

Survival Blueprint

Elephant Skin coral, *Pachyseris rugosa*



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1. STATUS REVIEW

1.1 Taxonomy:

Animalia > Cnidaria > Anthozoa > Scleractinia > Agariciidae > Pachyseris

1.2 Distribution and population status:

Region / province	Site	Level of Protection	Population size	Reference(s)
Noonu Atoll	Maavelaavaru	Not protected	2 observed colonies	Basheer 2016
	Manadhoo	Not protected	6 observed colonies	Basheer 2016
	Dhigurah	Not protected	6 observed colonies	Basheer 2016
Raa Atoll	Fasmendhoo	Not protected	1 observed colony	Basheer 2016
	Meedhupparu	Resort / Defecto MPA	16 observed colonies	Basheer 2016
	Hulhudhuffaar	Not protected	4 observed colonies	Basheer 2016
Baa Atoll	Sonevafushi	Resort / Defecto MPA	11 observed colonies	Basheer 2016
	Kendhoo	Not protected	5 observed colonies	Basheer 2016
	Olhugiri	Protected Island	1 observed colony	Basheer 2016
Lhaviyani Atoll	Kuredu	Resort / Defecto MPA	25 observed colonies	Basheer 2016
	Kurendhoo	Not protected	27 observed colonies	Basheer 2016
Kaafu Atoll	Bandos	Resort / Defecto MPA	31 observed colonies	Basheer 2017
	Emboodhoo	Not protected	13 observed colonies	Basheer 2018
	Gulhi	Not protected	15 observed colonies	Basheer 2018
	Guraidhoo	Not protected	12 observed colonies	Basheer 2018
	Kurumba	Resort / Defecto MPA	32 observed colonies	Basheer 2017
	Maniyafushi	Not protected	12 observed colonies	Basheer 2018
	Udafushi	Not protected	11 observed colonies	Basheer 2018
	Vabbinfaru	Resort / Defecto MPA	15 observed colonies	Basheer 2018
	Villimale'	Not protected	11 observed colonies	Basheer 2018
North Ari Atoll	Bodufolhadhoo	Not protected	36 observed colonies	Basheer 2016
	Feridhoo	Not protected	66 observed colonies	Basheer 2016
	Kandholhudhoo	Resort / Defecto MPA	20 observed colonies	Basheer 2016
	Maalhos	Not protected	6 observed colonies	Basheer 2016
	Maayafushi	Resort / Defecto MPA	13 observed colonies	Basheer 2016
	Madivaru	Not protected	34 observed colonies	Basheer 2016
	Meerufenfushi / Alikoirah	Not protected	20 observed colonies	Basheer 2016
	Velidhoo	Resort / Defecto MPA	15 observed colonies	Basheer 2016
	Vihamaafaru	Not protected	30 observed colonies	Basheer 2016
	Rasdhoo	Not protected	17 observed colonies	Basheer 2016
	Madoogali	Resort / Defecto MPA	8 observed colonies	Basheer 2016
	Gaathafushi	Not protected	10 observed colonies	Basheer 2016



1.3 Protection status:

Pachyseris rugosa is listed on the IUCN Red List of threatened species as Vulnerable under criteria A4cd. It is also listed on Appendix II of CITES. In Maldives under the Environmental Protection and Preservation Act removal and destruction of corals for any purpose is prohibited. Under the fisheries act all coral species are prohibited to be exported.

1.4 Ecology, behaviour and habitat requirements:

The colonies are mostly common on reef slopes between 5m to 20m depth and found on reefs which are exposed to strong wave actions.

Pachyseris rugosa is a reef building stony coral. Its colonies can be either encrusting or massive. The columellae are wall-like lobes. Corallites are in long rows parallel to the outer coral margin with distinctive walls between the rows (Veron and Pichon, 1979). Colour of the colonies varies from deep bluish-grey to brown.

This species showed a high frequency of occurrence in reefs surveyed within North Ari and Male' atolls in Maldives, with densities averaging 1.5 colonies/m², ranging from two colonies up to 63 colonies per 20x1 m transect.

1.5 Threat analysis:

Around a third of all hermatypic corals are now believed to be threatened. *Pachyseris Rugosa* is widely spread and highly susceptible to catastrophic events such as bleaching, as well as local threats derived from human activities. In 2016, almost 75% of Maldivian coral reefs were bleached (Ibrahim et al 2016). Since this species is highly susceptible to bleaching and prone to diseases, their population are expected to decline along the whole coral reefs which (Carpenter et al. 2008, Wilkinson, 2004).

Maldives is undergoing a rapid development and its coral reefs are at a high risk due to land reclamation. The health and resilience of reefs have been compromised due to the reclamation process leading to high sediment flow. Some reefs and areas with abundant coral life have been lost. However, reefs at semi-managed (resort house reefs) areas can be a future hope spots for the species survival and management.



1.6 Stakeholder analysis:

Stakeholder	Stakeholder's interest in the species' conservation	Current activities	Impact (positive, negative or both)	Intensity of impact (low, medium, high, critical)	Proposed activities
Marine Research Centre	Government	Researchers	Positive	Critical	Lobby and Collaborate
Environmental Protection Agency	Government	Law enforcement	Positive	High	Lobby and Collaborate
Ministry of Environment	Government	Law enforcement, conservation, practitioners	Positive	Critical	Lobby and Collaborate
Ministry of Fisheries, marine resources and Agriculture	Government	Law enforcement, conservation, practitioners	Positive and Negative	Medium	Lobby and Collaborate
Save the Beach Maldives	Conservation	Conservation	Positive	High	Collaborate
Parley	Conservation	Conservation	Positive	High	Collaborate
Gemana	Conservation	Conservation	Positive	High	Collaborate
UNDP Maldives	Development	Funder	Positive	High	Submit Proposal
Maldives National University	Research	Research and Extension	Positive	High	Collaborate
Ministry of Tourism	Government	Law enforcement, practitioners	Positive and Negative	Medium	Lobby and Collaborate
Fisherman's Association of Maldives	Commercial / Conservation	Commercial and Conservation	Positive and Negative	Medium	Collaborate
Ministry of Education	Government	Law enforcement, practitioners	Positive	High	Collaborate
National Institute of Education	Government	Research and Extension	Positive	Medium	Collaborate
IUCN Maldives	Conservation	Research and Conservation	Positive	Medium	Collaborate
Maldives Whaleshark Research Programme	Conservation	Research and Conservation	Positive	Medium	Collaborate



Manta Trust Maldives	Conservation	Research and Conservation	Positive	Medium	Collaborate
Maldives Coral Reef Society	Conservation	Research and Conservation	Positive	Medium	Collaborate
Blue Marine Foundation	Conservation	Research and Conservation	Positive	Medium	Collaborate
CDE Consulting	Commercial	Practitioners and Research	Positive	Medium	Collaborate
Water Solutions	Commercial	Practitioners and Research	Positive	Medium	Collaborate
LaMER	Commercial	Practitioners and Research	Positive	Medium	Collaborate
Divers Association of Maldives	Commercial and Conservation	Commercial and Conservation	Positive	Medium	Collaborate
Liveaboard Association	Commercial	Commercial and Conservation	Positive	Medium	Collaborate
ZSL	Conservation	Research, Conservation, Practitioners	Positive	Medium	Collaborate, Submit proposal
UNEP	Conservation	Research, Conservation, Practitioners	Positive	Medium	Collaborate, Submit proposal
Reef World	Conservation	Research, Conservation, Practitioners	Positive	Medium	Collaborate



1.7 Context and background information that will affect the success of any conservation action for this species:

	Description	Barriers to conservation	Opportunities for conservation
Socio-cultural effects and cultural attitudes	Most of the fishing methods practised in the Maldives are environmentally safe compared to other global areas within the species range. Netting, dynamite and trawling are banned in the Maldives. Although netting in general is banned, it is allowed for bait fishing. A lift net is used to collect baits. At times there have been incidents where these nets are being entangled or while lifting the net, corals get damaged by entangling.	There are not much of direct impacts given the gear types used in the fisheries of the country. However, there is some minimal damage to the reefs when lifting nets during the bait overhauling. In addition to this, fishers' step on the corals when they snorkel causing further damage.	Fisherman's Association of Maldives (NGO) is actively involved in educating the fishermen. Best practices such as Green Fins methods for snorkelling can be taught to fishers.
Economic implications	Coral reef species and habitat are in general affected by the coastal development that is ongoing in the country. Development of harbours, resorts, jetties has led to reclaim some reefs while others have been impacted due to siltation from dredging	Sedimentation and siltation smother the reefs contributing to the decline of reefs. Dredging and reclamation has been carried out in some of the environmentally sensitive areas losing the biodiversity regardless of the conservation efforts and conservationists lobbying efforts to stop it.	Environmentally safeguard designs for projects needs to be adopted and made mandatory for the developers in order to avoid further environmental degradation and loss of biodiversity



<p>Existing conservation measures</p>	<p>Environmental Protection and Preservation Act is the law under which protected areas are declared. Under this law, EIA has been declared as mandatory process prior to the inception of any project in order to account the impact towards the site. Under this law several other regulations have been made such as waste regulation, dewatering regulation, clearing coastal vegetation and palm forests. Maldives have banned fishing, anchoring in all the 42 marine protected areas. Furthermore, resort house reefs are de-facto protected areas where fishing and anchoring is banned. Under the fisheries law, ecologically significant species such as turtles, whale sharks, sharks, corals (all species), napoleon wrasse, sea birds, dolphins are protected, and the fishing and export trade of these species are considered as a legal offense</p>	<p>Most of the actions have been started but follow up actions are yet to be implemented. For instance, protected areas have been declared but few are managed properly and most of them ended up as “paper parks”. There is little to no enforcement and implementation of these environmental laws.</p>	<p>The environmental law needs to be reviewed. Regulations should be revised. Instead of one general environmental law, several laws need to be made. The local councils have shown some interests of managing the critical habitats within their atolls, which indicates the enthusiasm among the local community. Given the legal power and financial providence, local governments should be attained to implement and monitor the environmental laws and regulation</p>
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Administrative/political set-up	<p>The new administration shows a balance notion towards environment and economic development. The existing government prioritise environmental protection however, economic stability is also given equal if not more priority. More protected areas are being declared and management plans for these are planned but at the same time lagoons and reefs are being declared to reclaim land in order to pave way for development of infrastructure</p>	<p>Promising early actions for conservations. Regulations and strategies need to be put in place while the interest in environment is stale</p>	<p>With the current movement of declaring new protected areas and the government's vision in protection and preservation of natural habitats, specific regulations should be proposed for coral reef conservation and management. The interested units within the government should lobby in making the development plans pertinent to attaining the conservation of species</p>
Local expertise and interest	<p>There is a big dive community among the Maldives tourism industry. Among this dive community, most are very well informed on the habitats and species of the marine environment and some are actively involved in environmental campaigns. Underwater photography is also growing within the dive community hence the interests shown to marine species is increasing</p>	<p>New impacts from increased diving activities might become an immediate threat to coral reefs and corals.</p>	<p>The dive enthusiasts and photographers (underwater) can be utilised in running campaigns to make the status of EDGE coral species and its significance. They can also be used for simple data collection which can be used as "self-esteem boosting campaign for underwater enthusiasts"</p>
Resources	<p>There is a national institute for the coral reef research and the</p>	<p>None</p>	<p>There are few marine scientists in the Maldives. More people need</p>



	<p>Environmental Protection Agency (EPA) which works closely in coral reef compliances. Few but emerging NGO's are working to raise awareness towards coral reef management. International NGO's and institutes such as IUCN, UNEP, UNDP, Blue Marine Foundation have projects which focuses in resilience reef projects. Some resorts pay a keen interest in coral reef conservation by periodic monitoring and coral reef restoration. Maldives due to its vulnerability towards climate change is eligible towards most of the grants which focuses on coral reef management and climate change adaptation.</p>		<p>to be engaged and trained in this field. There are young enthusiasts on coral reef conservation.</p>
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2. ACTION PROGRAMME

Vision (30-50 years)	
Elephantskin Coral <i>Pachyseris rugosa</i> is economically and ecologically valued and protected across the Maldives	
Goal(s) (5-10 years)	
Areas with significant population of <i>Pachyseris rugosa</i> are protected through well managed through well managed conservation measures	
Objectives	Prioritisation (low, medium, high or critical)
Strengthen enforcement and legal framework relevant to environmental conservation	Critical
Increase the capacity of stakeholders to monitor and manage coral reefs	Critical
Improve and maintain access to coral reef science for policy development and decision making	High
Increase awareness about coral reef science and conservation	Critical



Activities	Country / region	Priority (low, medium, high or critical)	Associated costs (currency)	Time scale	Responsible stakeholders	Indicators	Risks	Activity type
Objective 1: Strengthen enforcement and legal framework relevant to environmental conservation								
Review existing environmental laws and regulations to identify the loop holes	Maldives	Critical	30,000 USD	6 months	Attorney General Office, Ministry of Environment, Ministry of Fisheries Marine Resources and Agriculture, Environmental Protection Agency Maldives	Review paper on environmental laws and regulations	The existing environmental regulations are made under one single umbrella law which does not address the specific environmental components such as conservation at its best interest. In addition, loop holes such as conflict of areas for usage in tourism and fisheries law enables environmental misconducts being judged lightly	Law and Policy
Develop law and regulation to give more legal recognition to MPA's and coral reefs	Maldives	Critical	30,000 USD	12 months	Attorney General Office, Ministry of Environment, Ministry of Fisheries Marine Resources and	New law passed upon presidential decree	Lack of specific laws and regulations addressing the different components of environmental	Law and Policy



					Agriculture, Environmental Protection Agency Maldives		management meant less priorities given in environmental misconducts in a legal perspective	
Introduction of more marine rangers for compliance	Maldives	Critical	60,000 USD	18 months	Ministry of Environment, Environmental Protection Agency Maldives	Trained rangers for each region of the Maldives	With Maldives reefs being remote, it is challenging for the enforcement authorities in the central government to properly monitor the reefs in the Maldives	Law and Enforcement
Compliance regulations developed with rangers given the legal authority to charge offenders	Maldives	Critical	25,000 USD	12 months	Attorney General Office, Ministry of Environment, Ministry of Fisheries Marine Resources and Agriculture, Environmental Protection Agency Maldives, Ministry of Home Affairs, Maldives Police Service, Maldives National Defence Force	Rangers implementing penalties for environmental misconducts	The existing rangers have to report to EPA and which is then upon approval is contacted to Police service. There is no formal compliance management framework in the Maldives to report misconducts and incident reporting	Law and Enforcement
Economic Valuation of Coral reefs (with a	Maldives	Critical	40,000 USD	6 months	Ministry of Environment,	A penalty attained for	Lack of an economical value of coral reefs	Law and Enforcement



specific recognition to (Elephant skin coral) in order to attain a penalty fee for any offense related to coral reefs					Environmental Protection Agency Maldives, Ministry of Fisheries Marine Resources and Agriculture, NGO's, Attorney General Office, Ministry of Economic Development	shipwreck incidents in coral reef habitats, import, export and removal of corals from the habitats, sale and aesthetic usage of corals, destructive actions on coral reef habitats	have hindered the possibility of charging a value-worth penalty towards environmental offense. Through this research, incidents such as shipwrecks on reefs can be accounted with a proper value to those hold responsible	
Objective 2: Increase the capacity of stakeholders to monitor and manage coral reefs								
Integrate the coral reef monitoring training programs in the national vocational training programs	Maldives	Critical	25,000 USD	12 months for inception, afterward an annual programme	Ministry of Environment, Environmental Protection Agency Maldives, Ministry of Fisheries Marine Resources and Agriculture, Marine Research Centre Maldives, Ministry of Education, National Institute for Education, Schools	Coral reef training taught as a module under the national vocational program	More youths will be engaged in the coral reef monitoring. At the moment more, youth seems to be interested engaging within conservation activities but a lack of platform to be trained seems to discourage these individuals	Capacity-Building
Regular training for resort marine	Maldives	High	50,000 USD	Annual	Marine Research Centre Maldives,	Annual reef monitoring and	Coral reef monitoring in the Maldives will be	Capacity-Building



biologists, local NGO's and other relevant stakeholders on coral reef monitoring and management					Ministry of Fisheries Marine Resources and Agriculture, Ministry of Environment, Environmental Protection Agency Maldives, Resorts, NGO's	management program	more streamlined with stakeholders adopting one common method for data collection which will be run under a single common umbrella	
Coral reef management leadership program for MPs, local councillors	Maldives	High	15,000 USD	Annual	Marine Research Centre Maldives, Ministry of Fisheries Marine Resources and Agriculture, Ministry of Environment, Environmental Protection Agency Maldives, Ministry of Housing, Local Government Authority, People's Majilis	Annual coral reef management leadership program	Decision makers such as MP's and Local councillors will be made aware on the coral reef importance and best management practises in order for them to make informed decisions.	Capacity-Building
Objective 3: Improve and maintain access to coral reef science for policy development and decision making								
Foster and encourage scientific studies on the effectiveness of MPA in habitat management	Maldives	High	60,000 USD	60 months	Marine Research Centre Maldives, Ministry of Fisheries Marine Resources and Agriculture,	Scientific meetings on habitat management and species	At present there is lack of scientific studies carried out in relevant to protected areas in the Maldives. Very few	Management and Assessment



and species conservation					Ministry of Environment, Environmental Protection Agency, Maldives National University, Ministry of Education	conservation, technical reports, scientific expeditions	areas are in place with management plans, however in these areas also there has been lack of studies which documents the effectiveness of conservation and its benefit. Hence with lack of MPA science, it has sometimes proven difficult to justify the actions of conservation to the norms and political masters	
Include a specific data collection protocol for Elephant skin coral and EDGE coral species in the national coral database	Maldives	High	45,000 USD	6 months	Marine Research Centre Maldives, Ministry of Fisheries Marine Resources and Agriculture, Ministry of Environment, Environmental Protection Agency, Resorts, NGO's, EIA consultation firms	Database with distribution and composition patterns for Elephant skin coral and EDGE coral species across the Maldives	There is an existing database which have protocols to collect coral and reef habitat data. This database is used by resort marine biologists, EIA consultants, technical staffs of relevant authorities and other interested individuals. Including a separate protocol to collect data on EDGE coral species	Conservation, Management and Assessment



							in this platform could assist in tracking the status of these species in the country	
Understanding the temporal and morphological patterns in Elephant skin coral and other EDGE coral species dominant habitats	Maldives	High	50,000 USD	48 months	Marine Research Centre Maldives, Ministry of Fisheries Marine Resources and Agriculture, Ministry of Environment, Environmental Protection Agency, Resorts, NGO's, EIA consultation firms	Temporal patterns and other morphological changes documented in EDGE coral species dominant habitats	Coastal infrastructure development is on the boom within the country, with more demands for harbours, jetties, airport and resorts. As such, reef habitats which are not protected under regulation gets either reclaimed or is effected due to sedimentation. Documenting the effects of morphological and anthropological changes and temporal changes to the reef habitats can be used as evidence to tailor the national development policies in best of coral reef conservation	Science, Management, Conservation and Assessment



Objective 4: Increase awareness about coral reef science and conservation								
Include coral reef science and management as a separate module for Tertiary students in the national curriculum	Maldives	Critical	30,000 USD	12 months	Marine Research Centre Maldives, Ministry of Fisheries Marine Resources and Agriculture, Ministry of Environment, Environmental Protection Agency, Ministry of Education, National Institute for Education	Coral reef science and management taught as separate module in tertiary schools in the Maldives	More students will be engaged in marine science hence more individuals working in the field of conservation and environmental science	Awareness and Education
Media campaign to foster the knowledge of coral reef and its importance (kids, adults)	Maldives	Critical	40,000 USD	Annual	Marine Research Centre Maldives, Ministry of Fisheries Marine Resources and Agriculture, Ministry of Environment, Environmental Protection Agency, Ministry of Education, Maldives Media Council, Public Service Media, Other TV and Radio Channels, Local Artists and Celebrities	Programs, animated cartoons and documentaries on coral reef and its importance	Kids, youths, adults will be made aware on the corals and its importance and their status. More interested individuals will be engaged in conservation activities.	Awareness and Information Management



<p>"I have seen a coral reef": A nation-wide Awareness campaign where each and every citizen are given an experience of underwater with snorkelling, diving</p>	<p>Maldives</p>	<p>High</p>	<p>50,000 USD</p>	<p>Annual</p>	<p>Marine Research Centre Maldives, Ministry of Fisheries Marine Resources and Agriculture, Ministry of Environment, Environmental Protection Agency, Ministry of Education, Maldives Media Council, Public Service Media, Other TV and Radio Channels, Local Artists and Celebrities, Divers Association of Maldives, Resorts, Liveaboard Association</p>	<p>An underwater experience campaign run in each island of the Maldives</p>	<p>Citizens will be made aware on the beautiful underwater habitats and its fragile status. In addition to this, such campaigns will teach the participants on simple actions that can be taken to save the ecosystems to which the community depends on</p>	<p>Awareness</p>
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