

Title

Enhancing the Resilience of Coral Reefs and Assessing Vulnerability of Ecological and Social Communities to Climate Change¹

Location

Maldives, Indian Ocean

1 Introduction

Coral reefs are highly diverse ecosystems that are vital to the welfare of large human populations throughout the tropical world. Coral reefs and tropical marine ecosystems are facing increasing stress from a variety of causes including over-exploitation, land-based sources of marine pollution and severe events including storms and tsunamis. They are also highly vulnerable to climate change, with 16% of the world's reefs suffering serious damage during the global bleaching event of 1998. Climate Change is now recognized as one of the most serious long-term threats to the biodiversity and services provided by tropical marine ecosystems. The effects of climate change are visible today and predictions for coral reefs are extremely dire with many experts predicting the functional extinction of many coral reef systems during this century.

Globally, the economic and social importance of coral reefs has been acknowledged and it has been recognized as the first ecosystem to face “irreversible changes” under the global temperature increases that are expected. Because of the great socio-economic importance of coral reefs, especially to the tourism and fisheries industries, the loss of these ecosystems would perturb the livelihoods of hundreds of millions of people around the world. As a result, the coral reef management community is engaging with the need for greater understanding, improved monitoring, management, and public awareness of the growing threat of climate change to coral reefs and dependant communities and sectors.

2 Objectives

Objective 1: Implement a public awareness and education program for Marine Conservation and Coral reefs.

This will utilize core strengths of the tourism industry in reaching out to a broad constituency regarding environmental challenges and especially climate change, and how actions by resorts can make.

Objective 2: Train and empower local capacity to manage and monitor coral reefs.

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Particular attention to capacity building and networking among resorts, with the aim of developing a network of marine managed areas, generating information helpful in tourism planning, and connecting project initiatives with the nationally coordinated monitoring programme implemented by the national Marine Research Centre.

Objective 3: Assess the vulnerability and adaptation potential of different sectors and local communities dependant on coral reefs.

Vulnerability to climatic change will be considered both in terms of impacts due to loss of key assets (e.g. coral degradation from warming) as well as in terms of how action at the local and national level can reduce (or increase) vulnerability to climate change.

3 Main activities

3.1 Implement education program for marine conservation and coral reefs

3.1.1 Resort Staff Training on Environmental Sustainability and Marine Conservation

The Maldivian tourism industry is highly dependant on the pristine nature of the marine environment. Each and every staff of every resort should be well informed about the marine environment for them to be able to deliver the product to the guests. At present, most resort staff are aware of the marine environment to some extent but not sufficient to act consciously to ensure proper conservation of the environment.

This component is centred on training the resort staff on the different aspects of the marine environment focussed on environmental sustainability and conservation. Workshops will be held at the selected resorts to enhance their knowledge on climate change and it's impacts, management of the house reef, waste management, conservation of species and other related topics. Focus will be given how they can proactively cooperate to avoid negative impacts on the marine environment themselves and how to communicate these aspects to the guests.

Deliverables:

- Education material and presentations adapted to the Maldivian resort context.
- Visits and workshops held at each of the selected resorts with list of attendants and workshop evaluation.

3.1.2 BleachWatch Program

Coral bleaching refers to a process in which corals expel the algal cells (zooxanthellae) that normally live within their tissue. Large-scale bleaching episodes are usually associated with unusually high sea temperatures, suggesting that coral reefs are showing early signs of stress due to global warming. There has been extensive climate-related damage to Maldivian coral reefs while other reefs have escaped the damage.

Understanding the effects and implications of climate change, and identifying management responses are urgent challenges for the conservation of reefs worldwide. Yet, detecting and measuring climate change impacts, even dramatic effects such as coral bleaching, can be difficult. The initial onset of mass coral bleaching can range from gradual and patchy to rapid and uniform, and can occur with varying synchrony over hundreds or thousands of square kilometres. Detecting the early signs of a mass-bleaching event requires a wide network of observers providing regular reports of conditions throughout the region.

As a program, BleachWatch has been designed to provide reliable reports of reef condition from a range of reef users. BleachWatch taps into the experience and intimate knowledge many members of the community have about their local reefs. It provides a formal mechanism to link observations by tourism guides, management field staff and other regular reef visitors with conservation and management programs. BleachWatch originated in the Great Barrier Reef Marine Park in Australia, but is now running in several other countries, including the USA, Indonesia, Madagascar, and in Phase I of this project in Egypt. The main objective of this program will be to set up training sessions for resort marine biologists, tourism guides and management field staff to recognise and report coral bleaching events. The project will deliver the following:

- Setting up a network of volunteers to report on coral reef conditions.
 - Volunteers should include marine biologists, tourism operators, field management staff, community members and scientists.
 - A list of stakeholders and volunteers will be established in collaboration with SeaMarc and the Maldives Marine Research Centre staff.
- Identify key coral reefs to be monitored.
 - Will be a subset of sites that are dived / visited regularly by the dive community and are representative of the Maldives
- Define the BleachWatch monitoring protocol.
 - Customise content (already developed for Australia and Egypt) for the Maldives
- Set up a database to gather the collected information.
- Define the content and the agenda of training sessions.
- Identify key individuals to act as trainers and utilise the marine science e-network as a platform.
- Prepare a package containing all the material to be used during the BleachWatch training sessions.
- Organize and undertake at least five training sessions in different atolls
- Participate in the data management and coordinating program activities of marine biologists at the resorts.

3.2 Train and empower local capacity to manage and monitor coral reefs.

3.2.1 Training on climate change and coral reef management

It is important to frame marine area management (regulating fishing, pollution, tourism) within the context of Climate Change with the purpose of enhancing the ability of coral reefs to resist or recover from unavoidable climate change associated impacts.

Understanding the ecological vulnerability of the coral reef system in the Maldives is important to identifying priority areas for conservation or management. The need for rapid methodologies for measuring coral reef resilience and their application in assessing the effectiveness of coral reef conservation and management measures is becoming increasingly acute, and especially so in the developing world. It is therefore crucial to integrate monitoring and assessment protocols within the tourism and government sectors to build an understanding of environmental indicators that can be used for managing coral reefs, including MPAs associated with high quality coral sites, as well as the house reefs of resort islands, key assets to the tourism industry that constitute de facto MPAs. Specifically this objective will work to:

Capacity building activities are planned to assist coral reef managers, resort managers, and tourism operators understand the risks associated with climate change and to identify adaptation strategies to reduce these risks. The Project will deliver Climate Change and Reef Management Workshops that address the following issues:

- Coral reefs and climate change: what are the issues?
- Predicting and preparing for coral bleaching events
- Monitoring the impacts of climate change
- Social and economic implications of coral bleaching events
- Sharing knowledge and managing media
- Understanding reef resilience in a changing climate
- Building resilience through local management

3.2.2 Resort House Reefs declared as privately managed Marine Managed Areas

The resort house-reefs are by law protected from all extractive activities except for bait fishing by the local fishermen. As such, these areas act as MPAs by default. However, as management plans do not exist for the house-reefs, destructive activities do occur on some from time to time and declaring these areas as MPAs by law would ensure that the marine environment around the resorts is appropriately managed and conserved. For many of the resorts that lie on the same reef system as other resorts or inhabited islands, boundaries of the house-reefs are often ambiguous, as they are not demarcated. This results in unacceptable use of the reefs by outsiders leading to conflicts between the resort and local people. Thus, delimiting the boundaries is of utmost importance for proper management and conservation.

This component will develop MPA management plans for 4 Kuoni resorts based on ecological surveys and discussions with local stakeholders. This will involve investigating the institutional arrangements within and between the government and resorts and the barriers to implementation of privately managed MPAs. The marine biologist or a dedicated person on the resort will be trained as a warden in enforcement such as techniques to drive away intruders to the MPAs and monitoring including Fishwatch, Sharkwatch and Bleachwatch. A whaler or mode of transport dedicated to the warden is necessary at participating resorts and it has to be the investment of the resort.

Four main areas will be used as pilots for this exercise:

1. Four Seasons Resorts, Kuda Huraa Island location, North Male Atoll and Landaa Giraavaru Island location, Baa Atoll
2. Waldorf Beach House, Mannufaruu Island, Upper North Atoll
3. Reethi Beach Resort, Fonimagoodhoo Island, North-east of Baa Atoll
4. Sixth Sense Resort, Kunfunadhoo Island, Baa Atoll

Deliverables:

- MPA management plans developed for house-reefs of at least 4 resorts
- Declaration of 4 MPA house-reefs
- Training of staff in enforcement and monitoring of MPAs

3.2.3 Setting up Waste Management Systems on 10 inhabited islands

Waste management is one of the greatest environmental challenges in the Maldives where space is limited and the islands are spread over a large geographical area. Rapid population growth, the uneven distribution of this population over a widely dispersed set of islands along with changing consumption patterns have worsened the waste management situation of the country. While it is difficult to decrease the direct impacts from climate change, it is possible to make the reefs more resilient to these impacts by reducing anthropogenic environmental impacts. As such, waste management can be seen as the largest and most extensive human threat to the marine environment of the Maldives. The widespread nature of the islands makes it difficult to implement proper waste removal and the small islands do not have space for storing nor managing non-biodegradable waste.

This component aims to set up a system of final disposal of non-biodegradable waste from 10 inhabited islands in coordination with the neighbouring Kuoni resorts. The islanders will be taught to segregate waste at household level and bins will be provided to store the waste separately until removal from the island. The resort boat will pick up the local island waste once a week en route to Thilafushi in Male' Atoll (municipal landfill site) when they transport their own waste. A small shed will need to be built at the harbour to store the bins and this should be constructed by the island community. A once-off large clean up may need to be organised before implementation of the system as most islands have accumulated waste over time. While this activity results in cleaner, more hygienic islands, it also provides the resort an activity of Corporate Social Responsibility and reduces the waste that washes up on the shores of the resorts themselves.

Deliverables:

- System of final disposal of non-biodegradable waste implemented on 10 local islands in coordination with Kuoni resorts

3.3 Assess the vulnerability and adaptation potential of different sectors and local communities dependant on coral reefs.

As our awareness of climate change has increased, so has our need to understand the changes it will bring and our vulnerability to it. Climate change cannot be fully averted as past emissions will increase global temperatures by up to 0.6% over the next four decades and we must understand, prepare for and adapt to its inevitable effects. Adaptation is

essential if the different sectors (including the important Maldivian tourism sector) is to reduce its vulnerability to climate change and limit negative changes in tourism visitation and resources to the local community of this highly vulnerable developing island state.

Adaptive capacity is defined as the ability to respond to challenges through learning, managing risk and impacts, developing new knowledge and devising effective approaches. It requires the flexibility to experiment with novel solutions. Adapting to climate change requires adequately anticipating and preparing for change. Some individuals and some industries will be better able to plan and reorganize than others. Enhancing adaptive capacity can significantly reduce risks of adverse impacts from future and unpredictable events. Characteristics that contribute to adaptive capacity include possessing creativity and innovation (for identifying solutions or adaptation options), testing and experimenting options using effective feedback mechanisms, using adaptive management approaches, emotional and financial flexibility for absorbing the costs of change and being able to reorganise given novel information. These characteristics can be actively targeted for development and enhancement as part of strategic efforts to build capacity to adapt to climate change. Accessing projections of the future to better understand the threats facing climate-sensitive enterprises can enhance adaptive capacity. This may help identify opportunities and reduce risks associated with climate change. In turn, the project will:

- Assess perceptions of climate change issues among the tourism industry and local communities
 - Review of past and current initiatives on climate change adaptation and mitigation and disaster risk reduction
 - Surveys of perceptions of climate change among tourism operators and tourists
 - Scoping study to assess the vulnerability of the tourism industry to climate change
 - Report on the likely resilience of different sectors / island communities to change events such as climate change and policy restricting access to resources (eg. implementation of a Marine Managed area)
- Develop adaptation options for climate change for tourism sector and local communities
 - Organize and convene a Climate Change & Tourism workshop with appropriate national participants and international experts
 - Based on the studies and discussions, develop a Draft Guide to Climate Change for the tourism industry
 - Meet with key policymakers to share global best practice in addressing climate change
 - Map opportunities and processes for developing a Climate Adaptation Plan