Ocean Country Partnership Programme

Report of Protected Area Management Effectiveness Evaluations for three sites in the Maldives

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and Technology

For further information please contact:

Joint Nature Conservation Committee
Monkstone House
City Road
Peterborough
PE1 1JY

https://jncc.gov.uk/our-work/ocean-country-partnership-programme/

Communications@jncc.gov.uk

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Authors:

Jamie Small, Eirian Kettle, Emily Hardman, Beth Flavell, Muhusina Abdul Rahman

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Evidence Quality Assurance:

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Acronyms

BACF	Baa Atoll Conservation Fund
CBD	Convention on Biological Diversity
Cefas	Centre for Environment, Fisheries and Aquaculture Science
EPA	Environment Protection Agency
GDP	Gross Domestic Product
JNCC	Joint Nature Conservation Committee
METT	Management Effectiveness Tracking Tool
METT-4	Management Effectiveness Tracking Tool, version 4
MMO	Marine Management Organisation
MoECCT	Ministry of Environment, Climate Change and Technology
MoFMRA	Ministry of Fisheries, Marine Resources and Agriculture
MoT	Ministry of Tourism
MMRI	Maldives Marine Research Institute
MPA	Marine Protected Area
NGO	Non-Governmental Organisation
OECM	Other Effective Conservation Measures
OCPP	Ocean Country Partnership Programme
PAME	Protected Area Management Effectiveness
SMART	Specific, Measurable, Attainable, Relevant, Time bound
WCPA	World Commission for Protected Areas
WDC	Women's Development Council

Summary

The UK-led Ocean Country Partnership Programme (OCPP), delivered under the UK Blue Planet Fund, was invited to work with the Government of the Maldives to undertake a pilot study into the management effectiveness of three different types of sites in Maldivian waters.

The aim of this study was to increase understanding on how these sites function, determine how well they are being managed, highlight key success areas, and provide recommendations on how management could be improved. The three sites for the study were chosen based on their different management attributes:

- Hanifaru Area as a national Marine Protected Area (MPA) under the Maldivian Environment Protection Act (No.4/93) and a core zone of the Baa Atoll UNESCO Biosphere Reserve with an active management plan.
- Kudahuvadhoo Kanduolhi a grouper spawning aggregation site regulated under the Fisheries Act of the Maldives (No.14/2019) as a fisheries protection measure.
- Angsana Velavaru house reef as a ‘no take’ site under the Tourism Boundary Regulation (No.2012/R-7) and a potential candidate for designation as an Other Effective Area-based Conservation Measure (OECM).

To assess Protected Area Management Effectiveness (PAME), version 4 of the Management Effectiveness Tracking Tool (METT-4) was used and completed by the OCPP team in the UK. The METT-4 involves answering 38 questions based around five management elements that focus on planning, inputs, processes, outputs and outcomes of the protected site. The evaluation of each stage results in an overall score and helps to highlight key management achievements and key ‘actions to improve’ management. These actions can then be taken forward by the site management team to ensure the continued success of the site. The three assessments were completed based on the best available evidence for each site, based on desk-based research, stakeholder surveys, and meetings with managers and stakeholders, and the results were validated by stakeholders through workshops and meetings.

Hanifaru Area scored 55% overall with the highest scoring management element being Outcomes at 78%, due to the good conservation status of the key habitats and species in Hanifaru Area. The lowest scoring element was Outputs at 40% due to functional connectivity of the site (for example migration channels) not currently taken into consideration as part of the site management, and the lack of a monitoring and research plan.

Kudahuvadhoo Kanduolhi scored 23% overall, achieving its highest score, 38%, for Planning partly due to the comprehensive national Grouper Fishery Management

regulation that the site sits under. The lack of enforcement and monitoring processes in place resulted in the lowest score of 15% for the Process management element. However, these scores are to be expected for Kudahuvadhoo Kanduolhi as the assessment was based on the newly introduced management plan which is in the early stages of development and is yet to establish enforcement and monitoring strategies.

Angsana Velavaru scored 49% overall with the highest score given to management inputs at 78%. The site is supported by a sufficient budget, excellent facilities and access to adequate equipment and skilled staff. The lowest scoring management element was Planning at 33% because the site does not currently have an official management plan or clearly defined objectives.

Although all three sites are quite different in their approach, objectives, management and structure, significant similarities emerged from the recommendations identified by the METT-4 assessments. All sites would benefit from SMART (Specific, Measurable, Attainable, Relevant, Time Based) management plans that include indicators to measure the effectiveness of management actions. The development of associated research and monitoring plans would help to underpin the evidence required to assess the success of management actions. Engagement with local communities linked to each site highlighted that there is a general lack of awareness around MPAs in the Maldives including their purpose, locations and associated rules and boundaries. Stakeholders also felt that they were not fully engaged in the management processes for each site. Therefore, the development of MPA educational and awareness programmes and the establishment of community MPA working groups would improve stakeholder engagement and community awareness. One potential idea could be to establish an ‘Environmental Champion’ role on Atoll Councils who would be responsible for disseminating information about local MPAs to their communities. Lastly, challenges in enforcement capabilities due to capacity and costs could be addressed through the exploration of new technology.

The similarity in successes and gaps across all three of the sites may infer that these key themes occur in other MPAs across the Maldives and thus this pilot study can help direct key actions that would benefit the effectiveness of all MPAs in the Maldives.

1 Introduction

The Republic of Maldives is known for its rich marine environment and is home to a range of habitats including mangroves, seagrass meadows and coral reefs. These habitats are integral to Maldives' two major industries of fisheries and tourism, and provide food security, employment, foreign income, and recreation. In efforts to protect the marine environment, the Maldives has implemented a Marine Protected Area (MPA) network, consisting of officially designated sites (including three UNESCO Biosphere Reserves), informal protected areas, and areas protected under fisheries legislation.

The Ocean Country Partnership Programme (OCPP) is a UK Government-led programme, being delivered under the Blue Planet Fund and supported in the UK by the Joint Nature Conservation Committee (JNCC), the Marine Management Organisation (MMO) and the Centre for Environment, Fisheries and Aquaculture (Cefas). OCPP was invited to collaborate with the Government of the Maldives to explore opportunities to support effective management of their marine environment. The partnership is consequently providing demand-led technical assistance to provide support for the Maldives MPA network.

Working in partnership with the Maldives Government, the OCPP will be undertaking a number of activities in furthering MPA management, monitoring and enforcement strategies. In the first year of the OCPP, a pilot project looking at MPA management and effectiveness was undertaken. Protected Area Management Effectiveness (PAME) evaluations of three sites in the Maldives were completed, with the aim of better understanding how these sites function, determining how well they are being managed, and providing recommendations on how management could be improved.

This report outlines the methods used to evaluate the management effectiveness of the three sites and discusses the results and recommendations of each assessment. As part of the pilot approach three different sites were selected to help demonstrate the flexibility of the PAME process and how it can be used under different circumstances:

1. **Hanifaru Area MPA** a core zone within the Baa Atoll Biosphere Reserve designated under the Maldivian Environment Protection and Preservation Act (No.4/93) with an existing management plan and protective systems in place.
2. **Angsana Velavaru** a resort house reef in Dhaalu Atoll with "no take" protection under the Tourism Boundary Regulation (No. 2012/R-7).
3. **Kudahuvadhoo Kanduolhi** grouper aggregation site in Dhaalu Atoll, an area protected for fisheries measures under the Fisheries Act of the Maldives (No.14/2019).

Each of the selected sites are designated under different legislation, are at different management stages with different management processes in place and vary in the resources available to them.

1.1 Protected Area Management Effectiveness (PAME)

Once a MPA has been designated and a management plan developed, it is important to understand whether the management actions are working and achieving what they set out to do. A PAME evaluation helps to measure and understand the impact of management actions on the MPA's values and tracks progress towards achievement of the MPA's goals and objectives. The results of a PAME evaluation will help MPA managers to document achievements, identify and set new priorities to improve future management and enable effective resource allocation, as part of an adaptive management approach. Additionally, a PAME evaluation can help to build support and trust by sharing information about management achievements with the community and other stakeholders. International reporting on the management of protected areas is also becoming increasingly common. For example, PAME is embedded within the Convention on Biological Diversity (CBD) and contracting parties are required to report on it.

A PAME evaluation is generally achieved by the assessment of a series of criteria (represented by carefully selected indicators) against agreed objectives or standards.

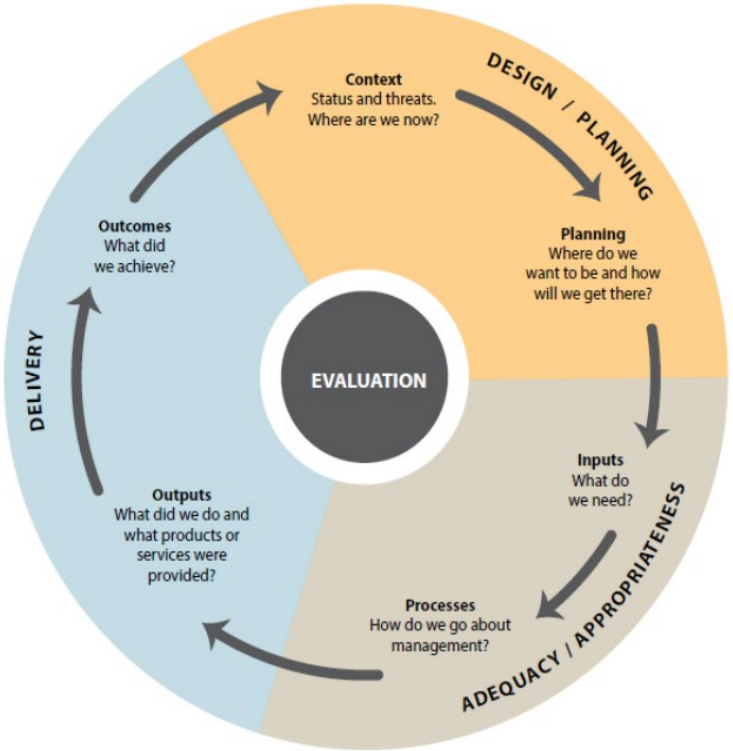

Figure 1. An example framework for assessing management effectiveness, developed by IUCN's World Commission for Protected Areas (WCPA) (Hockings *et al*., 2006).

The IUCN's World Commission for Protected Areas has developed a framework for assessing management effectiveness (Figure 1). This is based on six stages or elements to good management:

1. Context: the framework begins with understanding the context of the site by establishing the current threats and values. This background information is needed to help plan and implement management effectively.
2. Planning: considers the design features of the protected area such as the physical, legal and institutional factors that determine the complexity of management.
3. Inputs: investigates the adequacy of resources – human capacity, facilities, information, equipment, and budget – for effective management and considers the level of resources needed; the extent to which these resources are available; and importantly whether resources are being used and applied in the best way.
4. Processes: focuses on the standard of management within a protected area i.e., the suitability of management processes, the extent to which established or accepted processes are being implemented and whether the systems and standards are appropriate or could be improved.
5. Outputs: focuses on the results of management actions and determines whether the MPA managers and other stakeholders have achieved what they set out to do. Assessment of outputs looks at the number or level of products and services delivered (e.g. number of people trained, the numbers of meetings held with local communities, or the numbers of fisheries patrols undertaken); and the extent to which stated actions, tasks and strategies were implemented.
6. Outcomes: evaluates the outcomes of management actions and includes the review of ecological, social, economic, and cultural values and if they have changed over time, the extent to which a threat has been reduced or the extent to which other objectives of management have been achieved.

Once all six stages of the management framework have been evaluated, the results should be used to inform adaptive management actions to ensure the continued success of the MPA and introduce improvements where necessary (Hockings *et al*., 2006).

2 Methods

The Management Effectiveness Tracking Tool (METT) is one of the most well-known and commonly used PAME tools and has been used to assess management effectiveness in over 5,000 protected areas in over 170 countries (Stolton *et al*., 2021). The METT uses a scorecard approach and is designed to be simple. It consists of an evaluation spreadsheet containing a questionnaire with series of questions, each with four alternative responses and an associated score. A key part of the questionnaire is

to provide a justification for each answer given and to set out the next steps that will be taken to improve or maintain management. Additionally, the METT collects information on protected area attributes such as designation date, size, and management authority alongside threats associated with the protected area. The values, ecosystem services and objectives of the site are also identified and used throughout the questionnaire to assess the management outputs against. The METT has been designed to be easily answered by MPA managers without any additional research, but quantitative data such as results of existing monitoring programmes should be used where possible to support the assessment.

The METT version 4 (METT-4), the most recent version of the METT at the time of writing, was selected for this pilot PAME project due to its simple and inexpensive evaluation process, its global use allowing for a consistent approach to CBD reporting, and because members of the Maldives Government have had previous experience in using the METT-4 compared to other PAME tools. The METT-4 is also effective at addressing changes in a single protected area over time compared to other PAME tools such as the Rapid Assessment and Prioritization of Protected Area Management (RAPPAM), developed by WWF, which is designed for broad level comparisons among a protected area network (Ervin, 2003).

The METT-4 is split into five elements, which represent five of the six stages outlined in the IUCN's management effectiveness framework (Figure 1); Planning, Inputs, Process, Outputs and Outcomes. The sixth stage of Context is represented through the collation of evidence to support the assessment of the other five elements, in addition to the protected area attributes and detailed assessment of threats. The METT-4 is comprised of 38 questions spread unevenly across the five management elements; this unbalanced representation is due to the varied consideration within each element. For example, the element of Process has the largest number of questions at 16, while the element of Outcomes, has the fewest number of questions at four. This leads to percentage scores that are not necessarily comparable between the elements, however it is important to note that this assessment tool is designed primarily for internal evaluation using qualitative data. The aim is to identify key areas of improvement for a given site and to assess changes in management effectiveness for a site over time.

Each question is multiple choice and is scored from 0 to 3, depending on how successful the management of the protected area is in that area. Figure 2 shows an example of a question in the METT-4 which shows the criteria that must be met to achieve each score. While the scores are a useful tool to assess progress over time, if the METT-4 is regularly completed for a protected area, the most important output is the list of actions for improvement that should be compiled during the assessments; these actions allow protected area managers to ensure the effective protection of their site.

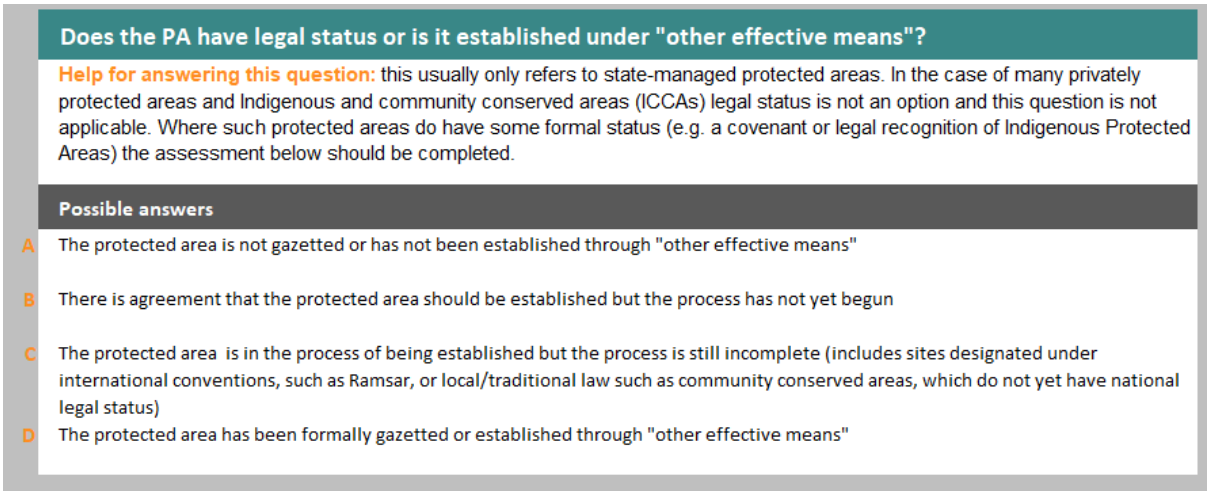

Figure 2. Screenshot of the first question in the METT-4. The image shows the four possible answers to the question; answering A results in a score of 0 while D achieves a maximum score of 3.

Ideally, METT-4 assessments will be undertaken by site managers and those directly involved in the site in collaboration with a range of different stakeholders. However, due to limited capacity, and as this was a pilot project to explore methodologies and approaches in the Maldives, OCPP staff based in the UK led on the completion of the METT-4 assessments for the three sites. Engagement with Maldives Government staff and stakeholders in the Maldives took place at key points during the process. This is a clear limitation of this project, however validation of the METT-4 results with the Maldives Government and key stakeholders helped to ensure that they are a true reflection of the current status of the sites.

The following four stages were undertaken by the OCPP team based in the UK to successfully complete the METT-4 assessments for each of the three sites. We have stated where Maldives Government and stakeholders were engaged and at which stages. Figure 3 provides an overview of the process taken.

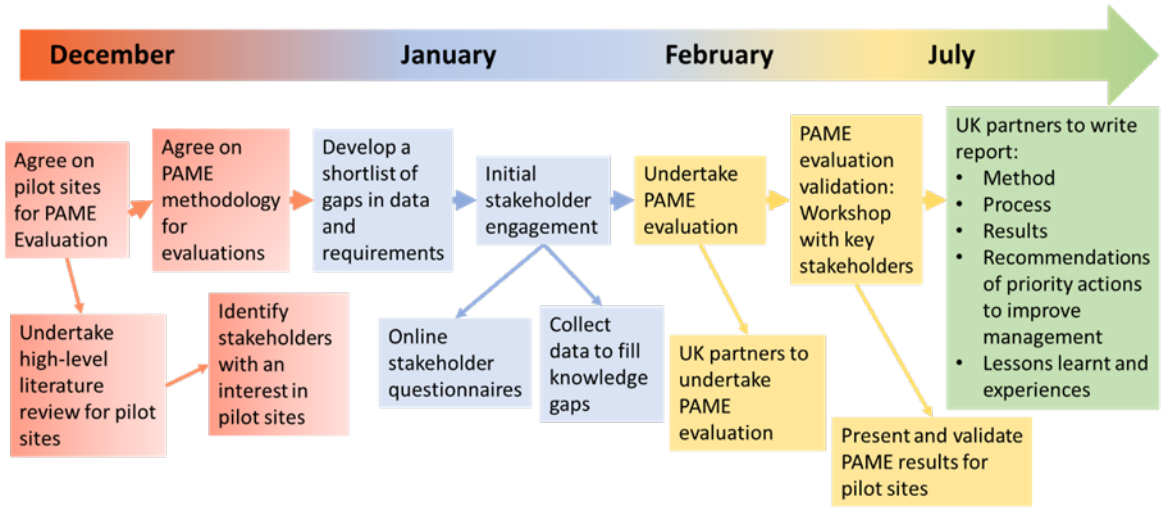

Figure 3. Flow chart displaying the stages undertaken by the OCPP team to complete the METT-4 PAME evaluation for three marine sites in the Maldives during 2021-22.

2.1 Data Gathering

The METT-4 can be completed using limited resources and the knowledge of site managers alone, however, quantitative data and input from multiple stakeholders provides for a more robust and impartial assessment. To prepare for the METT-4 assessments, an initial online data gathering exercise took place to build understanding of the purpose of each site. Basic information, based on the attribute table in the METT-4, such as location, designation status, management authority, size and protected features were collected and used to create site profiles. This was followed by more focused research based on the 38 questions in the METT-4 to ensure the correct information required to support each answer was identified. Information sources used included published scientific literature, government and NGO reports and websites linked to each site. All information gathered was recorded, referenced and stored for future use. Following the online data collection process, evidence gaps for each METT-4 question were outlined. At this stage, focused questions were sent to relevant Ministries of the Maldives Government and site managers to seek additional data to support the METT-4.

2.2 Stakeholder Input

Ideally, the METT-4 process should include varied stakeholder input through in-person workshops to ensure that the assessments reflect a range of views on management and provide impartial results. However, due to travel constraints associated with the Covid-19 pandemic, online surveys were designed to capture the specific information required to help answer the METT-4 questions. Four key stakeholder groups were identified for the surveys:

1. Fisheries and tourism personnel – to provide on-the-ground knowledge of human activities and the status of marine biodiversity
2. NGOs and researchers – to provide insights into conservation, education and research, including knowledge on specific sites, marine life, and management of human activities
3. MPA managers and marine enforcers – to provide on-the-ground knowledge on the feasibility of managing and enforcing human activities; and
4. Local government – to provide knowledge of site governance.

A specific survey was designed for each stakeholder group to ensure questions were appropriate and tailored to each stakeholder group's knowledge and experience. Fisheries and tourism personnel, MPA managers and enforcers, and local government were thought to more likely be associated with one site, therefore the survey was designed for stakeholders to complete questions based on one site. Whereas the survey template for NGOs and researchers was designed to include all three sites per question as it was thought that this stakeholder group may be more likely to provide input on all sites due to their wider scope of work. The surveys were created online as a series of questions with multiple choice answers and free text comments boxes,

using the digital survey platform SmartSurvey. The surveys were all provided in English.

A simple stakeholder mapping exercise provided a list of key stakeholders associated with each site. These stakeholders were contacted directly by email by the Maldives Government Ministry of Environment, Climate Change and Technology (MoECCT) for their assistance in completing the surveys. The surveys were also advertised on the MoECCT Facebook account to provide opportunities for wider community input. Respondents completed the surveys online via SmartSurvey between the survey open dates: 31 January to 14 February 2022. The survey window was short due to the wider time constraints around completing the pilot PAME evaluations, however, if surveys were to be run again, a longer period to comment would be recommended. Completed surveys were received by JNCC directly through SmartSurvey. In line with data protection requirements, all personal information including names and email addresses were de-coupled from each response before the responses for each question were collated based on stakeholder group and summarised for each site. Seventeen responses from fifteen respondents were received in total: eight from fisheries and tourism personnel, one from MPA managers and enforcers, and six from NGOs and researchers (Figure 4). No responses were received from local government.

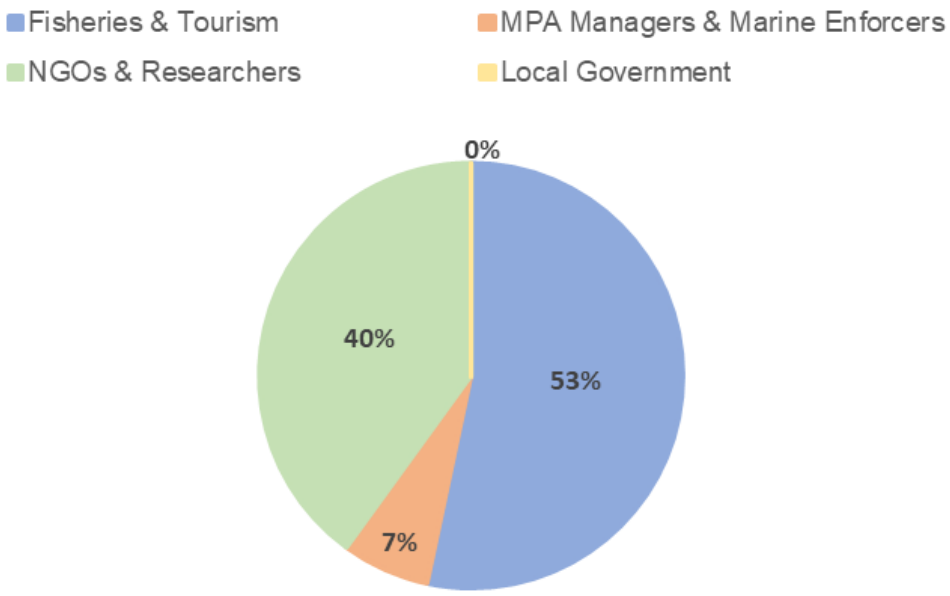

Figure 4. Pie chart showing the percentage of respondents from the four key stakeholder groups that engaged with the Protected Area Management Effectiveness (PAME) online survey in February 2022

In addition to stakeholder input through the stakeholder surveys, virtual meetings took place between the OCPP team and the site manager and marine team for one of the sites. Unfortunately, it was not possible to arrange meetings with key staff from each

site before the first draft of the METT-4 assessments were completed due to limited capacity in country.

2.3 Evidence Packages & METT-4

Information collected via the online review, from the relevant Ministries and site managers, and through the stakeholder surveys was combined into evidence packages for each site. Evidence packages were formatted based on the 38 METT-4 questions with supporting information clearly outlined per question. The three evidence packages were circulated amongst the OCPP team one week prior to the assessment workshops to allow enough time to thoroughly read the materials available to support the assessment process.

The PAME evaluations were completed virtually by five staff from the OCPP team. One individual facilitated the sessions by leading the others through the Excel-based METT-4 form question by question. The evidence outlined for each question was thoroughly discussed and one of the four answers available for each question was finalised. All evidence used in the discussion was recorded along with any necessary recommendations to improve the management component. Overall, each full assessment took between 5 and 12 hours depending on the amount of information that was available to discuss. During the assessment process, evidence gaps were noted and this information was used to create focused questions for the relevant authorities to help answer.

2.4 PAME Stakeholder Validation

Once the three draft METT-4 evaluations were complete, the UK OCPP team provided an overview of the results and key recommendations identified for each site in a virtual workshop with technical staff across the Maldives Government on 21 March 2022. The workshop was also used as an opportunity for technical staff to provide additional information for each site. This new information was incorporated into each METT-4, following the method previously stated.

Protected Area Management Effectiveness (PAME) evaluation stakeholder validation for each site was undertaken in person through a series of meetings and workshops in the Maldives between 15 and 19 May. Validation methods varied depending on the site. A one-day workshop took place on 16 May on Eydhafushi, Baa Atoll, to validate the PAME results for Hanifaru Area MPA. Over 50 stakeholders were invited to the workshop including representatives from each Island Council and Women's Development Council (WDC) under the Baa Atoll Council administration, Baa Atoll Council, the Baa Atoll Biosphere Reserve Office (Baa Atoll BR Office hereafter), Baa Atoll Conservation Fund, relevant Government ministries and representatives from resorts, guesthouses, NGOs and the fishing and diving sector based in Baa Atoll (Appendix 1.1). Unfortunately, due to weather warnings on the day of the workshop,

some stakeholders were unable to attend, but despite this unavoidable challenge 34 stakeholders from a range of backgrounds took part in the workshop. The workshop consisted of four presentations to provide background information about the site, the PAME process and the results of the draft METT-4 evaluation. Workshop participants were then randomly divided into five groups (approximately seven participants per group) and assigned a workstation. Each workstation had three or four validation questions for participants to work through. METT-4 questions for validation were identified and split equally into five groups prior to the workshop, ensuring a mix of topics were included in each group (e.g. science, community benefits and management-related questions). Questions were displayed on A3 pieces of paper along with the selected answer and recommended actions to improve management. The facilitator presented the initial results for each question and participants were then asked whether they agreed with the answer and if not, to explain why. After gathering everyone's views, the group were encouraged to agree by consensus a final answer for each question. Actions to improve management were then discussed. All discussion points and decisions were recorded on flipchart paper where all members of the group could see it.

A carousel methodology was used during the workshop. Restricted time meant participants were allocated 30 minutes to validate the first set of questions in their group. Groups then rotated clockwise to the next workstation with the aim to confirm whether they agreed with the previous groups' decision. Ten minutes was allocated for these subsequent sessions and groups rotated until the time for the overall session ran out. This resulted in each group of participants reviewing four of the five sets of validation questions. The final stage of the workshop involved stakeholders identifying their priority recommended 'actions to improve' management. Five lists of recommendations covering five different areas of management: Management Implementation, Enforcement, Capacity Building, Education, and Research, were shown to participants. Participants were then provided with stickers to place next to the actions that they thought were the most important. An overview of the recommendations with the highest scores was then provided.

Due to the lower level of community awareness and prior engagement of stakeholders for sites in Dhaalu Atoll it was thought a validation workshop, as used in the case of Hanifaru Area, was not appropriate to validate the PAME evaluations for Kudahuvadhoo grouper site and Angsana Velavaru house reef. Instead, a series of focussed stakeholder meetings were held to discuss each site and fill in knowledge gaps. Discussions around Kudahuvadhoo grouper site were held with Dhaalu Atoll Council, Kudahuvadhoo Island Council, Kudahuvadhoo WDC and Maaenboodhoo Island Council, reef fisherfolk, recreational and part time fisherfolk, the Maldives Marine Research Institute (MMRI) and the Ministry of Fisheries, Marine Resources and Agriculture (MoFMRA). Unfortunately, it wasn't possible to meet with representatives from the tourism sector such as the nearby resort to gather their views. Therefore, it should be noted that the PAME evaluation for Kudahuvadhoo is

not representative of all stakeholders and future evaluations should seek to include the tourism sector. Stakeholder meetings for Angsana Velavaru house reef took place with the resort management and marine lab staff, representatives for Meedhoo Island Council and WDC and the Ministry of Tourism (MoT). Please refer to A1.1. for details on stakeholders that attended validation meetings.

2.5 Final METT-4 Evaluation & Write Up

Additional information gathered via the workshop and stakeholder meetings was incorporated into the evidence packages for each site. This information was then used to review each draft METT-4 assessment by four members of the UK OCPP team following the previously outlined method. Only questions with new evidence were reviewed and where necessary scores were adjusted. The METT-4 results were subsequently summarised in this report. A final draft of the report was posted on the JNCC website, and promoted by the MoECCT to national and local stakeholders, providing a period of two weeks for comments on the draft report to be returned via an anonymous Microsoft Online Form. All comments received were reviewed by the OCPP UK team and where necessary, edits were made to the final report. A one-page summary page for each site was created to share key findings and recommendations with stakeholders.

3 Results

The METT-4 evaluations and subsequent results presented in this section are based on the combination of stakeholder workshops, meetings, stakeholder survey, grey literature and published papers. Only published reports have been referenced here. The list of data that informed the METT-4 evaluations is provided in the References section.

3.1 Baa Atoll, Hanifaru

3.1.1 Context

Hanifaru is an uninhabited island situated within the Baa Atoll, in the central western section of the Maldives. The island has an enclosed channel-like bay, approximately the size of a football field, known locally as ‘Vandhumaafaru Adi’ or Hanifaru Bay (Figure 5).

Winds and currents, which increase in intensity during the southwest monsoon, funnel large amounts of zooplankton into the bay, which attracts an abundance of whale sharks and manta rays (Murray 2013). As a result of this high productivity and presence of megafauna, the site is a popular tourism destination and has high economic value. In 2009, the direct value of biodiversity accounted for 89% of the

Maldives' national Gross Domestic Product (GDP) and in Baa Atoll, it provided 47% of all employment (AEC 2012, Emerton *et al*., 2009).

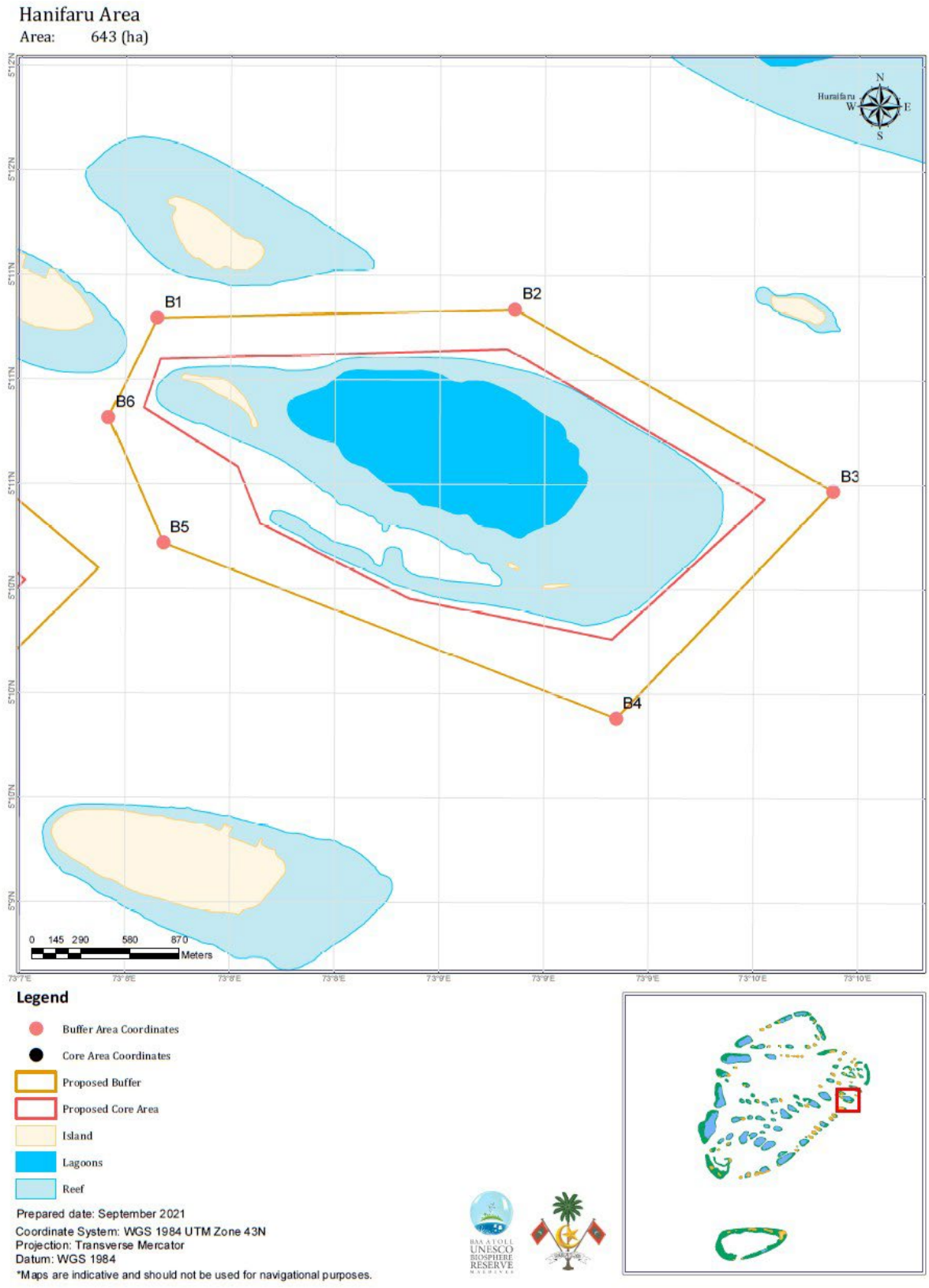

Figure 5. Map of Hanifaru Area showing core and buffer zones. Map sourced from Baa Atoll Biosphere Reserve and Maldivian Government, September 2021.

The significance of Hanifaru Area ecologically and economically cannot be overstated, so much so that in 2009 the six resort islands of Baa Atoll came together and signed a memorandum of understanding to manage the site and protect it from any future degradation (Brooks 2010). Later in 2009, Hanifaru Area was designated as an MPA under Government Directive 133-EE/2009/19 (Brooks 2010). The MPA is 11.6 km^2 in size and the main goals are to ensure the long-term conservation of the wider ecosystems and to generate income for people on local islands (UNEP-WCMC 2022).

In 2011, the wider Baa Atoll was also designated as an UNESCO World Biosphere Reserve, which aims to promote conservation, sustainable development and education/research. UNESCO World Biosphere Reserves have three zones: core protected areas, buffer zones, and a transition area where people live and work, which can be used for testing out approaches to sustainable development.

Hanifaru Area is a core zone of the Biosphere Reserve, and there are a range of restrictions in place to manage the impact of activities on the site. Activities such as scuba diving and fishing are prohibited within the core area of Hanifaru, the number of vessels within the MPA is limited to seven in the designated mooring area and three in the waiting area (Biosphere Reserve Office, personal communication, April 28, 2022) . The number of tourists allowed inside the bay is limited to 80 (Government Directive 133-EE/2009/19), and no person entering the water is allowed to disturb whale sharks or manta rays (Brooks 2010).

Hanifaru Area is managed locally by the Baa Atoll BR Office, with rangers present on site to ensure compliance, and nationally by the Environmental Protection Agency (EPA), on behalf of the MoECCT. A comprehensive Management Plan has been developed for Hanifaru Area MPA which was gazetted in 2012.

In 2019, a METT-4 assessment was completed for Hanifaru Area by its primary manager; however, this assessment was completed by one person with limited external engagement.

The main values listed in the METT-4 for Hanifaru Area are ‘Key species: manta rays and whale sharks’, ‘Ecological processes’ and ‘Recreation and Tourism’. The main ecosystem services delivered by the protected area is identified as ‘Recreation and Tourism’ and ‘Education and research’.

Objectives

The goal for Hanifaru Area management is “*To ensure the long-term sustainable management and protection of Hanifaru reef, its resources and biodiversity.”*

Additionally, the management plan has three objectives:

- To protect the globally significant feeding aggregation of manta rays and whale sharks.
- To provide a sustainable, high-quality experience for visitors that does not threaten the biodiversity.
- To support sustainable livelihoods of local communities.

Threats

A review of available literature, stakeholder survey responses and discussions with management bodies has identified the below as the primary threats to Hanifaru Area MPA:

- Illegal fishing in the no take zone
- Boat traffic within and around the site causing sound and plastic pollution
- Rising sea surface temperature impacting monsoon times, currents and primary production
- Shoreline erosion of Hanifaru Island due to vegetation loss and boat wash
- Human intrusion resulting in boat strikes and impacting megafauna feeding activities
- Pressure from tourism due to increasing accommodation options in Baa Atoll.

3.1.2 Overview

The METT-4 assessment identified an overall score for Hanifaru Area of 61 out of 111 (55%). The overall percentage score is the average score achieved across the five management elements assessed in the METT-4: Planning, Inputs, Process, Outputs and Outcomes, as shown in Table 1.

Table 1. Scores per management element achieved by Hanifaru Area. This information was taken from the dashboard of the METT-4.

Element	Your Element Score	Maximum Element Score	Your Element %	Max. %
Planning	15	21	71.43%	100.00%
Inputs	10	18	55.56%	100.00%
Process	23	48	47.92%	100.00%
Outputs	6	15	40.00%	100.00%
Outcomes	7	9	77.78%	100.00%
Total	61	111	54.95%	100.00%

Figure 6 shows a spider diagram, which visualises the percentage scores for Hanifaru Area against the highest possible score of the five management elements. For Hanifaru Area, the highest overall score was in the Outcomes element which achieved 7 out of 9 (78%). The lowest score; 6 out of 15 (40%), was achieved in the Outputs element. Planning also scored quite highly with 71%.

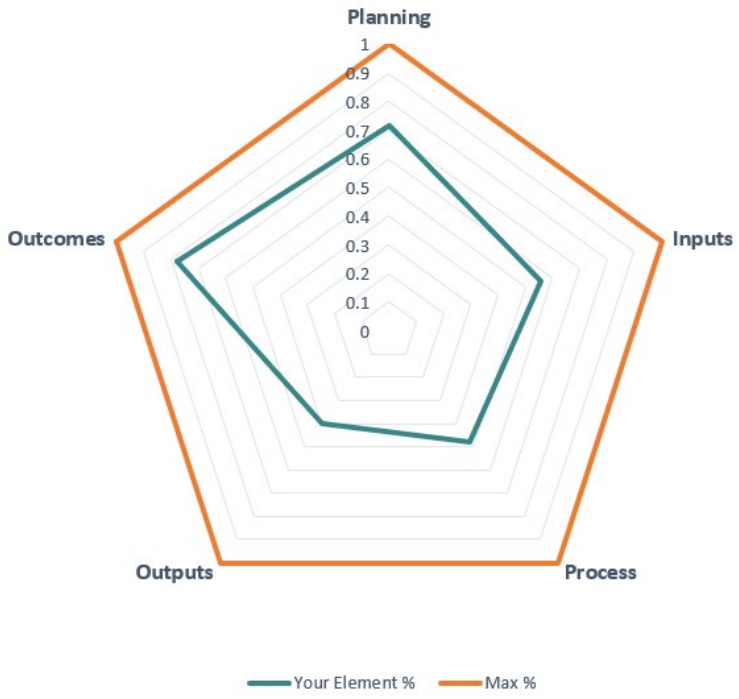

Figure 6. Spider chart of scores per management element for Hanifaru Area MPA. The maximum score of 100% is outlined in orange and the score of Hanifaru Area is in blue. Taken from the dashboard of the METT-4.

The natural versatility and adaptability of the METT-4 assessment means there is limited insight that can be gained from comparing scores across different protected areas. However, Hanifaru Area is unique in this study as it has a pre-existing METT-4 assessment. It can be noted that the total score of this METT-4 assessment of Hanifaru Area is higher (61) than the score it achieved during its 2019 assessment (46). This increased total score is a positive step, however limited insight can be gained as these assessments were completed by different people, followed different processes, had access to different information and had different levels of stakeholder engagement. To have results that can reliably be compared, a consistent approach must be followed and, ideally, similar people should be involved in the assessments each time.

3.1.3 Planning

Planning was the second highest scoring element, achieving 15 out of 21 (71%) (Table 1). The key areas achieving particular success were that the site is legally designated, there is a management plan in place, actions are being undertaken to achieve management objectives and the site is the right size and shape to protect the key attributes of the MPA.

Hanifaru Bay was designated as a national MPA in 2009 under the Maldives Environment Protection and Preservation Act (Act 4/93). The Bay and island were then designated as a core area of the Baa Atoll UNESCO Biosphere Reserve in 2011.

A comprehensive management plan for Hanifaru Area was gazetted in 2012 and contained three primary objectives for site management. The management plan was successfully implemented, including actions to achieve the sites objectives. Increased transparency of the management review process and streamlining of official processes surrounding the site, would further improve its management effectiveness.

The site was designated with core and buffer zone boundaries and covers the whole lagoon of Hanifaru, as well as the Bay that is the primary site for manta ray and whale shark feeding aggregations. The size and shape of Hanifaru Area MPA is considered appropriate to protect aggregations of manta rays and whale sharks when they are feeding in the MPA. However, to further the protection of these species it is recommended research is undertaken to effectively protect other key aggregation sites within the Baa Atoll Biosphere Reserve, such as nursery grounds and cleaning stations, coupled with the establishment of migration corridors.

The key gaps identified in the existing management for Hanifaru Area were based around best practice for site management. At the time of this assessment, discussion with stakeholders indicated there was no formal process through which stakeholders across all sectors could influence the management of Hanifaru Area. While there is an informal method of annual review, the process does not include representation of all stakeholders and the process for achieving management amendments is considered inefficient. Hanifaru Area does not have an official monitoring programme, and whilst independent research groups collect data on Hanifaru Area regularly, it is unclear if, or how, this data is fed back into the management of the site.

3.1.4 Inputs

The management element Inputs achieved a score of 10 out of 18 (56%) (Table 1).

No aspect of this element achieved a score of 3, however the knowledge and skills of the MPA managers; Baa Atoll BR Officers was scored well, as the team are considered to have the core knowledge and skills to effectively manage the site. Training on conflict resolution and managing difficult situations would improve this score.

Key gaps identified by the assessment were focussed on staff capacity and equipment availability. Overall, the site has two rangers, an outreach officer, who acts as a ranger when needed, and a boat captain. These are Baa Atoll BR Officers and are responsible for management and enforcement of all 10 core areas of the Biosphere Reserve. The Baa Atoll BR Officers have a single boat and if incidents occur at multiple sites, a second boat must be rented. While management of Hanifaru Area is prioritised due to its high volume of visitors, it is still considered that the staffing capacity and available equipment is inadequate for effective management.

3.1.5 Process

The Process element achieved the second lowest score of 23 out of 48 (48%) (Table 1). No areas in this element achieved the highest or lowest available score. As such key points of interest have been highlighted below which represent key gaps and successes from the viewpoint of the OCPP review staff.

Areas of success for the Processes element include the existence of legal regulations to manage use and activities in the MPA, consideration of the site's natural values in management and the effectiveness of protection systems in the site. The natural values are closely linked to the tourism industry of Hanifaru Area and the protection of biodiversity at the site is a focus of two of the management plan's objectives. The management plan is effectively implemented and includes mitigations against the most pressing threats facing the site's natural values. There is also a degree of monitoring research that is undertaken, largely by non-affiliated groups such as the Manta Trust, who make their research publicly available.

Improvements could be made by establishing a long-term monitoring programme with research partners to provide more data with which to assess the effectiveness of existing management. The systems in place to protect the site are well established and enforcement officers have a well-known presence at the site, which they prioritise over the other nine core areas of the Biosphere Reserve. Overall, the available capacity of the enforcement officers is effectively utilised to manage the site, however streamlining of official responses to infringement would improve non-compliance management.

Key gaps identified ranged from education to monitoring and budget management. The funds intended for implementing the work plan for Hanifaru Area, are managed by the Baa Atoll Conservation Fund (BACF), which is funded by sources such as the sale of visitor permits to the site, tour guide exam registration fees, commercial video/ photo permits and partnership fees. The BACF is intended to cover both implementing the work plan and funds intended for community development projects. The lack of clarity between the funds intended for management and for community development appears to have resulted in a lack of investment in the future work plan for the site. A breakdown of annual costs, revenues and resources associated with the BACF has been identified as a priority action.

There is an ad hoc approach to the monitoring of activities on the site and the feedback of this information into the management plans. The creation of a monitoring and research plan, to complement the existing management plan, has been highlighted as a resource that would collate the monitoring and research being undertaken by different organisations and improve managers wider understanding of the status of the key values and the effectiveness of current management measures, enabling management to be more adaptive. In addition to this, making the monitoring and research plan available on a public forum, such as a dedicated website for

Hanifaru Area, would increase public awareness and engagement of research and conservation groups.

Stakeholder feedback suggested that there is no formal workplan for the site and while visitor numbers are recorded, there is no system for evaluation of visitor numbers and their impacts on megafauna. The development of a Specific, Measurable, Attainable, Relevant, and Time-bound (SMART) management plan with indicators against which progress can be measured against would help complete the system of monitoring, evaluation and adaptation.

Education and outreach is cited as a key goal in the management plan. Previously the Baa Atoll BR Office undertook outreach programmes with the local communities, however these activities halted over the past several years, partially due to the Covid-19 pandemic. The absence of a dedicated website for Hanifaru Area has compacted the challenge of local communities looking to engage with the management and conservation activities.

Whilst the Biosphere Reserve Rangers presence in the Bay has been observed to have a positive effect on compliance with regulation, their capacity is limited. Although rangers are present during the peak manta season, it is suggested that increased ranger presence, or numbers, and potentially establishing ranger posts outside of Eydhafushi (e.g. Dharavandhoo) could build opportunities to improve compliance locally.

3.1.6 Outputs

The Outputs element was the lowest scoring element for Hanifaru Area, with a score of 6 out of 15 (40%) (Table 1). Key areas of success for this element were visitor facilities and services, and whether the threats to the main values of the site were being addressed, which were both scored as 2. The primary threat to the site is considered to be tourism and the negative interactions of visitors with the megafauna. The control of this threat is the main focus of the site's management plan which has a range of restrictions and regulations to promote sustainable tourism. However, concerns of overcrowding and lack of compliance are stated by several sources and a review of threat management would be beneficial.

The key gap was identified as functional connectivity, which was found to not be assessed or implemented as part of the site management and was scored as a 0. Research has shown that a significant number of mantas and whale sharks that visit the site show injuries from boat strikes. There is a speed limit imposed within the Hanifaru Bay core and buffer zones, suggesting a need for speed limits along migration channels to protect the megafauna as they travel to Hanifaru Area. Migration channels are not considered in the management of this site and therefore the score for functional connectivity of the site was a 0.

3.1.7 Outcomes

Outcomes was the highest scoring element in the assessment, achieving 7 out of 9 (78%) (Table 1), however it must be noted that this is also the smallest element, with only four questions.

The primary success of this element is the conservation status of the habitats for Hanifaru Area. Whilst, Hanifaru Area is not designated for the conservation of any habitats, due to its connection with essential plankton, the water column is considered a key habitat and is considered to be of desirable condition. This question scored 3, and it is noted that an increase in boat traffic, tourists and ocean-borne plastic waste from boats or neighbouring islands could impact the water quality. Research on pollution (e.g. microplastics, chemical and noise) and studies on the impact climate change will have on water temperature, currents and primary production would be important to consider the future quality of the habitats at Hanifaru Area.

The status of manta rays, one of the key protected species for this site, is thought to have improved over the last five years, although the number of sightings fluctuates between years. There has been an increase in pregnant manta ray sightings in recent years (Manta Trust, personal communication, 16 May 2022). The status of whale sharks is less clear as there is a lack of long-term data available for Hanifaru Area, and stakeholders had mixed views.

Whilst no question in this element scored lower than a 2, there were several actions identified, particularly focussed on research gaps relating to whale sharks and the impacts of climate change. There is an imbalance of available data for whale sharks compared to manta rays at this site; any anecdotal information on the possible decline or increase of whale shark populations at Hanifaru has no supporting evidence. Equally, a lack of research on the potential impact climate change will have on currents and primary production in the area limits the ability of managers to put mitigation measures in place to protect the site.

3.1.8 Recommendations

Overall, Hanifaru Area shows evidence of being managed well, with indications that management is having beneficial impacts on manta ray and whale shark populations. The below recommendations are designed to further improve the process of management and expand the beneficial outputs felt by both the natural values and the local communities.

A large number of recommendations for the improved management of Hanifaru Area and a range of short-term and long-term actions of varying priority were identified. Actions considered to be a priority by the OCPP review staff were presented to the stakeholders at the validation workshop and the top priority actions identified are

presented in Table 2. All actions recommended for Hanifaru Area MPA are presented in the Appendix 2.1.

For Hanifaru Area MPA, there were several key themes identified across the elements. The workshops and assessments have shown that the local stakeholders have interest in the MPA and are eager for opportunities to engage more fully with it, both through education and active involvement in management. Recommendations such as reviving the pre-existing education and awareness programme run by the Baa Atoll BR Office and facilitating opportunities for members of the local community to visit the site were prevalent. Consistently, it was suggested that the formation/ re-establishment of a stakeholder committee / working group as a forum to input actively into the management of Hanifaru Area would increase the sense of engagement and local ownership of Hanifaru Area. While the local community were supportive of Hanifaru Area, the number of benefits to the local community they could identify were limited; raising awareness of the direct and indirect benefits the site provides is recommended, in addition to the creation of new benefits; for example, resorts taking tourists to local islands and providing opportunity for locally made souvenirs to be sold at resorts.

A key recurrent theme was that of transparency, which is reflected in the more limited communication between management and official channels and the locals who live and work with the MPA at the current time. The lack of open communication has led to varied and inconsistent views of the activities and success surrounding Hanifaru Area's management. It has consistently been suggested that a central source of information would improve this situation and the recommended medium would be a dedicated website which would allow access to research, plans and decision making for locals, tourists and researcher with an interest in Hanifaru Area. The creation of a dedicated Hanifaru website would also provide an opportunity for increased financial transparency; The majority of stakeholders suggested that a breakdown of the annual income and costs of Hanifaru Area would be a priority.

Two other themes identified as priorities across the elements were those of research and compliance. The development of a Monitoring and Research plan to complement the existing management plan and the online publication of this would greatly improve the level of confidence in future management plan revisions and would further increase the transparency of the site for the public. Addressing the imbalance of available research for whale sharks compared to manta rays through the formation of research partnerships would also be beneficial. In addition to this, the METT-4 assessment identified that the potential impacts of climate change were not considered in the management plan, partially because there is limited available information on the impacts that climate change may have on oceanographic process and primary production cycles that create the ideal feeding conditions for the megafauna. Collecting research, either directly or through partnerships on this topic will be a step towards future-proofing the management of Hanifaru Area. The issue of

compliance is a more immediate concern, as tourism was identified as a primary threat to conservation of the site. Improving the capacity of management to identify non-compliance and enforce the regulations through increasing ranger numbers is an essential step. Further improvements could be made by strengthening links between the rangers, resorts and tour guides so enforcement and awareness can be increased at all stages of a site visit.

Table 2. Priority recommended actions to improve management for Hanifaru Area MPA following a METT-4 evaluation of the site.

Recommendation Category	Priority Actions
Management Implementation	Develop an MPA Business Plan that includes a breakdown of income sources including annual revenues; annual costs (e.g. management activities; staff expenditure; education outreach and research expenditure etc.,)and details on how the BACF is utilised including awarded grants. The business plan should be made publicly available and published online to help provide greater transparency and understanding of Hanifaru funds and expenditure.
	Improve transparency of management decision-making by involving local council/communities through establishment of working groups and by publishing all management documents online
	Development of a SMART management plan, which includes a framework to evaluate the effectiveness of current management measures
Enforcement	Enhance compliance by strengthening official responses such as the implementation of on-the-spot fines
	Increase ranger presence during peak manta season and establish ranger posts outside of Eydhafushi
	Strengthen links between rangers, resorts and tour guides, so enforcement and awareness can be increased and roles and responsibilities defined.
Building Capacity	Create/ re-establish a committee/ working group for stakeholders to discuss and actively input into site management
	Empower the stakeholder working group to input in the use of the Baa Atoll Conservation Fund budget
	Provide training for tour guides, resorts and guesthouses to improve understanding of the rules and their responsibilities to improve compliance.
Education and Awareness	Further develop education programme for local communities and schools, and develop programme to take local people from every island to the Bay to explore it.

Recommendation Category	Priority Actions
Education and Awareness (continued)	Create a dedicated Hanifaru website to increase transparency and share all news and research, include boundary information.
	Raise awareness of the site and the rules through innovative digital outreach tools and traditional materials.
Research	Develop an integrated monitoring and research plan linked to the aims and objectives of the management plan.
	Establish a long-term monitoring programme for whale sharks.
	Research the impacts of climate change and water quality, including microplastics and pollution (e.g. chemical and noise), in relation to manta ray and whale shark health.

3.2 Kudahuvadhoo Kanduolhi

3.2.1 Context

Kudahuvadhoo Kanduolhi (here after referred to as Kudahuvadhoo) is a protected grouper spawning aggregation site situated in the south of Dhaalu Atoll next to Kudahuvadhoo Island, the atoll capital. The site covers an area of 7.4 km² and was originally designated in 2013 under the 'Regulation on Grouper Fishing and Exporting Groupers from the Maldives' Regulation No.2013/R-41 (Ministry of Fisheries, Marine Resources and Agriculture, 2020) (Figure 7). This regulation has since been replaced by the 'Fisheries Act of the Maldives' Law No.14/2019 and the management of the site is delivered in accordance with the 'Regulation on Grouper Fishery Management' Regulation No:2022/R-2, led by the Ministry of Fisheries, Marine Resources and Agriculture (MoFMRA). Kudahuvadhoo is one of five grouper aggregation sites managed under the Grouper Fishery Management Regulation in the Maldives.

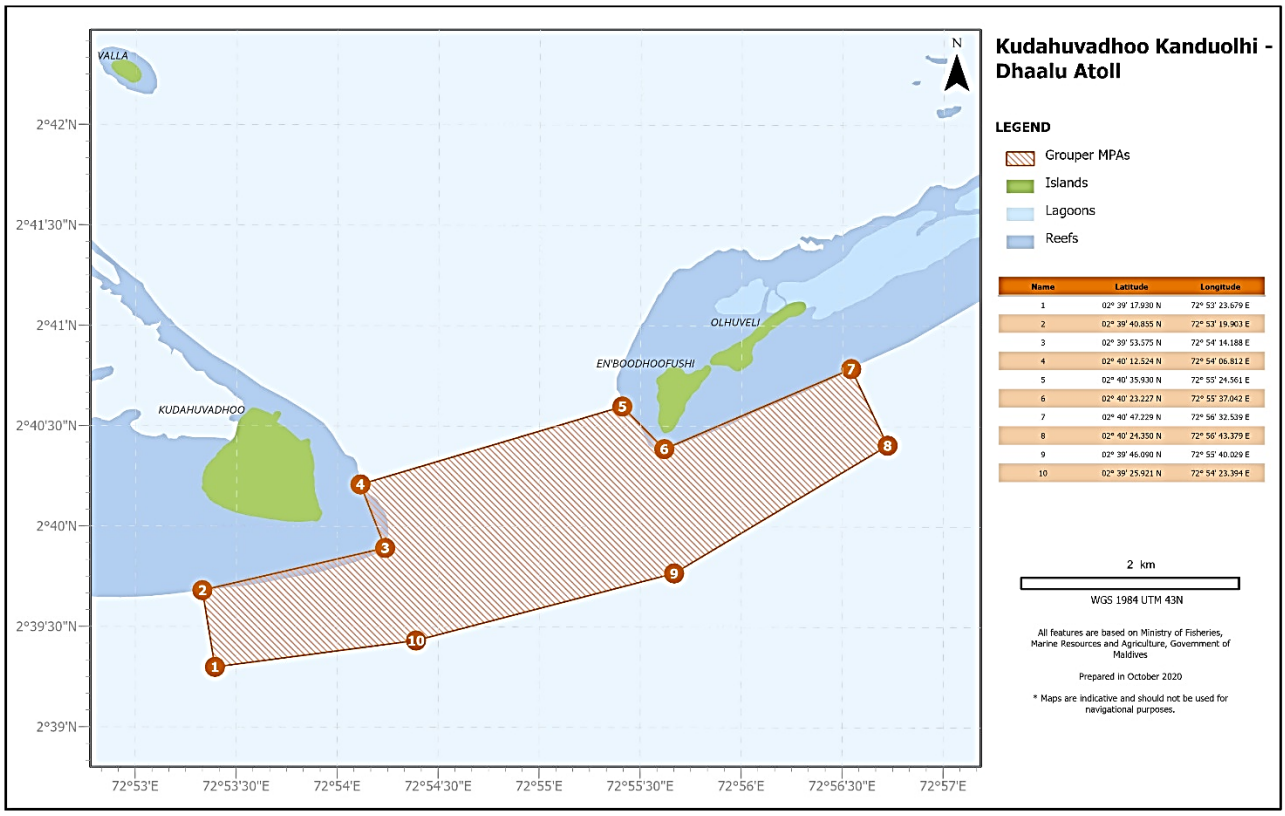

Figure 7. Map of Kudahuvadhoo Kanduolhi, Dhaalu Atoll and it's designated boundary. Map sourced from the Regulation on Grouper Fishery Management (No:2022/R-2).

Groupers are highly valued in the Maldives due to the specialised export-based grouper fishery, where live groupers are exported to East and Southeast Asian markets (Sattar *et al*., 2011; Sattar and Adam, 2005). In efforts to protect grouper populations in the Maldives and promote a sustainable grouper fishery, Kudahuvadhoo alongside four other grouper aggregation sites were identified to protect mature spawning grouper (family Serranidae, subfamily Epinephelinae) from removal and disturbance (MoFMRA, 2020). Groupers tend to spawn in aggregations over a period of several weeks to several months during a full or new moon and are thought to return to the same spawning site (Sattar *et al*., 2011; Robinson *et al*., 2008). This behaviour makes them highly susceptible to fishing pressure, as large quantities of mature groupers can be removed rapidly when fishing activities target aggregation sites (Sattar *et al*., 2011). The species are also vulnerable to over exploitation as they are long-lived, have a late age-at-maturity, and many species are protogynous hermaphrodites (beginning life as females, and changing into males at a later stage) (Morris *et al*., 2000; Heemstra *et al*., 1993 cited in Sattar *et al*., 2011). Kudahuvadhoo was identified as an aggregation site by stakeholders. To protect the spawning grouper the following activities are prohibited at the site: all fishing activities (except trolling), anchoring, mining for or removal of sand, coral and stone, introduction of new species, fish feeding and aquaculture (MoFMRA, 2020). Several activities are also prohibited during the grouper spawning aggregation period,

including diving and snorkelling, water sports activities that use motorised crafts, and use of lights to attract fish for any purpose (MoFMRA, 2020).

The main values listed in the METT-4 for Kudahuvadhoo are 'Grouper Species' and 'Sustainable use of Resources'. The main ecosystem service delivered by the protected area is identified as 'Wild fish as a food resource'.

Objectives

Two key objectives were identified from the Maldives Grouper Fishery Management Regulation that are particularly relevant for Kudahuvadhoo:

1. Ensure that all activities associated with the harvest and trade of groupers are carried out through the application of principles of sustainability, ecosystem-based management, and the Precautionary Approach.
    - Under this objective establish, maintain and manage new and existing protected grouper spawning aggregation sites to provide a form of protection to mature spawning population.
2. Prioritise evidence-based policymaking through the collection of biological, ecological, and socio-economic data on the grouper fishery and associated resources.
    - Under this objective conduct grouper tagging studies at grouper aggregation sites to collect data on movement, growth, habitat range and the connectivity between grouper populations, both inter-atoll and intra-atoll.

Threats

Through an analysis of the available literature, responses from the stakeholder survey and meetings with stakeholders on Kudahuvadhoo Island the following threats to Kudahuvadhoo were identified:

- Illegal fishing within the site including the targeted fishing of grouper
- Tourism activities, particularly safari boats
- Development activities in the adjacent coastal zone to the site
- Climate change in reference to temperature extremes causing mass coral bleaching events

3.2.2 Overview

The total score given for the METT-4 assessment of Kudahuvadhoo was 21 out of a maximum 93 (23%) (Table 3). Figure 8 presents the scores for each of the five management elements in a spider chart. The highest scoring management element was 'Planning' at 38% and the lowest scoring element was 'Process' at 15%, closely followed by a score of 17% for both 'Outputs' and 'Outcomes'. These scores are to be expected for Kudahuvadhoo as the assessment was based on the newly introduced

management plan which is in its early stages of development and is yet to establish enforcement and monitoring strategies. The METT-4 assessment was based on the new 'Regulation on Grouper Fishery Management' (Regulation No:2022/R-2). As time goes on each element will likely gradually increase as the results of management actions become more evident.

Table 3. Scores per management element for Kudahuvadhoo Kanduolhi grouper aggregation site. Table taken from METT-4 assessment dashboard.

Element	Your Element Score	Maximum Element Score	Your Element %	Max %
Planning	8	21	38.10%	100.00%
Inputs	4	15	26.67%	100.00%
Process	6	39	15.38%	100.00%
Outputs	2	12	16.67%	100.00%
Outcomes	1	6	16.67%	100.00%
Total	21	93	22.58%	100.00%

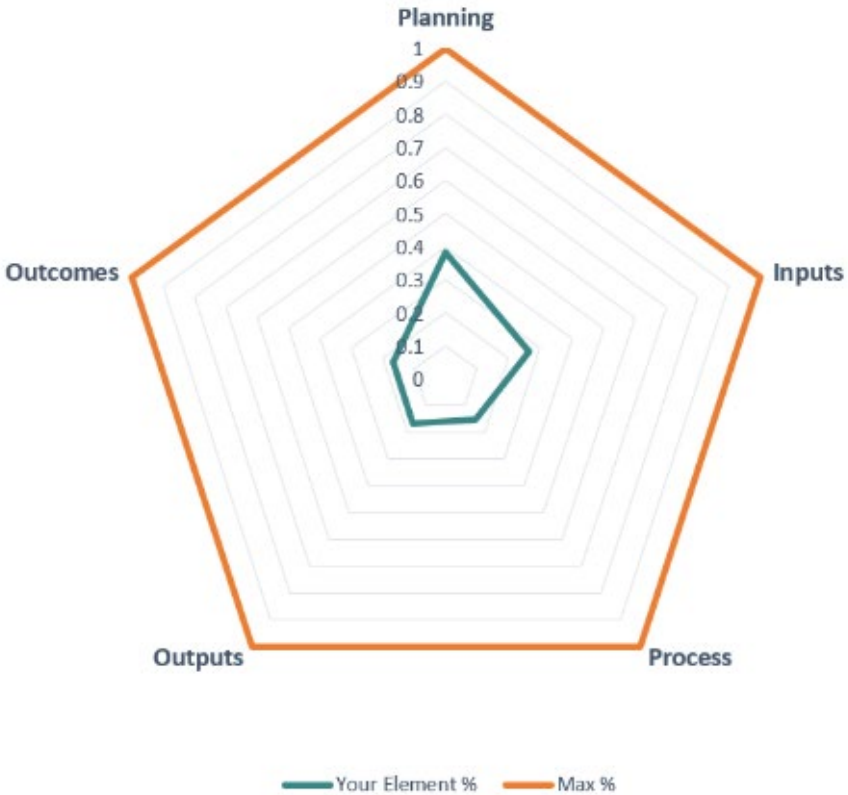

Figure 8. Spider chart of scores per management element for Kudahuvadhoo Kanduolhi grouper aggregation site. The maximum score of 100% is outlined in orange and the percentage Kudahuvadhoo Kanduolhi scored is in blue. Taken from the dashboard of the METT-4.

3.2.3 Planning

Planning was the highest scoring management element for Kudahuvadhoo, with a score of 38% (Table 3). The site is legally established under the 'Fisheries Act of the Maldives' Law No.14/2019 and site objectives and management actions are clearly outlined in the 'Regulation on Grouper Fishery Management' Regulation No:2022/R-2. This provides a good foundation to support the protection of the grouper aggregation site.

The evaluation highlighted that a key gap is around implementation of the Regulations and Management Plan. The Management Plan is a national document that covers all five grouper spawning sites and there is not a site-specific work plan. Additionally, to help achieve the objectives of the management plan and determine whether the MPA is the right size and shape to support the protection of spawning grouper, regular long-term monitoring is required. It is understood that extensive stakeholder consultation with grouper fishers identified the site as a grouper spawning area prior to its original designation in 2013, however, a survey of the site in 2013 did not find any grouper. Local fisherfolk confirmed some species of grouper occur at the site including coral trout (*Plectropomus leopardus*) and marbled grouper (*Epinephelus fuscoguttatus*) but there are other areas nearby with more significant spawning aggregations. During the stakeholder validation meetings, local fisherfolk highlighted that they felt they had not been adequately consulted with prior to site designation and that engagement opportunities more recently had been limited.

Lastly, gaps in land and sea use planning were identified as a potential risk to the MPA due to the general lack of awareness about the site. There is the potential that development projects could be put forward without fully considering the effects the project may have on Kudahuvadhoo.

3.2.4 Inputs

Inputs was the second highest scoring management element for Kudahuvadhoo with a score of 27% (Table 3). The assessment highlighted that all staff involved in the running of the site at the MMRI and MoFMRA are skilled and knowledgeable in their roles but the number of staff available is inadequate to fully meet all management needs.

There are currently no local management staff which significantly hinders awareness of the site amongst the local community and the ability to enforce regulations. There is also very limited data available to help support planning and decision making for the MPA. These gaps in management input can partly be attributed to the absence of a site-specific budget to help support staff and monitoring actions.

3.2.5 Process

Management processes for Kudahuvadhoo scored 15% (Table 3). The ‘regulation on Grouper Fishery Management’ has been successful in introducing clear regulations and restrictions for specific activities in grouper aggregation sites across the Maldives to protect spawning groupers from extraction and disturbance.

Several gaps were identified, which is to be expected due to the management plan still being in its early stages of implementation. The key gap is a lack of awareness amongst stakeholders about the existence of the MPA including the site boundaries and associated regulations. Through conversations with stakeholders, it was clear that restricted activities continue to take place within the boundaries of the MPA. An education programme is outlined in the Management Plan, but it is yet to be implemented. Additionally, there is no site-specific operational enforcement system in place to effectively enforce regulations. Compliance resource exists at a national level, but a ranger is yet to be assigned specifically for Kudahuvadhoo.

3.2.6 Outputs

Outputs achieved as a result of management actions scored 17% (Table 3). The assessment highlighted that stakeholders feel there is limited communication between themselves and MPA managers and that the site does not provide benefits to the community in its current state. This has resulted in mixed support for the MPA with some stakeholders suggesting they did not support the site. Other stakeholders would support Kudahuvadhoo if it was actively managed and benefited the local community.

3.2.7 Outcomes

The results of management actions are yet to materialise due to the need to implement multiple management actions such as monitoring and enforcement. Therefore, the assessment of outcomes for Kudahuvadhoo scored 17% (Table 3). More information is required to help determine whether grouper populations have changed over the last five years. Based on anecdotal evidence from fisherfolk it is thought grouper populations at Kudahuvadhoo are unstable. However, monitoring surveys have not been conducted and therefore there are no data available to corroborate this information.

3.2.8 Recommendations

From the METT-4 evaluation of Kudahuvadhoo the key ‘actions to improve management’ that emerged were mostly themed around building upon the national Regulation on Grouper Fishery Management to develop site specific management for Kudahuvadhoo. Actions include the introduction of a local on-the-ground management team such as a ranger and outreach officer to enforce site regulations and deliver

community engagement and education activities; develop a compliance strategy for the site; implement a site-specific annual operational plan and develop a specific monitoring and research plan. These site level actions would strengthen the relationship between the local community and the site, as there is currently very little awareness of the MPA, and would help to start building evidence about the site and the effectiveness of the management on grouper populations.

Table 4 summarises the recommended 'actions to improve management' from the METT-4 for Kudahuvadhoo. Actions have been grouped into 5 management themes: Management Implementation, Enforcement, Building Capacity, Education and Research. Within each theme the top actions are listed in priority order based on stakeholder input, expert opinion from the OCPP team and the stage the action sits within the management framework cycle. To view all actions alongside their associated METT-4 question/management element refer to Appendix A2.2.

Table 4. Recommended actions to improve management for Kudahuvadhoo Kanduolhi grouper aggregation site following a METT-4 evaluation of the site.

Recommendation Category	Priority Actions
Management Implementation	Implement the national grouper management plan at a site level through the development of a site-specific annual operational plan setting out actions, responsible parties and outputs/targets.
	Recruit a site-level manager responsible for ensuring the management plan is implemented.
	Develop site specific regulations that are appropriate to the site.
Enforcement	Recruit a local site ranger to be responsible for compliance, enforcement and outreach activities.
	Develop a compliance and enforcement strategy specific to the site.
	Ensure inspections from the national fisheries compliance team take place if site rangers do not have powers to enforce the legislation themselves.
Building Capacity	Designate an 'Environmental Champion' in the local council who would be responsible for disseminating information between the community and the Government.

Recommendation Category	Priority Actions
Building Capacity (Continued)	Establish a local working group to provide opportunities for community input into ongoing management. The working group would also help to maintain a relationship between local stakeholders and MPA managers.
	Establish partnerships with local resorts and NGOs to help support and deliver management actions including scientific monitoring of the site and education and awareness-raising.
Education	Establish an educational programme to raise awareness amongst the community about the MPA. Include information about the site, rules (and justifications), grouper species and their ecological value, importance of protecting grouper and the benefits from protection (e.g. 'spill-over' effect).
	Provide wider education for the local community around MPAs in general. Include information on MPA purpose, types, the value of a healthy marine ecosystem, the role of sharks in the ecosystem, climate change resilience and benefits from protection.
	Raise awareness about fisheries regulations outside of the MPA including the minimum landing sizes for grouper species.
Research	Develop site specific monitoring and research plan led by MoFMRA with the MMRI to identify priority research areas.
	Undertake a socio-economic assessment to identify the livelihood benefits to local communities, including investigation into potential livelihood diversification options (e.g. grouper mariculture / nature-based tourism).

3.3 Angsana Resort & Spa Maldives – Velavaru (Velavaru, Dhaalu Atoll)

3.3.1 Context

Angsana Velavaru is a five-star resort situated in Dhaalu Atoll (also known as South Nilandhe Atoll) in the western section of the Maldives. The resort house reef is located 1 km from the main island and encompasses outer and inner atoll areas and two channels that connect the atoll lagoon to the open ocean. The diverse reef environment attracts a range of marine life, including silky sharks, black tip reef sharks, eagle rays, and turtles. Inside the reef is a large sandy lagoon area, which acts as a shark nursery area and a foraging habitat for many ray species (IUCN and USAID unpublished).

Angsana Velavaru house reef (referred to as Angsana Velavaru here after) is designated as a 'no take' zone under the 'Regulation on Determining Boundaries of Leased Islands for Tourism Development' (Reg. No: 2012/R-7) and is currently being considered for classification as an OECM. The site protects an area of 0.65 km² with a core zone where strict restrictions are in place to protect the ecosystem, including prohibitions on all extractive activities such as fishing and mining of sand. A buffer zone borders the core zone to allow for ecologically compatible activities. Angsana Velavaru is managed by resort staff including a marine team that undertakes research and monitoring activities.

The main values associated with the site and listed in the METT-4 are 'coral reef ecosystem diversity', 'tourism', and 'shark nursery areas'. The main ecosystem services provided by the MPA are identified as 'recreation and tourism' and 'education and research'. Angsana Velavaru does not currently have clearly outlined objectives.

Threats

The following threats to Angsana Velavaru were identified by stakeholders:

- Illegal fishing activity, particularly at night, including the targeting of lobster, grouper and bait fish. Surface trolling also takes place.
- Tourism including diving, anchoring boats, safari boats, and tourists
- Corallivorous starfish outbreaks (crown-of-thorns starfish and pincushion starfish)
- Pollution including the dumping of rubbish close to the MPA
- Development close to the reef
- Climate change and the increased risk of mass coral bleaching events from temperature extremes and ocean acidification

3.3.2 Overview

Angsana Velavaru house reef scored a total of 56 out of a possible 114 (49%) (Table 5) for the METT-4 assessment. Figure 9 presents the scores for each of the five management elements in a spider chart. The highest scoring management element was 'Inputs' scoring 78% whilst the lowest scoring element was 'Planning' at 33% due to the absence of a formal management plan with clear objectives.

Table 5. Scores per management element for Angsana Velavaru house reef. Table taken from METT-4 assessment dashboard.

Element	Your Element Score	Maximum Element Score	Your Element %	Max %
Planning	7	21	33.33%	100.00%
Inputs	14	18	77.78%	100.00%
Process	25	51	49.02%	100.00%
Outputs	6	15	40.00%	100.00%
Outcomes	4	9	44.44%	100.00%
Total	56	114	49.12%	100.00%

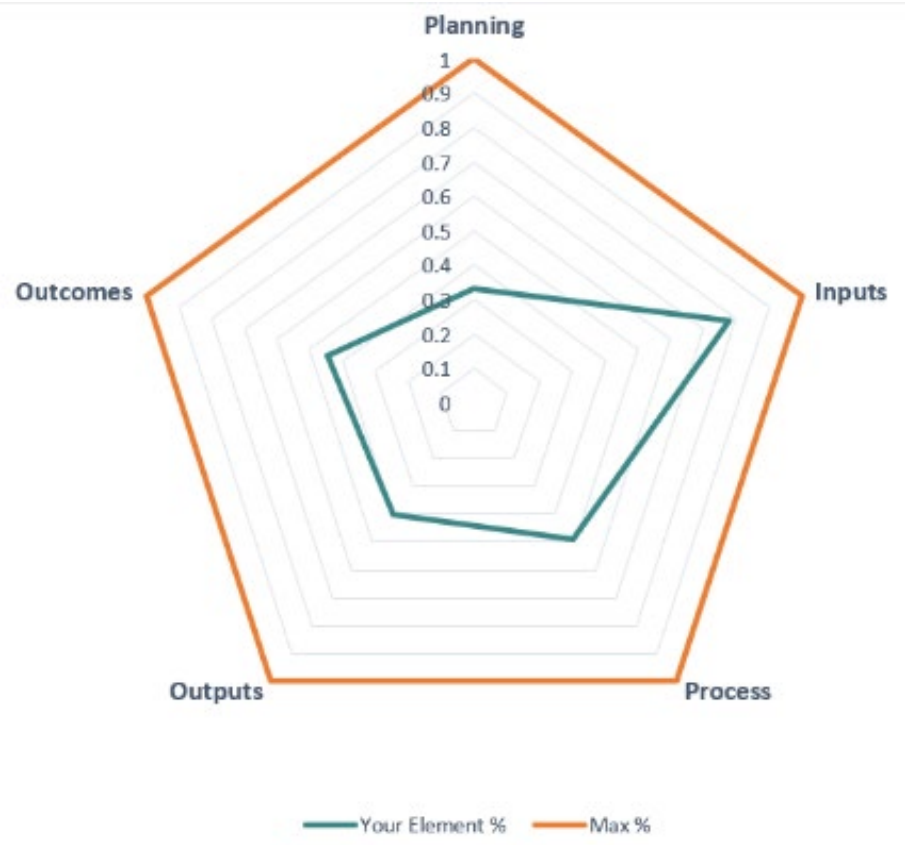

Figure 9. Spider chart displaying METT-4 scores per management element for Angsana Velavaru house reef. The percentage of maximum scores is outlined in orange and the percentage Angsana Velavaru scored is in blue. Taken from METT-4 assessment dashboard.

3.3.3 Planning

Planning scored 33% and was the lowest scoring management element for Angsana Velavaru (Table 5). A high score was achieved for the legal status of the site under the Ministry of Tourism regulation ‘Regulation on Determining Boundaries of Leased Islands for Tourism Development’ (Reg. No: 2012/R-7). The size and area of the site is also thought to be suitable to protect the key site value ‘coral reef ecosystem diversity’ and appropriate regulations are in place to ensure land and sea use planning considers the area in development proposals.

Several questions in the Planning element of the METT-4 evaluation refer to the management plan and site objectives. Angsana Velavaru does not currently have a formal management plan, clear objectives, or associated work plan to support the aims of the management plan. The absence of these key planning documents contributed to the lower score for this element.

3.3.4 Inputs

Angsana Velavaru scored highly for management Inputs with all questions scoring 2 or more (maximum score per question is 3) resulting in an overall score of 78% (Table 5). The evaluation highlighted that the site is supported by a sufficient budget which is relatively secure allowing for the management needs to be met on a long-term basis. The site team also have adequate equipment and facilities to monitor and manage the area alongside good staff availability. Members of staff that are directly involved in the management of the site are knowledgeable and skilled. All members of the monitoring team are provided with training prior to the annual monitoring surveys to ensure that their identification skills and knowledge are adequate to undertake surveys. Visiting university students undertaking Masters and PhDs also contribute to the pool of skills available to manage the site.

Annual monitoring surveys provide a sufficient amount of information to help manage the area, however monitoring focuses on the coral reef which could lead to gaps in data available for associated habitats and species such as the lagoon area which is highlighted as being an important foraging and nursery ground for sharks and rays.

3.3.5 Process

Process was the second highest scoring management element at 49% (Table 5). The METT-4 highlighted the strong emphasis at Angsana Velavaru on active management to maintain the health of the coral reef. Programmes exist for coral reef restoration, Crown of Thorns (COTS) monitoring and removal and annual reef monitoring surveys. Effective protection systems are in place for tourists visiting the site with a daily limit of 50–60 snorkellers taken to the protected area each day by boat. When snorkelling, guests are not allowed to swim directly over the reef, instead guides direct snorkellers

along the reef edge, reducing snorkeller impact. As part of the Banyan Tree chain Angsana Velavaru resort also collects a voluntary environmental guest fee that the resort matches to fund the Banyan Global Foundation Fund. A percentage of the funds are used to help support management activities for the site and additional funding is available for research projects. Whilst monitoring is undertaken on Angsana Velavaru, it is not clear if all of the data collected is regularly processed to ensure it is fed back into management decisions.

The evaluation highlighted that there is confusion over the boundary of the site with various stakeholders stating different boundary distances. The local community are aware that in general, resort house reefs in the Maldives are restricted, but they do not know the exact boundary line of Angsana Velavaru house reef. It is also evident that although MPA staff can enforce activities undertaken by resort guests they do not have the authority to enforce the site regulations for site users outside of the resort. Incidences can be reported to the police and local councils, but it is unclear whether penalties are given.

3.3.6 Outputs

A score of 40% was achieved for the Outputs of Angsana Velavaru (Table 5). A key area of success was the availability of excellent facilities and services for visitors to the site. Resort guests wanting to visit the site must join an organised snorkel tour accompanied by guides and there are many educational opportunities for guests to learn more about the marine environment and conservation. Weekly lectures take place in the Marine Lab and guests can take part in citizen science surveys and contribute to the coral restoration programme.

Stakeholder input to the METT-4 highlighted that there is a disconnect between Angsana Velavaru house reef managers and the local community. Community representatives stated that there is very little communication between themselves and the resort, particularly in recent years. They would welcome programmes to enhance local livelihoods as they currently felt more benefits could be achieved for the local community, for example, through re-establishing tourist visits to local islands. The Marine Lab team at Angsana Velavaru have previously run an educational programme for both guests and local communities, however, it does not appear that these activities have taken place in recent years, perhaps partly due to the Covid-19 pandemic.

3.3.7 Outcomes

The final management element assessed, Outcomes, scored 44% (Table 5). The condition of the coral reef at the site has improved over the last five years and recovered from previous bleaching events with an observed increase in coral cover and coral recruits. The fish community overall appears to be healthy although some

key indicator species such as grouper and butterfly fish have declined in recent years. However, it is important to note that the condition of habitats and species for this assessment were based on monitoring surveys undertaken in 2018 therefore may not show an accurate picture of current site condition. Stakeholder surveys indicated an increase in other key species such as sharks and turtles, but more data is required to confirm these changes.

3.3.8 Recommendations

The key recommendation highlighted by the METT-4 evaluation to improve the management of Angsana Velavaru was the need to develop a SMART management plan with clear objectives. The creation of this document and associated annual work plan will greatly improve the overall effectiveness of the site by helping to define its goals and purpose. Greater communication between the site staff and the local community through regular stakeholder meetings where information sharing could take place would also help to increase the trust and support for the site by the local community.

Table 6 summarises the recommended 'actions to improve management' from the METT-4. Actions have been grouped into five management themes: Management Implementation, Enforcement, Building Capacity, Education and Research. Within each theme the top actions are listed in priority order based on stakeholder input, expert opinion from the OCPP team and the stage the action sits within the management framework cycle. To view all actions alongside their associated METT-4 question/management element refer to Appendix A2.3.

Table 6. Recommended actions to improve management for Angsana Velavaru house reef following a METT-4 evaluation of the site.

Recommendation Category	Priority Actions
Management Implementation	Develop a management plan for the site setting out key objectives and activities for the next five years
	Develop an annual operational work plan to ensure effective implementation of the management plan
Enforcement	Clarification on how the regulations under the Tourism Boundary Regulation are enforced e.g. outlining responsibilities of the resort and national marine police would assist in designing a system to help enforcement of the site.

Recommendation Category	Priority Actions
Enforcement (continued)	Clarification on the boundaries of the site and the resort is required to ensure all stakeholders and resort staff are aware. Provide GPS points of the site to the local community and include in the management plan.
Building Capacity	Enhance communication between the resort and the local community by setting up regular community meetings. This will provide an opportunity to share information and updates on the site and wider resort and community activities.
	Although there are a number of staff that contribute to the site as part of their resort role it would be beneficial to employ additional staff in the resort Marine Lab to pre-2020 levels. This additional capacity would help to specifically support site management.
	Undertake a socioeconomic study to investigate options for livelihood diversification in the local community linked to Angsana Velavaru e.g. traditional fishing excursions, handicrafts, training opportunities
Education	Reinvigorate the educational and outreach programme with local communities and schools. Information to include the importance of MPAs and their benefits. Introduce an evaluation process linked to the programme to gauge its effectiveness.
	Develop communication materials to clearly outline the regulations of the site (e.g. posters and information boards) for stakeholders and neighbouring local communities.
Research	Develop a monitoring and research plan linked to the management plan to help map out what research is required to support the site in achieving its goals. The research plan can also be used to allocate projects to visiting students.
	Extend annual coral reef monitoring to also include other essential habitats linked to the reef including the lagoon and channels and key species such as sharks and turtles.
	Ensure survey data is processed and fed back into national monitoring programmes as well as communicated with the local community to help build support for the site.

4 Discussion

Although the three sites evaluated are all quite different in their management structures, lengths of establishment, and availability of resources, the METT-4 highlighted relatively similar successes and gaps across all sites. All three sites are legally protected through various legislation and regulations are in place to support their objectives and protect their key values. All three sites scored highly on the expertise of their management staff, with staff at each site feeling confident in their ability and skills to undertake management actions. Access to training courses and opportunities to learn from other experts in the field to further develop skill sets is also available to management staff. Two of the three sites have fairly secure dedicated budgets and designated staff to action management; Kudahuvadhoo however, is managed on a national level rather than site level, with no field staff available at the moment.

Key gaps highlighted across all sites included a lack of capacity due to staff resource, meaning management needs cannot be fully met. This is particularly apparent for the enforcement of regulations for all three sites with no field staff in place at Kudahuvadhoo, no specific enforcement role at Angsana Velavaru and a need for more rangers at Hanifaru Bay. The ability to monitor and collect all the necessary data to inform the effectiveness of management measures for Kudahuvadhoo and Hanifaru Area was also highlighted as a gap, partially due to staff capacity.

There is variation in the level of detail included in the management plans for each site; all three sites would benefit from the development of “SMART” goals and objectives with indicators to help measure against progress. Hanifaru Area has a site-specific management plan, but this does not include “SMART” goals and objectives. Additionally, a lack of capacity restricts the research conducted at Hanifaru Area, which limits the input of data into the review of the management plan. A lack of staff resource also limits the ability of managers to coordinate and integrate ongoing research currently being undertaken by other key stakeholders. Kudahuvadhoo is managed via the national Regulation on Grouper Fishery Management which is very detailed with clear objectives for the Maldivian grouper fishery and the five grouper aggregation sites on a whole, but it is not specific to the local situation at Kudahuvadhoo. There is no formal management plan in place for Angsana Velavaru.

At all three sites, stakeholders felt that they were not adequately involved in management decision-making processes. The establishment of stakeholder committees or working groups would help to address this gap, with stakeholders able to actively participate in management planning and regular reviews to assess the effectiveness of management actions. Lastly, there are varying degrees of awareness amongst local communities about the sites. Stakeholders engaged in the validation meetings and online survey for Kudahuvadhoo and Angsana Velavaru were mostly unaware of the purpose of the sites and their boundaries and rules. Local communities

living near to Hanifaru were aware of the MPA, but there was a lack of awareness of the rules associated with it.

The similarity in successes and gaps across all three of the sites may infer that these key themes occur in other MPAs across the Maldives and thus this pilot study can help direct key actions that would benefit the effectiveness of all MPAs in the Maldives.

4.1 Limitations

The greatest limitation of this pilot study was that the METT-4 assessments were completed by the OCPP team remotely, in the UK. Ideally, the managers for each site would have completed the METT-4 with the facilitation of OCPP staff in person, as it is designed to be a self-assessment tool. Travel restrictions during the Covid-19 pandemic reduced the opportunities for the OCPP team to deliver training, or facilitation, in person. Additionally, the challenges posed by the limited capacity of governmental departments meant that this approach was not possible. Alternative methods were taken, focussing on virtual surveys and meetings, and followed by validation workshop. meetings in country to gather as many impressions as possible. This is a time-consuming process, but allows for the greatest input and transparency in a virtual setting.

Despite this approach it was not possible to meet all relevant stakeholders at either the virtual or in-person stages, for example the tourism sector was not consulted for Kudahuvadhoo. An online survey was used to allow for wider stakeholder input but the number of responses was quite limited. The evaluations were completed using the best available evidence that could be collated at the time of the review, noting these were completed by staff who had no personal experience of the sites and had to rely on the impressions of others. The benefit of this situation is that it allowed for an unbiased assessment. There are several gaps in the data that was not available, for example, a key challenge globally is understanding the impact of climate change on marine environments.

5 Recommendations

5.1 Recommendations to improve management

Completing the METT-4 is just the first step. Once the evaluation is complete, it is important to communicate the results to both site managers as well as stakeholders and other interested parties. It is then essential that the actions identified during the evaluation are implemented to result in more effectively managed sites. Despite the differences between the three sites focused on in this review, there are significant similarities in the recommendations that have been identified to improve the management of these protected areas. This allows us to develop a list of

recommendations that could be considered across all MPAs across the Maldives to help improve management more broadly. This list is by no means considered exclusive, but provides a useful starting point for consideration:

1. Development of SMART management plans: Currently very few MPAs in the Maldives have site specific management plans in place. The development of SMART (Specific, Measurable, Attainable, Relevant, Time Based) management plans should use indicators to assess progress towards the achievement of MPA objectives. Capacity to support the development of management plans is limited in the Maldives, and so the development of overarching management plan frameworks could help ensure that plans can be delivered as efficiently and consistently as possible. Under the management plan, annual operational work plans can be an important way to ensure the effective implementation of management plans.
2. Development of research and monitoring plans that are linked to MPA management plan aims and objectives – These plans help to identify priority research areas and ensure that data and evidence is fed back into decision making through the management plan review process.
3. Improve awareness raising and communication around designated MPAs – Providing more information about designated MPAs locally; including boundaries, what they are designated for and the regulations. More broadly, more awareness is needed around the importance of MPAs, and the potential benefits they provide. It could also ensure that marine conservation is included on the curriculum of all schools in the Maldives.
4. Improve stakeholder engagement in MPA management – We appreciate that the Covid-19 pandemic has made face to face engagement with stakeholders very challenging. However, moving forwards, any opportunities to allow stakeholders to actively engage in MPA processes would be hugely beneficial. In some instances, such as Hanifaru, this could include the re-establishment of the MPA management committee, in other instances, it could be the identification of Environmental Champions on Atoll councils who help to disseminate information about locally designated sites to local stakeholders and communities.
5. Improve compliance and enforcement of MPAs – This could include the recruitment of new rangers where resourcing allows, but also could explore the use of new technology, such as remote monitoring and surveillance, to support enforcement of MPA regulations.

5.2 Recommendations for future PAME work

This pilot project has undertaken a comprehensive PAME review for three sites in the Maldives using the METT-4 approach. The methodology applied to undertake this review is clearly outlined in this report, and all data used is detailed in the METT4

spreadsheets. For consistency and where possible, we would recommend that future PAME evaluations for MPAs in the Maldives could consider a similar approach. Ideally, PAME reviews should take place on a regular basis, depending on the complexity of the site, this could be every 2 to 5 years.

Following the completion of the PAME evaluations, this information should be shared locally and globally. Summary documents for each of the three MPAs considered in this report are being prepared and will be shared in English and Dhivehi to share with stakeholders. It is also recommended that the results be added to the Global Database on Protected Area Management Effectiveness (Explore the World's Protected Areas (protectedplanet.net)).

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Appendix 1 Stakeholder Validation List

A1.1 PAME Validation Workshop & Meetings Stakeholder List.

Hanifaru		Kudahuvadhoo Kanduolhi		Angsana Velavaru	
Stakeholder	**No.**	**Stakeholder**	**No.**	**Stakeholder**	**No.**
Baa Atoll Council	4	Kudahuvadhoo WDC	19	Angsana Velavaru Resort Staff	3
Baa Atoll Biosphere Reserve Office	5	Kudahuvadhoo Island Council		Angsana Velavaru Marine Lab Staff	1
Amilla Resort	1	Maaenboodhoo Island Council		Meedhoo Island WDC	3
Ocean Dimensions Kihaa Resort	1	Dhaalu Atoll Council		Meedhoo Island Council	5
Manta Trust	1	Kudahuvadhoo Reef Fishers	3		
Reefscapers	1	Kudahuvahoo Yellow Fin Tuna Fishers	4		
Soneva Fushi Resort	2	Kudahuvadhoo Recreational/Charter Fishers	5		
B.Fehendhoo WDC	1	Maaenboodhoo Island Reef Fishers	3		
B.Thulhaadhoo Island Council	2				
B.Goidhoo Island Council	1				
B.Fehendhoo Island Council	1				
B.Dohfah Island Council	1				
B.Maalhos Island Council	2				
B.Kihaadhoo Island Council	1				
B.Eydhafushi Island Council	3				
B.Dhonfanu Island Council	1				
B.Dharavandhoo Island Council	2				
B.Maalhos WDC	1				
B.Kihaadhoo WDC	1				
B.Dharavandhoo WDC	1				
B.Kendhoo Island Council	1				
B.Hithaadhoo Island Council	1				

Appendix 2 METT-4 Results

A2.1 Hanifaru Area, Baa Atoll

Question	Score	Actions to improve management
1. Does the PA have legal status or is it established through "other effective means"?	3	No further action required
2. Is management undertaken to achieve the objectives of the protected area?	3	- Transparency on the regular review and revision of the management plan is critical to determine whether the current objectives are still appropriate and could improve wider engagement. - Improve integration and clarity on governance structure and improve streamlining of official roles and processes.
3. Are appropriate regulations/controls in place to manage use and activities in accordance with the management objectives of the protected area?	2	- Review regulations for waste management in Hanifaru Bay. - Consider the possibility of speed limits or a code of conduct outside Hanifaru Bay to minimise the risk of boat strikes/disturbance to manta rays and whale sharks.
4. Does land and sea use planning outside of the protected area recognise the protected area and contribute to the achievement of management objectives?	2	- A marine spatial planning approach could be useful to help manage sea use in adjacent areas if current Environmental Impact Assessments (EIA's) do not consider indirect impacts of activities in the region on the site. - Consider the possibility of speed limits or a code of conduct outside Hanifaru Bay to minimise the risk of boat strikes/disturbance to manta rays and whale sharks. - More strategic monitoring would improve planning and mitigation of future activities.

Question	Score	Actions to improve management
5. Is the protected area the right size and shape to protect species, habitats, ecological processes and water catchments of key conservation concern?	3	- To enhance site protection of the key features (manta rays and whale sharks) research into, and protection of, migration corridors could be considered in the future. - Long-term monitoring research on the site and its benefits would be useful.
6. Is the boundary known and demarcated?	2	- Explore different methodologies to demarcate the boundary (e.g. virtual AIS/ uploading coordinates onto boats GPSs/ demarcation buoys). - Increase awareness amongst site users through interpretation boards near the harbour, leaflets, information online showing the site boundary, digital posters (to be shared in local Viber groups), provision of GPS positions for tour operators and focused engagement with the surrounding communities/fishing communities including communities/ fishers from outside of Baa Atoll. - Reinstating the Baa Atoll website would provide a good central point of information.
7. Is there a management plan or equivalent and is it being implemented?	2	- A comprehensive review and revision of the management plan is required on a regular basis with publicly available processes and feedback. - The implementation of a smart management plan that is led by data/ monitoring and reviewed by stakeholder groups across all sectors would be greatly beneficial. - Future management plans should also include key indicators or goals for assessing progress towards the MPAs key objectives over time; this will help provide the quantitative data to support future management amendments and this information needs to be publicly available. - Integration of monitoring data and short/long-term objectives into the management plan are essential to assess the success of the MPAs management plan. - It is essential to ensure that everyone involved in the management is aware of the difference between a comprehensive management plan and the regulations that comprise the enforcement of the MPA management.

Question	Score	Actions to improve management
7a-c. Additional points: Planning process	0	- A comprehensive review and revision of the management plan is needed which takes into consideration recent monitoring and research and involves stakeholders in the process; this is currently being undertaken and the results will be shared publicly once completed. - There is a great need to set up a stakeholder committee and undertake public engagement sessions across the Atoll. A public consultation took place as part of the 10-year review currently underway however the scale and scope of this consultation is unclear.
8. Is there a regular work plan and is it being implemented?	2	- Increased transparency on activities undertaken as part of the work plan and review processes would greatly improve the system. - Making the work plan and its outputs publicly available would improve wider awareness, and improve opportunities for support from wider stakeholders/ researchers.
9. Do you have enough information to manage the area?	2	- Develop a monitoring and research plan for the site (linked to the management plan) which highlights key needs e.g. additional information required for whale sharks, oceanic processes and impacts of climate change and ensuring integration of the research undertaken by different organisations. - Look into collaboration opportunities with research organisations to help deliver research and monitoring activities. Ensure that results are collated and regularly reviewed to inform management planning and decision making, as a condition of working in the area. - Re-establish the Baa Atoll Biosphere Reserve website to provide a central location for researchers to share their scientific evidence (datasets, reports etc) for use in Hanifaru Bay and wider Biosphere Reserve management.
10. Are there enough people to manage the protected area?	1	- Increased patrols required during periods of high aggregations (July - September) to monitor visitor permits and ensure compliance with MPA regulations. - Increase the number of permanent Rangers, particularly during manta season, to allow approximately 2-3 rangers at a time in separate boats in Hanifaru Bay. - The establishment of satellite ranger stations (possible on Dharavandhoo and/or Dhonfanu) would reduce the distance to Hanifaru Bay, which would allow quicker responses to infringement and stronger deterrent presence.

Question	Score	Actions to improve management
11. Do the people involved in managing the protected area have the necessary knowledge and skills?	2	- Undertake staff training needs assessment. - Ensure refresher training courses and regular training available for all staff including conflict management training and handling compliance issues. - Consider an international MPA exchange for knowledge sharing.
12. Is the current budget sufficient?	2	- Development of MPA business plan, if one doesn't already exist, with a budget breakdown to identify annual costs compared to current budget inputs e.g. core budget and Hanifaru Bay visitor income vs staffing expenses and monitoring. - Evaluate how effective the Baa Atoll Conservation Fund is, identifying how much of the money supports management activities vs livelihood activities. - Transparency in the sources and the use of the fund is essential.
13. Is the budget secure?	2	- Increase transparency on the income and outgoings of funds for the area, within reasonable bounds. - A longer-term solution could be to transition to an online cashless system for Hanifaru Bay visitor tokens, which would improve transparency and also improve accuracy of reporting visitor numbers. Money within the BACF should be ringfenced for use on monitoring and management specifically. - Undertake socio-economic studies/ stakeholder surveys to understand visitors willingness to pay, to scope whether entry fees could be increased to generate additional income which could be used to fund additional rangers and equipment.
14. Is the budget managed to ensure effective administration of the protected area?	1	- Increase budget security by ringfencing funds for specific purposes; such as management, buying equipment and community. - Improve transparency by creating and publishing a business plan, publish the annual financial audits on the Hanifaru Bay website. - Improve transparency and information about the BACF within stakeholders and the local community so they can understand how the money is being used and how it can applied for.

Question	Score	Actions to improve management
		- Consider a separate element to the BACF focused on smaller community projects that could be applied for and awarded more regularly than fewer large scale projects to improve local understanding of the fund, information about these projects could also be shared with visitors so they can understand how their money goes to helping local initiatives.
15. Are equipment and facilities sufficient for management needs?	1	- Additional equipment needed including a vessel, drones and cameras to support enforcement. - New office may be needed in the future as the Biosphere Reserve team expands, and the new office could include an interpretation centre as part of outreach.
16. Can staff (i.e., those with responsibility for managing the site) enforce protected area legislation and regulation?	1	- Increase the number of permanent rangers, particularly during manta season, to allow approximately 2-3 rangers in separate boats in Hanifaru Bay. - Establish ranger posts outside of Eydhafushi (on Dharavandhoo and Dhonfanu) to support reactive enforcement and improve ranger presence in Hanifaru Bay. This would also help outreach and awareness raising due to their physical presence on additional local islands. Research has suggested more patrols/staff are required for peak seasons when aggregations are large (July-September). - Investigate new technology to help enforcement, such as drones or remote tracking of vessels. - Clarify the roles and responsibilities of the rangers: provide training to rangers on the legislation, their rights are and what powers they have. - Ensure site users are also aware of the rangers' role and responsibilities and how to contact them. Raise awareness of the penalties for non-compliance among visitors and site users. - In the longer term, it is suggested that legislation is changed to improve enforcement regulations and give powers to the rangers to allow them to issue on-the-spot penalties for minor offences; fines could also be increased to provide a greater deterrent.
17. Are systems (e.g., patrols, permits, intelligence gathering etc) in place to control access/resource use in the protected area?	2	- Ensure there is a dedicated enforcement team for Hanifaru Bay; increase ranger presence during peak period (July-September), base rangers at satellite locations outside of Eydhafushi and provide training to rangers to ensure they are aware of their responsibilities and role. - New technology could support the tracking of vessels to support compliance.

Question	Score	Actions to improve management
		- More monitoring of visitor permits was suggested by stakeholders: rangers should check visitor permits before access is given. - Increase awareness of rules and regulations to all stakeholders (local communities, resorts, tour operators, speed boat skippers etc and visitors). - Improve communication/contact between the Biosphere Reserve Office and the resorts. - A more comprehensive system is needed to manage the site, including reporting of the visitor numbers and levels of compliance with the regulations in a transparent manner to ensure this feeds back into management through the annual review process. - The role and responsibilities of the tour guides should be clarified to allow them to confidently address compliance issues. The training for tour guides should have a greater focus on the rules and regulations of Hanifaru Bay and why those rules are in place and should include practical element which should include a site visit and health and safety scenarios to ensure guests can be managed more effectively in the water and improve tour guide confidence. - Resorts and guesthouses should be encouraged to take more responsibility for their visitors and ensuring compliance with the rules through training / awareness-raising. Consider whether the resorts could be fined for infractions by their guests as well as the individual tour guides.
18. Do protected area staff have safe working conditions and does management prioritise safety?	2	- Undertake risk assessments for all staff for any activity at sea. - Arrange adequate insurance for all staff working at sea. - Ensure that equipment is maintained and always available e.g. VHS radios to maintain contact.
19. Is there a programme of management-orientated survey and research work?	1	- Develop a Monitoring and Research plan linked to the management plan to help map out what research is required to support the MPA in achieving its goals and enhance integration and collaboration between the different organisations undertaking research at the site. - Feed survey data into national-level reporting and ensure information is communicated back to key stakeholders, including local communities (e.g. shared on social media), and is used as part of the management review process to inform adaptive management.

Question	Score	Actions to improve management
		- Collation of data collected from external sources on a regular basis and ensure it is shared with all relevant parties. - Dissemination of key points of research as part of outreach and to make research as accessible as possible.
20. Are management activities regularly monitored, evaluated and adapted?	1	- Development of a SMART management plan that includes specific management objectives and actions with appropriate indicators to quantitatively assess progress over time. - Ensure a process for adaptive management is in place i.e. a feedback loop so that data collected can inform adaptive management. For example, continuous monitoring of the status of manta ray / whale shark populations would enable on-going evaluation of the effectiveness of current management measures; once a pre-determined threshold was met, then stricter management measures could be quickly brought in to reduce impacts (e.g. reducing the number of visitors allowed into Hanifaru Bay at any one time). Undertaking a carrying capacity for Hanifaru Bay (if not already available) would help to inform this. - The management plan should be reviewed on a regular basis - interim review on an annual basis with a full review every 5 years.
21. Is active resource management being undertaken?	0	*No actions were given as this question is not relevant to the site*
22. Is the protected area consciously managed to adapt to climate change?	1	- Undertake research and monitoring to understand the impacts of climate change on manta ray and whale shark aggregations including research into oceanographic processes and what impacts these have on the plankton blooms. - Ensure that climate change is considered as part of the management plan review process. Improving resilience of the marine environment to be able to adapt to climate change by improving the management of threats that can be managed at a local level.

Question	Score	Actions to improve management
23. Is the protected area being consciously managed to prevent carbon loss and to encourage further carbon capture?	0	*No actions were given as this question is not relevant to the site*
24. Does management consider ecosystem service provision?	2	- Undertake natural capital/ ecosystem services valuation assessment to demonstrate the benefits of the site. - Raise awareness of the wider benefits of the site to the local community and use the site to improve positive opinions of locals on the site. - Increase the profile of Hanifaru Bay as an important research site among the scientific community to raise the profile of the site on an international scale and generate indirect benefits to local communities (science tourism).
25. Is there a planned education programme linked to the management needs?	1	- Raise awareness of what management actions are being taken and how the site is managed. - Help improve transparency and wider understanding by creating a dedicated website for Hanifaru Bay or the Biosphere Reserve in general. Educational materials as well as meeting notes, management plans, research reports etc could be made available on the website and shared via media campaigns/social media. - Produce innovative, digital outreach tools (e.g. Facebook, Instagram, digital posters shared via Viber) as well as the traditional means (e.g. leaflets for local guesthouses, billboards near the harbour) to increase dispersal and engagement and raise awareness of the site and the associated rules. - Enhance awareness-raising activities with the local communities about the site, the marine wildlife and the wider benefits it provides, including with communities outside of Baa Atoll (especially fishers). - Revive the education and outreach programme with local schools and undertake more regular island outreach. Take local communities and students to visit Hanifaru Bay and see if for themselves. Involve marine biologists from the resorts in the education work.

Question	Score	Actions to improve management
		- Support routes into conservation careers and instil conservation into the public across all ages. - Evaluate how effective the education and outreach programmes are from the perspective of the local communities and restart engagement with all locals.
26. Is there co-operation with neighbouring land/sea State and commercial users?	1	- An organogram of organisations and responsibilities linked to Hanifaru Bay's management would be beneficial. - There is a need for greater communication between managers and local Island/Atoll Councils. - Reinstate the Stakeholder Group or establish an Advisory Group with representatives from each Island Council to create a more official system for communication and cooperation between site managers and site users. Each Island Council should nominate an Environment Champion who can advocate environmental issues to their community.
27. Do commercial tour operators contribute to protected area management?	1	- Establish a stakeholder group / working group for stakeholders including tour operators to contribute to MPA management and actively input into the management process. - Provide opportunities to feed into the annual review process and evaluation of the current management plan. - Improve communication between the Biosphere Reserve Office and resorts by reinstating BAARU; ensure representation includes guest houses and provide monthly working groups during the peak season and every 3 months during the off season.
28. If fees (i.e. entry fees or fines) are applied, do they help protected area management?	2	- There is need for an effective working group with stakeholder representation to decide how to use the Baa Atoll Conservation Fund (BACF). - There also needs to be improved communication about the BACF and how it is used. - A suggestion from grey literature is to raise the exclusivity of the site by increasing the fees and reducing the visitor capacity of Hanifaru Bay to reduce pressure; a willingness to pay survey would provide greater information on this.
29. Are visitor facilities and services adequate?	2	- If not already available, more information boards could be installed to raise awareness of the rules around interactions in the water and responsible behaviour to encourage compliance.

Question	Score	Actions to improve management
		- The management plan outlined an aim to build a visitor centre on a nearby island for Hanifaru Bay which would provide an area for educational materials to be displayed.
30. Are indigenous people involved in management decisions?	0	*No actions were given as this question is not relevant to the site*
31. Do local communities living in or near the protected area have input to management decisions?	1	- Establish a stakeholder group/ working group/ local management committee to improve communication between the Biosphere Reserve Office and local communities and to enable members of the local communities to actively input into management decisions. - Reinstate the official website for Hanifaru Bay and use social media (e.g. Facebook) to encourage local communities to engage with public consultations and share their views. - Undertake outreach and stakeholder engagement activities with the local communities. For example having 1 day per month where locals can be taken for visits to Hanifaru Bay; local resorts have indicated they are willing to transport and guide locals if a process was put in place. The Biosphere Reserve Office could facilitate this with help from the Island Councils. - Improve communication about the site and the procedures for visiting it to make it more accessible for local communities to visit it.
31a-c. Additional points - Impact on communities	1	- 31a- Establish a stakeholder group / working group / local management committee to enable members of the local communities to voice their views and actively input into management decisions. Increase social media presence to widen engagement in the community - 31b- Reactivate the Baa Atoll Conservation Fund (BACF). Raise awareness of the BACF and highlight the process for how locals and NGOs can apply to access the fund. Consider running a small award of the fund aimed at smaller scale community projects that locals can apply to. - 31c- Undertake outreach and stakeholder engagement activities with the local community on the benefits of the MPA. Enhance communication and transparency of the further benefits the MPA provides through educational activities with local communities. Increasing accessibility to the MPA for local communities would also be beneficial e.g. through visits to the site.

Question	Score	Actions to improve management
32. Is the protected area providing sustained livelihood benefits to local communities and/or Indigenous people, e.g., income, employment, payment for ecosystem services?	1	- Review the Baa Atoll Conservation Fund (BACF) to see if it is providing benefits to the local community and if not, identify where it could be improved. Raise awareness of the BACF and highlight the process for how locals and NGOs can apply to access the fund. - Provide more education awareness to local communities on the benefits of the MPA specifically outlining links between tourism and their livelihoods. - Undertake socio-economic studies to understand the benefits of the MPA and use the results to investigate opportunities for diversification of income for local communities. - Undertake socio-economic studies with visitors / tourists to understand the specific attractions of Baa Atoll and incorporate a willingness to pay survey to explore the opportunities for locals to benefit from tourism. Restart visits to local islands for tourists to provide opportunities for tourists to buy locally made souvenirs.
33. Are the threats to the main values of the protected area being effectively addressed?	2	- Review the structure and framework in place to manage the key threats caused by an increase in tourism. - Suggestions on threat mitigations by stakeholders include a reduction in the number of boats, increased presence of rangers during busy periods (July-September), a review of permits provided during busy periods, implementation of highways outside Hanifaru Bay to reduce boat strikes and a reduction in the number of people allowed in the water. - To help inform whether an increase in visitor fees could be applied, a willingness to pay study could be undertaken. - Increased responsibility should be placed on resorts to ensure their guests comply with the rules and are managed properly when in the water rather than full responsibility lying on the tour guides. Consider whether the resorts could be fined for infractions by their guests as well as the individual tour guides.

Question	Score	Actions to improve management
34. Have the requirements for functional connectivity have been assessed and implemented?	0	- Investigate whether additional management should be introduced in the wider Biosphere Reserve to protect the megafauna travelling to and from Hanifaru Bay, for example further speed limits and corridors around the site could help to reduce the threat of boat strikes. - Undertake research into oceanic processes and megafauna movement to gain a greater understanding of connectivity: how these species use the wider area and move around atolls and regional links (i.e. where they go when they leave Hanifaru Bay). - Undertake research into the impact of climate change on manta rays and whale sharks. A long-term dataset on whale sharks around Baa Atoll would also be beneficial.
35. What is the condition of the important natural values of the protected area as compared to when it was first designated?	2	- Undertake research into whale sharks to increase understanding of site use and identify why numbers seem to be decreasing before further actions can be outlined. Improve links with Maldives Whaleshark Research Programme (MWRP) to encourage them to extend their programme to Hanifaru Bay. - Additional research could also be undertaken on oceanographic processes and climate change to better understand the impacts of climate change on ecological processes. - Willingness to pay and visitor satisfaction surveys will help to identify links between visitor numbers and satisfaction levels.
35a-c. Additional points – Condition of natural values	2	- Further research is required for whale sharks through the establishment of a long-term monitoring programme or through a partnership with researchers/Maldives Whaleshark Research Programme. - Enhance enforcement, particularly during the peak season (July-September) and undertake a comprehensive review of the management plan to ensure it is still effectively meeting the needs of the site, in light of increasing visitor numbers since its conception.
36. What is the condition of the important cultural values of the protected area as compared to when it was first designated?	0	*No actions were given as this question is not relevant to the site*
36a-c. Additional points – Condition of cultural values.	0	*No actions were given as this question is not relevant to the site*

Question	Score	Actions to improve management
37. Has the status of key indicator species changed over the last 5 years?	2	- Undertake research into whale sharks to increase understanding of site use and their population structure. Improve links with Maldives Whaleshark Research Programme (MWRP) to encourage them to extend their programme to Hanifaru Bay. - When reviewing the management plan, consider the inclusion of climate change and its possible impacts on the protected species of the site. - Review the possible impacts on key species caused by the increase in tourism and use the results to inform the management plan review.
38. Has the status of habitats changed over the last 5 years?	3	- The following areas could be investigated to improve understanding of the water column and identify threats that may be caused by an increase in boat traffic: assessment of water quality including microplastics presence and chemical pollution, assess changes in temperature and currents and the impact these factors have on primary production.

A2.2 Kudahuvadhoo Kanduolhi, Dhaalu Atoll

Question	Score	Actions to improve management
1. Does the PA have legal status or is it established through "other effective means"?	3	No further action necessary
2. Is management undertaken to achieve the objectives of the protected area?	1	– Develop and implement an annual operational plan and research and monitoring plan specific to the site to achieve the outlined objectives.
3. Are appropriate regulations/controls in place to manage use and activities in accordance with the management objectives of the protected area?	2	– Develop site specific regulations that are appropriate to the site.
4. Does land and sea use planning outside of the protected area recognise the protected area and contribute to the achievement of management objectives?	1	– Establish an education and awareness programme to raise awareness of the site amongst the community. – Ensure impacts to the site are considered in new development proposals and appropriate mitigations put in place. – Monitor grouper populations in the site to help identify changes.
5. Is the protected area the right size and shape to protect species, habitats, ecological processes and water catchments of key conservation concern?	1	– Regular monitoring throughout the year to determine location and seasonality of grouper spawning. This could help inform revision of the site boundaries if required. Potential use of BRUVS to help with survey work. – Investigate whether there are climate change models available for the area to infer whether any changes have taken place that could affect the location of grouper spawning grounds.

Question	Score	Actions to improve management
		– Consider extension of the protected area to include nearby seagrass beds that provide important fish nursery habitat.
6. Is the boundary known and demarcated?	1	– Development of communication materials including posters, leaflets, and information boards close to the site and in the harbour. Leaflets with the minimum sizes of grouper for fishers fishing outside of the MPA would also be useful to increase fisherfolk awareness of regulations. Communication materials to cover why the site is protected, where it is, life history of groupers to help improve local knowledge. – GPS points for the site should also be provided to users of the area - fishing and tourism.
7. Is there a management plan or equivalent and is it being implemented?	1	– Recruit site level manager responsible for ensuring the management plan is implemented and develop site specific annual operational plan. – Establish a partnership with the local council(s) and resort to help support and deliver management actions including education awareness and site monitoring.
7a-c. Additional points: Planning process	1	– Establish a local working group to provide opportunities to input into ongoing management. Explore opportunities to integrate the local councils in site management and designate a local 'environmental champion' within the council to ensure there is a link between the Maldives Government and local community to help filter information in each direction allowing for greater awareness of Government actions. – Ensure regular monitoring of the site throughout the year to determine location and seasonality of grouper spawning, species present, research such as tagging grouper etc and ensure that the results are incorporated into management planning and shared amongst stakeholders to help further understanding and knowledge of the site.
8. Is there a regular work plan and is it being implemented?	0	– Develop and implement an annual operational plan to ensure effective implementation of the management plan at a site level.

Question	Score	Actions to improve management
9. Do you have enough information to manage the area?	1	– Develop site specific monitoring and research plan led by MoFMRA with the MMRI to identify priority research areas. Determine standardised monitoring protocol for all grouper sites and provide training to those responsible for monitoring each site e.g. local resorts. – Key research gaps identified include: grouper movements in and outside the site, what species are present in the site and when, anthropogenic impacts on reef fish populations in the site (incl. groupers), health and distribution of key habitats that support grouper populations, integration of fisheries monitoring (catch data) to inform the management measures.
10. Are there enough people to manage the protected area	1	– Recruit a site specific manager (ideally based in Kudahuvadhoo) to manage the site and a ranger responsible for the compliance, enforcement and educational outreach. – Explore opportunities to integrate the local councils in managing the site on a local level and use local resorts/ NGO's to help deliver management objectives e.g. monitoring activities and educational activities.
11. Do the people involved in managing the protected area have the necessary knowledge and skills?	2	– Build staff and knowledge resilience by establishing relationships with the local council, NGOs and resorts to help manage the site and ensure knowledge sharing amongst all staff. – Build skills at local level by providing training to help implement management and designate an 'environmental champion' in the Council to help disseminate information between the local community and the government/ site management team.
12. Is the current budget sufficient?	0	– Assign site specific budget linked to the annual operational plan. Source external funding to help support monitoring/research/ outreach activities
13. Is the budget secure?	0	– Assign site specific budget linked to the annual operational plan. Source external funding to help support monitoring/research/ outreach activities
14. Is the budget managed to ensure effective administration of the protected area?	0	*No actions were given as this question is not relevant to the site*

Question	Score	Actions to improve management
15. Are equipment and facilities sufficient for management needs?	0	– Develop a site-specific annual operational plan and monitoring and research plan to identify equipment and facility needs for the site.
16. Can staff (i.e., those with responsibility for managing the site) enforce protected area legislation and regulation?	1	– Deploy a ranger to the site and work in partnership with the local council for outreach and awareness activities. – Ensure inspections from the national fisheries compliance team take place if site rangers do not have powers to enforce the legislation themselves.
17. Are systems (e.g., patrols, permits, intelligence gathering etc) in place to control access/resource use in the protected area?	0	– Develop a compliance and enforcement strategy specific to the site. Recruit local site staff to be responsible for compliance, enforcement and outreach/engagement. Ensure rangers have the powers to enforce the regulations. – Explore opportunities to integrate the local councils in site management and use an 'environmental champion' within the council to be the key link between distributing information from the government, site management team and local community. – Establish an educational programme to raise awareness amongst the community include information about the site, rules and reasons for these rules, species and their ecological value and the benefits of protecting them. Install communication materials near the harbours to increase engagement.
18. Do protected area staff have safe working conditions and does management prioritise safety?	0	*No actions were given as this question is not relevant to the site*
19. Is there a programme of management-orientated survey and research work?	0	– Develop site specific monitoring and research plan led by MoFMRA with the MMRI to identify priority research areas. Determine standardised monitoring protocol for all grouper sites and provide training to those responsible for monitoring each site e.g. local resorts.

Question	Score	Actions to improve management
		– Key research gaps identified include: grouper movements in and outside the site, what species are present in the site and when, anthropogenic impacts on reef fish populations in the site (incl. groupers), health and distribution of key habitats that support grouper populations, integration of fisheries monitoring (catch data) to inform the management measures. – The management plan already outlines the following research activities to take place within the site: tagging studies to collect data on movement, growth and habitat range and the connectivity between grouper populations, both inter-atoll and intra-atoll; regular monitoring of the site to gauge effectiveness.
20. Are management activities regularly monitored, evaluated and adapted?	0	– Develop an evaluation framework linked to the management plan to assess effectiveness of management activities.
21. Is active resource management being undertaken?	0	*No actions were given as this question is not relevant to the site*
22. Is the protected area consciously managed to adapt to climate change?	1	– Investigate potential grouper migration models to understand potential impacts of climate change and support the continued establishment of this area as a regular spawning site
23. Is the protected area being consciously managed to prevent carbon loss and to encourage further carbon capture?	0	*No actions were given as this question is not relevant to the site*
24. Does management consider ecosystem service provision?	1	– Natural capital / ecosystem services valuation assessment to demonstrate benefits of the site. – Raise awareness of the wider benefits of the site to the local community including the indirect benefits from protection.

Question	Score	Actions to improve management
25. Is there a planned education programme linked to the management needs?	0	– Develop site specific communication materials and general information about grouper (importance of protecting grouper and their ecology e.g. lifecycle) and the site – Include marine science/fisheries in school curriculum in local schools. – Raise awareness around MPAs - what are they and benefits etc. – Build relationships with local resorts/NGOs to help deliver education in schools and amongst the local communities. Establish information boards in public places e.g. at the harbour. Include educational materials about the role of sharks in the ecosystem.
26. Is there co-operation with neighbouring land/sea State and commercial users?	0	– Establish an education and awareness programme to raise awareness of the site amongst the community. – Ensure impacts to the site are considered in new development proposals and appropriate mitigations put in place. – Monitor grouper populations in the site to help identify changes. – Establish a local working group/committee to build relationships between MPA managers, the local community and resorts and to provide an opportunity to discuss management.
27. Do commercial tour operators contribute to protected area management?	0	– Introduce a stakeholder working group or environmental champion in the local council to engage with the tourism sector and provide an opportunity for input to management.
28. If fees (i.e. entry fees or fines) are applied, do they help protected area management?	0	*No actions were given as this question is not relevant to the site*
29. Are visitor facilities and services adequate?	0	*No actions were given as this question is not relevant to the site*

Question	Score	Actions to improve management
30. Are indigenous people involved in management decisions?	0	*No actions were given as this question is not relevant to the site*
31. Do local communities living in or near the protected area have input to management decisions?	0	– Develop a working group / local management committee to provide an opportunity for local stakeholders to feed into site-level management measures and be represented at a national level. – Increased engagement and awareness raising amongst local communities is required and an 'Environmental Champion' in the local council could help to connect all parties and ensure information about the site is disseminated.
31a-c. Additional points - Impact on communities	0	– Undertake studies to identify what benefits are achieved through the site e.g. identify the distribution of spawning outcomes, and undertake a socioeconomic assessment to investigate livelihood diversification (e.g. grouper mariculture options / nature-based tourism). – Develop a working group / local management committee to provide an opportunity for local stakeholders to feed into site-level management measures and be represented at a national level. Increased engagement and awareness raising amongst local communities.
32. Is the protected area providing sustained livelihood benefits to local communities and/or Indigenous people, e.g., income, employment, payment for ecosystem services?	0	– Undertake a socio-economic assessment to identify the livelihood benefits to local communities, including investigation into potential livelihood diversification options (e.g. grouper mariculture / nature-based tourism). – Raise awareness of wider ecological / indirect benefits brought through the protection of the site e.g. potential "spill-over" effect for local fisheries; value of healthy marine ecosystems for climate change resilience, etc.
33. Are the threats to the main values of the protected area being effectively addressed?	1	– Implement management plan at a site level through the development of a site-specific annual operational plan setting out actions, responsible party and outputs/targets. – Undertake regular long-term monitoring to assess the effectiveness of the regulations on grouper populations.

Question	Score	Actions to improve management
34. Have the requirements for functional connectivity have been assessed and implemented?	1	– Undertake grouper tagging studies to identify movements of species, identify larval drift/site use by juvenile grouper - some suggestions for future research already included in the management plan.
35. What is the condition of the important natural values of the protected area as compared to when it was first designated?	0	– Regularly monitor the site throughout the year to gauge its effectiveness (suggest use top 4 commonly caught species as indicator species); monitoring surveys should consider species diversity, grouper abundance, size and maturity. – Increase understanding of the habitats that support the grouper including nursery grounds - research health and distribution of key habitats linked to grouper.
35a-c. Additional points - Condition of natural values	0	– Develop site specific monitoring and research plan led by MoFMRA with the MMRI to identify priority research areas. – Determine standardised monitoring protocol for all grouper sites and provide training to those responsible for monitoring each site e.g. local resorts. – Key research gaps identified include: grouper movements in and outside the site, what species are present in the site and when, anthropogenic impacts on reef fish populations in the site (incl. groupers), health and distribution of key habitats that support grouper populations, integration of fisheries monitoring (catch data) to inform the management measures. – The management plan already outlines the following research activities to take place within the site: tagging studies to collect data on movement, growth and habitat range and the connectivity between grouper populations, both inter-atoll and intra-atoll; regular monitoring of the site to gauge effectiveness.
36. What is the condition of the important cultural values of the protected area as compared to when it was first designated?	0	*No actions were given as this question is not relevant to the site*

Question	Score	Actions to improve management
36a-c. Additional points - Condition of cultural values	0	*No actions were given as this question is not relevant to the site*
37. Has the status of key indicator species changed over the last 5 years?	0	– Regularly monitor the site throughout the year to gauge its effectiveness (suggest use top 4 commonly caught species as indicator species); monitoring surveys should consider species diversity, grouper abundance, size and maturity.
38. Has the status of habitats changed over the last 5 years?	0	– Undertake research into habitat range and condition to determine whether the health of the coral reef affects grouper aggregations and to understand how site-attached larvae and juveniles are. – Increase understanding of the habitats that support the grouper including nursery grounds - research health and distribution of key habitats linked to grouper.

A2.3 Angsana Velavaru, Dhaalu Atoll

Question	Score	Actions to improve management
1. Does the PA have legal status or is it established through "other effective means"?	3	- No further action required
2. Is management undertaken to achieve the objectives of the protected area?	0	- Define clear objectives for the site in collaboration with all key stakeholders.
3. Are appropriate regulations/controls in place to manage use and activities in accordance with the management objectives of the protected area?	2	- Clarification of regulations to ensure all stakeholders and the resort are clear on what the rules and boundary of the house reef are. - Awareness raising activities and communication materials for stakeholders and neighbouring local communities to clearly outline regulations.
4. Does land and sea use planning outside of the protected area recognise the protected area and contribute to the achievement of management objectives?	2	- Enhance communication between Meedhoo Island Council and Angsana Velavaru through frequent community meetings to allow for an opportunity to share information and updates.
5. Is the protected area the right size and shape to protect species, habitats, ecological processes and water catchments of key conservation concern?	2	- Outline clear objectives for the site and consider whether there is a need to review site design to include key species and habitats outside of the current house reef area e.g. turtle nesting areas and seagrass.

Question	Score	Actions to improve management
6. Is the boundary known and demarcated?	0	- Clarification of boundary regulations by the Ministry of Tourism to ensure all stakeholders and the resort are clear on what the exact boundary of Angsana is. - Include clear details about the boundary in the management plan with GPS points and make these available to the local community. - Awareness raising activities and resources to be developed through posters and information boards etc for stakeholders.
7. Is there a management plan or equivalent and is it being implemented?	0	- Develop a management plan for the site setting out key objectives and activities for the next 5 years in collaboration with all key stakeholders; use the results from the METT-4 to help develop the plan.
7a-c. Additional points: Planning process	0	- Develop a management plan for the site setting out key objectives and activities for the next 5 years; use the results from the METT-4 to help develop the plan. - Establish a process to enable stakeholders to fully participate in development of the management plan (e.g. through stakeholder workshops).
8. Is there a regular work plan and is it being implemented?	0	- Develop an annual operational work plan to ensure effective implementation of the management plan.
9. Do you have enough information to manage the area?	2	- Ensure coral reef monitoring continues on a regular basis and results are reviewed to inform management planning and decision making. - Undertake surveys of shark and ray numbers and to confirm their utilisation of the site as a nursery / foraging ground.
10. Are there enough people to manage the protected area	2	- Although there are a number of staff that contribute to the site as part of their resort role it could be beneficial to hire more staff (used to have four staff in the Marine lab and currently only have one) specifically to support site management and/or refine current roles to cover all aspects of site management alongside providing training options to ensure all members of the site team can efficiently contribute to the sites needs.

Question	Score	Actions to improve management
11. Do the people involved in managing the protected area have the necessary knowledge and skills?	2	- Enhance the capacity of the staff who have a role in enforcement for the site through training to support improved engagement with the local communities adjacent to the site. This could include an element of conflict resolution.
12. Is the current budget sufficient?	3	- If not already the case, develop a business plan to help determine what annual budget is required to cover all management activities of the site.
13. Is the budget secure?	2	- If not already the case, develop a business plan to help determine what annual budget is required to cover all management activities of the site.
14. Is the budget managed to ensure effective administration of the protected area?	0	*No actions were given as this question is not relevant to the site*
15. Are equipment and facilities sufficient for management needs?	3	- No further action required.
16. Can staff (i.e., those with responsibility for managing the site) enforce protected area legislation and regulation?	1	- Provide training to resort staff in conflict management/ local community engagement. - Clarify the enforcement process (legislation) and options available to resort staff to help effectively enforce regulations. - Raise awareness of the regulations and rules relating to access amongst the local community.
17. Are systems (e.g. patrols, permits, intelligence gathering etc) in place to control access/resource use in the protected area?	2	- Clarification on how the regulations under the Tourism Boundary Regulation are enforced e.g. responsibilities of the resort and national marine police, would assist in designing a system to help enforcement of the site regulations, particularly for addressing illegal activity undertaken at night. - Awareness raising about the rules and boundary amongst the local communities. - Clear rules to be presented to guests on the boat before they enter the water for snorkelling e.g. no touching of wildlife/coral in addition to the site induction when guests first arrive at the resort.

Question	Score	Actions to improve management
18. Do protected area staff have safe working conditions and does management prioritise safety?	2	- Provide conflict resolution training to resort staff. - Improve relationship between locals and the site through awareness raising and education.
19. Is there a programme of management-orientated survey and research work?	2	- Develop a monitoring and research plan linked to the management plan to help map out what research is required to support the site in achieving its goals. The research plan can then be used to allocate projects to visiting students. - Feed survey data into national-level reports and ensure information is communicated back to key stakeholders, including local communities, and is used as part of the management review process to inform adaptive management. Ensure student research data and reports are shared with the site team and made available to use to inform management decisions.
20. Are management activities regularly monitored, evaluated and adapted?	1	- As part of the management plan, develop an evaluation framework to assess effectiveness of management activities.
21. Is active resource management being undertaken?	2	- All programmes should link into regional restoration projects including reporting of data to national networks.
22. Is the protected area consciously managed to adapt to climate change?	1	- Ensure climate change considerations are incorporated into the management plan. - Undertake reef resilience studies to gain a greater understanding of the coral reef and its significance as a potential refuge site for coral species from rising sea temperatures.
23. Is the protected area being consciously managed to prevent carbon loss and to encourage further carbon capture?	0	*No actions were given as this question is not relevant to the site*

Question	Score	Actions to improve management
24. Does management consider ecosystem service provision?	2	- Natural capital / Ecosystem services valuation assessment to demonstrate benefits of the site. - Raise awareness of the wider benefits of the site to the local community.
25. Is there a planned education programme linked to the management needs?	2	- Reinvigorate the educational and outreach programme with local communities and schools and introduce an evaluation process of activities undertaken to gauge effectiveness.
26. Is there co-operation with neighbouring land/sea State and commercial users?	1	- Establish regular meetings between local community representatives/ stakeholders and the resort management team to discuss resort matters. - Improve collaboration opportunities between the resort and the local community in terms of environmental protection and sustainable development e.g., waste management systems.
27. Do commercial tour operators contribute to protected area management?	1	- Stakeholder survey suggests more support is needed at atoll, local government level to help enforce the boundary of the site. - Develop a working group for tour operators to feed into management and enable effective engagement with other neighbouring resorts that use the house reef.
28. If fees (i.e. entry fees or fines) are applied, do they help protected area management?	3	- No further action required.
29. Are visitor facilities and services adequate?	3	- No further action required.
30. Are indigenous people involved in management decisions?	0	*No actions were given as this question is not relevant to the site*
31. Do local communities living in or near the protected area have input to management decisions?	0	- Establish a community working group or local management committee to enable members of the local communities to actively input into management decisions. - Undertake stakeholder engagement activities with the local community.

Question	Score	Actions to improve management
31a-c. Additional points - Impact on communities	0	- Reinvigorate outreach and stakeholder engagement activities with the local community. - Raise awareness on wider benefits of a healthy coral reef / benefits from MPAs - Establish a community council / working group or local management committee to enable members of the local communities to actively input into management decisions.
32. Is the protected area providing sustained livelihood benefits to local communities and/or Indigenous people, e.g., income, employment, payment for ecosystem services?	1	- Undertake a socioeconomic study to investigate options for livelihood diversification linked to the resort to enhance business opportunities for local communities and to understand why tourists no longer visit the island. Livelihood diversification could include selling local produce / handicrafts to the resort, training opportunities (e.g. as snorkel/dive guides), traditional fishing excursions etc.
33. Are the threats to the main values of the protected area being effectively addressed?	1	- Conflict resolution training for staff and clarification on the legislation and responsibilities of enforcement for resort site managers. - Communication materials outlining rules to be followed on the reef are already in use but if not already they could be translated into different languages to ensure all guests can easily read and follow the rules. Clear instructions on snorkeller etiquette e.g. no touching of wildlife should be given at the start of every snorkel trip.
34. Have the requirements for functional connectivity have been assessed and implemented?	1	- Build on existing research programmes and investigate additional research that could be undertaken to help improve understanding of functional connectivity. Ensure research results feed back into management.
35. What is the condition of the important natural values of the protected area as compared to when it was first designated?	0	- Establish long term monitoring programme for sharks and turtles if not already in place. Undertake wider monitoring of the lagoon, channels and other essential habitats linked to the house reef to better understand their current condition and determine whether specific management activities are required. - Increased awareness of regulations and the enforcement of regulations is required to help prevent illegal fishing and impacts of diving and snorkelling on the reef. Efforts to reduce the impacts of all anthropogenic threats including tourism will help to enhance the resilience of reef species.

Question	Score	Actions to improve management
35a-c. Additional points - Condition of natural values	2	- Create a management plan to help evaluate management and monitoring activities and feed results of monitoring programmes back into the management plan. - Increased awareness of regulations and the enforcement of regulations is required to help prevent illegal fishing. Efforts to reduce the impacts of all anthropogenic threats including tourism will help to enhance the resilience of reef species.
36. What is the condition of the important cultural values of the protected area as compared to when it was first designated?	3	*No actions were given as this question is not relevant to the site*
36a-c. Additional points - Condition of cultural values	0	*No actions were given as this question is not relevant to the site*
37. Has the status of key indicator species changed over the last 5 years?	0	- Create a management plan to help evaluate management and monitoring activities and feed results of monitoring programmes back into the management plan. - Establish long term monitoring programme for sharks and turtles if not already in place. - Increased awareness of regulations and the enforcement of regulations is required to help prevent illegal fishing. Efforts to reduce the impacts of all anthropogenic threats including tourism will help to enhance the resilience of reef species.
38. Has the status of habitats changed over the last 5 years?	0	- Continue annual coral reef monitoring to assess change over time. Ensure results are fed into national-level reports, communicated back to key stakeholders, including local communities, and used as part of the management review process to inform adaptive management. - Undertake wider monitoring of the lagoon, channels and other essential habitats linked to the house reef to better understand their current condition and determine whether specific management activities are required.

Appendix 3 METT-4 References

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