities through a small grants programme.

This publication is based on a study undertaken by TAP. For more information on TAP programme and activities please visit www.tourism.gov.mv

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