



BLUE & GREEN LAAMU

*The Marine Conservation & Sustainability
Newsletter by the Maldives Underwater Initiative*

DECEMBER 2023



MALDIVES UNDERWATER INITIATIVE by Six Senses Laamu

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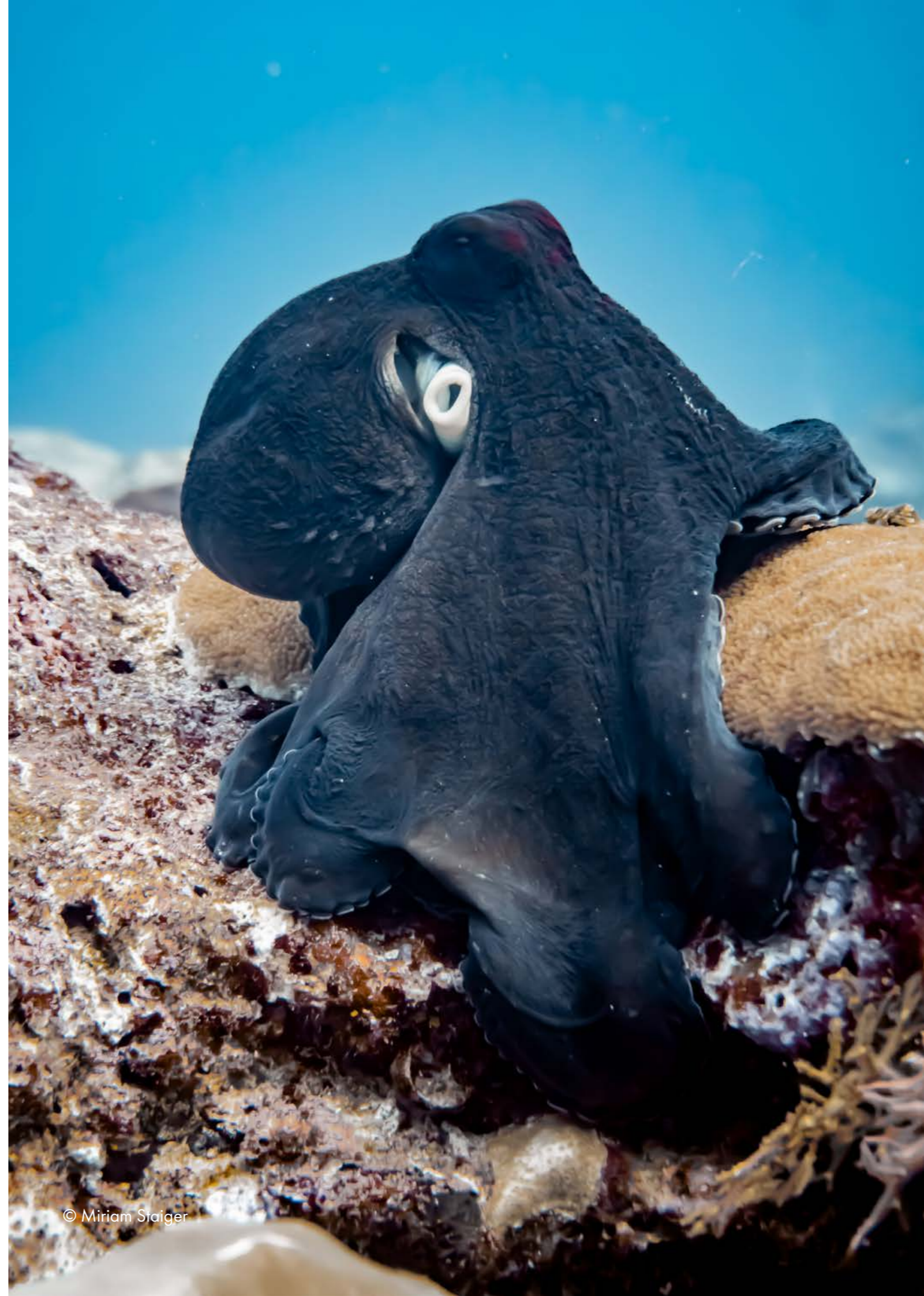


THE BIG STUFF

-  **296** sharks were sighted
-  **132** rays were sighted
-  **130** turtles were sighted
-  **187** Guests joined on megafauna surveys

OUR EDUCATION

-  **1398** moments of education were shared with guests
-  **124** moments of education were shared with hosts
-  **44** moments of education were shared with the community



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SIX SENSES CONSERVATION

A SLICK START TO THE YEAR!

December has been another big month for coral spawning in Laamu with both a spawning event in early December and in late December! The team recorded spawning in around 15 different species, including on Christmas and New Years Eve (clearly the corals were feeling the festivities)! The team also collected the gametes from 5 different species for larval restoration.

These gametes were then placed into our large floating larval pool which floats in front of the resort until they are ready to settle, whilst others were added to the tank in our lab for rearing and settlement. By giving them a safe environment to develop they avoid the hungry mouths of fish or strong ocean currents taking them away from the reefs.



6.8 million
fertilized eggs
released onto the reef



1309 minutes
spent on night dives



The team also had the first recorded observation of a substantial spawn slick at Olhuveli which turned the waters near the shore red with coral eggs! Resort Manager, Freddie, enthusiastically shared images with the team so that they could record the event. The team also then worked together to transfer some of the eggs to the protection of the larval pool.

The larvae are kept in the larval pool until they are ready to settle (actively swimming in a downwards direction) and then are released back onto the reef! In early December around 3.8 million fertilized eggs were released onto the reef whilst in late December an estimated 6.8 million ready to settle larvae were released! These larval releases are targeted onto areas of low coral cover and will help give the reef a boost in recruitment prior to the expected bleaching event.

This work is done in collaboration with Prof Peter Harrison from Southern Cross University who has guided the team through the process of larval restoration.

ESHARK - MALDIVES PROJECT

The MUI team has joined forces with the eOceans shark research team, to launch “eShark—Maldives.” This visionary collaboration harnesses the eOceans app, bringing together scuba divers, tourists, dive shops, fishers, and NGOs to drive real-time collaborations and actionable steps for shark and marine ecosystem conservation in the Maldives.

The partnership aims to leverage citizen science and technology through the eOceans app to gather essential data on sharks and rays, their threats, social values, and conservation successes. This information empowers stakeholders to make informed, timely decisions for effective shark conservation.

Dr. Christine Ward-Paige, lead scientist of eShark and CEO at eOceans, expressed excitement about the collaboration, stating, “By uniting all ocean explorers across the Maldives and worldwide, we can exponentially scale ocean monitoring efforts, enabling real-time collaborations and actionable steps towards smart conservation.”



Building on the success of previous initiatives, including the Great Fiji Shark Count, eShark—Thailand, eShark-Global, Shark Sanctuary evaluations, eManta, and other impactful studies, the partnership seeks to replicate and scale these efforts throughout the Maldives. The eOceans app allows ocean enthusiasts to log observations seamlessly, contributing to a comprehensive dataset on shark populations, threats, values, and behaviors.

Beyond sharks, the eOceans app and analytical tools address various marine aspects, such as plastic pollution, illegal fishing, tourism, fishing, marine protected areas, fisheries, and the blue economy.

The collaboration highlights the potential of citizen science and ecotourism to drive impactful change in marine conservation. By uniting ocean explorers and stakeholders in the eOceans app, the partnership aims to pave the way for a sustainable future for all ocean life and the communities dependent on it.



UNDER THE SEA COCKTAIL PARTY GETS AN UPGRADE

With the SHELL officially open for festive this year, this gave the MUI team an incredible platform to launch the Under The Sea Cocktail party to new heights, making the party more engaging and more educational than ever before!

If the 6 information tables, the blue discovery room full of interactive games and the Glass Bottom Boat room weren't already enough to excite and inspire guests during the party the MUI team also had stalls set up around the SHELL giving more hands-on learning experiences to guests. The fun evening was also intertwined with culture when the Bodumas (big fish in Dhivehi) came out and our team showed the guests, particularly the kids, how to dance around while holding a massive fish over your head!



 **45** guests joined the Under The Sea Cocktail party



FESTIVE FESTIVITIES

December welcomes an exhilarating time at the resort with our festive season, marked by a range of exciting and educational additional activities by the MUI team. This year holds particular significance as it marks the first time the SHELL has been open during the festive period. The MUI team seized this opportunity to utilize this remarkable and impactful educational platform, sharing our research and initiatives with the guests.



Continuing our tradition, MUI organized some of our regular and most enjoyable festive events, such as the underwater Star hunt and the underwater photoshoot on Christmas day featuring our underwater Christmas Tree. Additionally, our annual and highly anticipated Under The Sea Cocktail party was a delightful celebration enjoyed alongside our guests.

 **147** guests visited the SHELL over festive

In addition to these regular events, we introduced engaging new activities to this year's calendar. These included a fun Sand sculpture competition, inviting guests to craft their finest marine animals using sand. Furthermore, we hosted an energetic games afternoon at the SHELL featuring an assortment of games and challenges, ranging from plankton hunts and fact searches to animal bingo and word searches. These activities were enthusiastically embraced by many of the children on the island, and our aim for the coming year is to involve more adults in these enjoyable experiences! To conclude the festive season, our Maldivian team members hosted a captivating "Tales By the Campfire" evening. They regaled guests and hosts with age-old tales from Maldivian folklore, accompanied by performances that brought these stories to life through shadow puppets and live acting. It was a thrilling and engaging experience for everyone involved.



THE MANTA TRUST



11 Remote Underwater Video Systems deployed



73 guests joined for manta dives



22 Manta sightings

15 Manta Rays identified

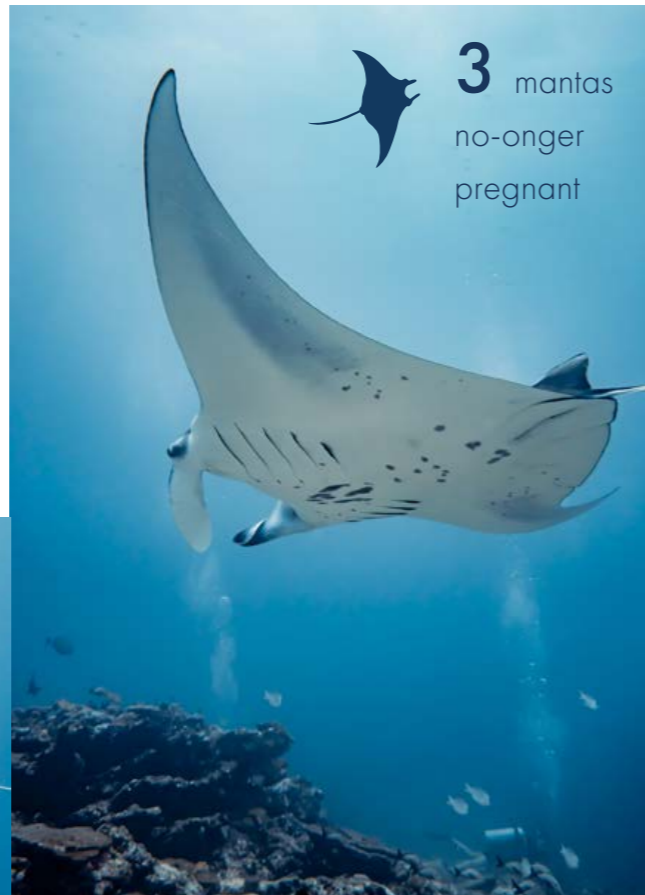


4 acoustic listening devices deployed

LAAMU'S MANTAS AREN'T PREGNANT ANYMORE!

Manta rays are still incredibly talented at keeping their births a big secret! In 2023, the team recorded 10 reef mantas that were pregnant - and while you might think that does not sound like a lot - for the researchers in Laamu it means great news for our manta rays.

The last few years have been a period of very low reproductivity, and this year has finally put a stop to it! Manta rays are pregnant for over a year and only give birth to one pup at the time - so the energy invested is high! Three of the ten pregnant manta rays have been re-sighted at the end of the year after not having been sighted for months, and with much surprise - not pregnant anymore! This means that somewhere, probably not too far from here, these mantas have given birth. Is it coincidence, that the community of Isdhoo (an island up in the north of Laamu) have reported the sighting of a new manta pup only last month? It is very exciting to think that this little pup might be a Laamu baby of one of our recently pregnant manta rays!



3D MODELING MANTA RAY CLEANING STATIONS!

Following a successful research project in 2023, in which an Exeter Marine Environmental Management MSc student analyzed Remote Underwater Video data at four cleaning stations in Laamu atoll to understand the species richness of cleaning stations and ecological role of cleaning symbioses, the Manta Trust aims to now expand this research into more detail by in depth monitoring of habitat complexity of these cleaning stations.

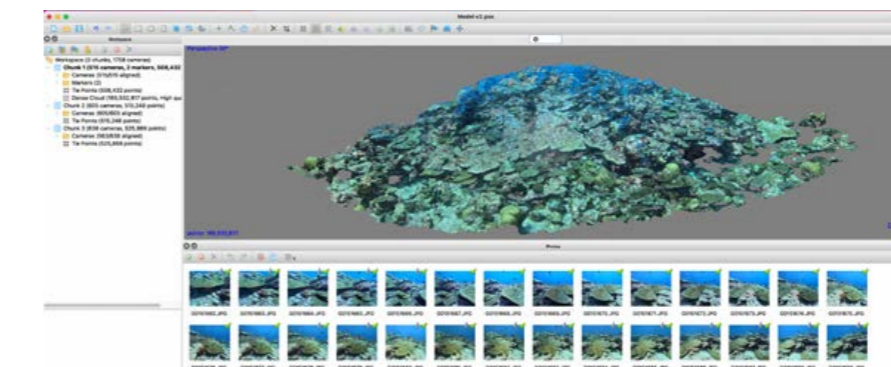
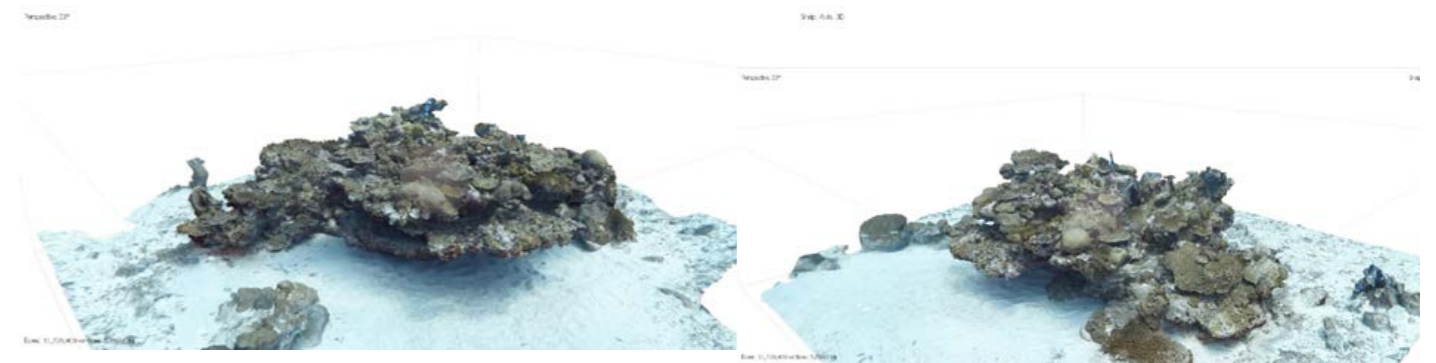
Over recent years, the MMCP has reported large deterioration of cleaning stations in areas such as Baa Atoll and around Male, however this has never been formally recorded, highlighting the need for baseline cleaning station monitoring to assess changes over time. From personal observations it has been recorded that the deterioration of cleaning stations in other areas has led to manta ray avoidance of these sites, which could be due to the cleaning stations no longer serving a cleaning benefit. However, manta ray absence could have a multitude of other reasons such as pressure from unsustainable tourism practices. This further highlights the importance of accurate monitoring of cleaning stations.

For this reason, the Manta Trust have started to 3D model various cleaning stations within Laamu to provide the team with an affordable coral reef assessment tool and

allow the team to closely monitor cleaning station habitats and their potential degradation as well as the effects on cleaning interactions using a combination of underwater surveillance. By combining the collected modeling data with remote underwater camera data, the gained knowledge could assist the team in making informed management decisions of specific areas within the atoll.

In order to 3D model a cleaning station, the team need to, very carefully and as slowly as possible, swim around the cleaning station multiple times at different angles and distances. While this can be done within 30 minutes for a small cleaning station, it takes a whole dive to model a cleaning station that is 10m wide. The depth of some of the deeper cleaning stations makes this a challenging task - that's why the team is extra careful on these dives and only model during good conditions without much current.

The research project was accepted as a remote Master student's project by the University of Exeter and the team have started conversations with the supervisor and students to discuss implementation of the monitoring protocol. This exciting project shows how much potential there still is to learn new things and how we can use it for global conservation efforts for Manta rays and the oceans as a whole.



6 cleaning stations 3D modeled

UPDATING THE LAAMU MANTA RAY ID BOOK!



Now that the year is coming to an end the Manta Trust is working on finalizing a big update for their Laamu Manta ID book! The team is really excited about it because they know that the book is being used on an almost daily basis for manta dive briefings as well as for kids club activities and outreach with the local community of Laamu.

The team has made a thoughtful effort to improve the guide with better explained information, updated knowledge and photos, highlights on new study sites and, of course, new manta rays! The Manta Trust has identified nine new Laamu reef and oceanic manta rays in 2023! Rafka, MUI's current intern, has even updated the illustrations of the "How to dive with manta rays - Code of Conduct" with a beautiful colorful touch and great attention to detail!

As the team keeps tweaking the new Manta ID book, they're hopeful it will make a positive difference in studying and protecting manta rays in the region. The team hopes to also distribute some of the new books to the local schools of Laamu so that teachers and students can use them as a tool to study and teach about these beautiful but endangered ocean giants and their relatives. The Manta Trust is looking forward to getting the first new samples printed in the next few months to then also sell the new books in the boutique.



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BLUE MARINE FOUNDATION



 **6** fishers sold fish

 **13** guest recreational fishing trips

 **300** fish landed



CELEBRATING SHAHA!

Shaha Hashim, MRR's Chairperson and Blue Marine's Maldives Programme Manager has been recognised twice in one month for her outstanding marine conservation work! Sha was announced as a 2024 Ocean Leader at CoP 28 on Oceans Day. The Edinburgh Ocean Leaders leadership program and network focus on supporting ocean professionals demonstrating exceptional leadership in making positive change for our ocean. Shaha has been instrumental to Blue Marine's work in the Maldives for the last 7

years including establishing local NGO Maldives Resilient Reefs. Sha is an inspirational leader, strong ocean advocate and knowledgeable marine scientist.

Sha was also recognised for outstanding service to raise public awareness about fisheries by the Maldives Ministry of Fisheries and Ocean Resources at the National Fishermen's Day ceremony in Male. Congratulations Sha!



FISH OF THE MONTH - ORIENTAL SWEETLIPS

The oriental sweetlips (*Plectorhinchus vittatus*), are a captivating species of predatory reef fish found in the Indo-Pacific region, from the Red Sea to the western Pacific Ocean. They exhibit a distinctive coloration characterized by alternating dark and light vertical stripes, earning them their common name.

Oriental Sweetlips are nocturnal feeders, actively hunting small crustaceans and worms by sifting through the sand during the night. This unique behavior adds an intriguing dimension to their

ecological role in coral reef ecosystems as this helps to keep some crustacean populations in control. Their striking patterns make them particularly enchanting when encountered while diving or snorkeling.

Did you know: There is a folklore story in the Maldives where a gray heron dies of hunger one day because he refused to eat anything but Oriental Sweetlips. Tells you a lot about their cultural significance in the Maldives.

A BRIGHT SPOT FOR SEAGRASS

Blue Marine and Maldives Resilient Reefs (MRR) hosted two scientists from the University of Northumbria (UK) for two weeks this month. They conducted research on the seagrass beds of Laamu on three islands: Hithadhoo, Gaadhoo and at Six Senses Laamu (Olhuveli island). The project was co-designed with MRR with the objective to quantify how much carbon Maldivian seagrass can store as currently there is no published data on this. Globally seagrass beds are declining, but in the Maldives seagrass is expanding, therefore this contradictory trend merits investigation.

 **3** islands sampled



By absorbing and storing carbon, seagrass contributes to mitigating climate change and the data could inform future blue carbon finance schemes. But seagrass is not only a vital ecosystem for storing carbon but also because many commercially and ecologically important fish species live here as juveniles before moving to the reef. Additionally, wave energy is absorbed by seagrass and sediment is trapped in the root systems, which protects beaches from erosion. Seagrass beds help to keep coral reefs healthier too by increasing water quality and reducing incidents of coral disease. For tourists, seagrass is a fantastic place to snorkel and see megafauna such as turtles, rays, sharks and a variety of fish.

 **12** biomass cores taken



The team assisted the researchers with taking sediment cores, which involved hammering 1 m pipes into the seabed. The pipes were then sawed open and the sediment contents were cut into 2cm slices in MUI's lab in the SHELL then frozen. Biomass cores of the leaves, roots and rhizomes were also taken. The cores will be processed and analyzed at the university's laboratory. Cores were taken in different sites around the island; in seagrass meadows that have existed for 40-50 years, in newer ones that have existed less than 20 years, in sheltered lagoons and exposed sites. Data analysis will compare the carbon storage capacity of the seagrass in these different sites. Quadrats were also randomly placed and photographed to estimate seagrass cover and species composition.

 **36** sediment cores taken





**OLIVE RIDLEY
PROJECT**

THE OLIVE RIDLEY PROJECT



8 new turtles identified



176 submissions by
MUI and DBD



48 in-water surveys



1024 turtles in Laamu

MASTER'S PROJECT FINDINGS ARE SHARED WITH THE MUI TEAM!

Earlier this month, Amy Feakes, a graduate student and the Olive Ridley Project's first master's researcher, presented the results of her research project on sea turtle social behavior and habitat use with the MUI team. In an online presentation, Amy shared the culmination of months of dedicated work on her project, unveiling findings that significantly challenge existing perceptions of sea turtle behavior. Conducting an impressive 73 dives at the research site, Amy's study revealed compelling insights into the social dynamics of sea turtles. Contrary to previous assumptions, her findings showed that sea turtles engage in socialization, particularly when at rest, with a notable tendency to form groups. Amy's analysis demonstrated that pairs of turtles resting in the same location occurred more frequently than expected by chance, suggesting a deliberate choice in their resting companions.



Although the MUI team works very closely together on research and outreach projects, it is easy to get caught up in each group's areas of focus, such as turtles, corals or manta rays, and be slightly out of touch with what the rest of the team is doing. Knowledge sharing sessions within the team such as these are important to foster stronger collaboration and ensure a holistic approach to marine conservation. Amy's study is currently in the process of being published, which will add credibility to the research coming out of ORP and MUI with the hope of contributing to better conservation strategies in Laamu atoll.



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WHAT ARE SEA TURTLES WORTH? WE'RE ABOUT TO FIND OUT

The team in Laamu have been heading a nation-wide survey to assess the socioeconomic value of sea turtles in the Maldives for 2022. This is a continuation of a similar survey that was conducted for 2019 (currently under review for publication), and aims to estimate the annual direct revenue generated by sea turtle tourism across the country. The goal of this study is to highlight the importance of sea turtles to the Maldives' tourism industry - the largest economic sector in the country - with the hope that this will leverage both institutions and the public to improve conservation measures for these beautiful marine creatures.



Within the Maldives, previous studies have assessed the non-consumptive value of manta rays and sharks, with each generating an estimated US\$8.1 million and US\$14.1 million in annual direct revenue respectively. Given that tourism accounts for 28% of Maldives' gross domestic product, the socio-economic value of marine megafauna to this industry cannot be understated. Additionally, the non-consumptive use of sea turtles is becoming a rapidly growing sector of the global tourism industry, and is increasingly recognised as an important source of economic benefit for many coastal communities. Despite this, this is the first complete assessment of the socio-economic value of sea turtles in the Maldives.

Between the months of June to November, the team along with other staff from ORP Maldives were able to collect survey responses from 116 tour operators from 13 atolls, 78 of which were from resorts, 32 from local islands, and 6 from liveaboards.



While the data is still being analyzed, preliminary results indicate that the non-consumptive use of sea turtles in 2022 may have generated upwards of US\$10 million. The study will also reveal areas in the Maldives most visited by tourists for sea turtle dives and snorkels, and can help advise better management of such areas. The full study is currently being written up and will be submitted for publication in 2024.



116 survey responses collected



TURTLE IN THE SPOTLIGHT

Meet Sharkbite (GR1008)

SharkBite, a familiar face in the waters off Hiithadhoo Corner, has become a regular encounter during our recent surveys to this site. This friendly green turtle, named for the prominent scar on her carapace left by a shark bite, has crossed our path an impressive 62 times since she was first sighted in April 2019.

The journey of a turtle is a testament to their resilience, particularly during their earlier stages of life when they're vulnerable to many predators. As these creatures mature, their

primary threats shift to large sharks. Tiger sharks and bull sharks have been documented as predators, and occasionally, killer whales may target sea turtles. Sharks, equipped with powerful, curved teeth, pose a significant risk by attempting to break open the turtle's protective shell. While sea turtles cannot retract into their shell, they can counter these attacks by using their shells as a natural shield, tilting the back of their carapace towards the predator, which is why you might sometimes see turtles doing the same to you when you get too close! During an encounter with

SharkBite this month, we noticed a piece of plastic protruding from her rear end that she likely ingested by accident. Sea turtles often mistake plastic debris as food because of the visual similarities to their prey (e.g. jellyfish). Plastics, being non-digestible and slow to degrade, pose a persistent threat and highlights the dangers of plastics to marine life. Fortunately, Sharkbite was resighted just weeks later free from any plastic with no apparent injuries, giving the team a sense of relief.



62 sightings

OUR HOME

 **29** guests experienced our local islands

 **35,392** KWH renewable energy

 **6,500** Kg wood recycled

 **367** eggs produced

REPRESENTING SUSTAINABLE TOURISM IN THE MALDIVES

The Sustainable Tourism Forum is an annual meeting of resorts, tourism operators and stakeholders to engage in a dynamic dialogue addressing the complex challenges of social, economic, and environmental sustainability in the Maldives. The theme of the 2023 Forum was 'Green Investments and Innovation for Responsible Tourism: Paving the Path for a Greener Future'. The Ministry of Tourism presented an overview of the 5th Tourism Masterplan, stating, "This Masterplan is centered around sustainability and focuses on establishing true sustainability within the industry in a holistic manner."

Lawrence, Director of Sustainability and Conservation, represented Six Senses Laamu in the Forum, giving a 10-minute presentation to 50+ people. The topic was on the sustainable management framework of Six Senses brand and how it is applied to Six Senses Laamu. The presentation was followed by a 40-minute panel discussion answering questions from the audience. The forum lasted 2 days, the first contained presentations and discussion panels, the second day involved working groups drafting sustainable practice recommendations that will be revised and submitted to the government from the Sustainable Tourism Forum and its participants.



WORLD SOIL DAY CELEBRATION

On the 5th of December 2023, the Landscaping team at Six Senses Laamu marked World Soil Day in a meaningful collaboration with Laamu Maamendhoo School. Twelve students from Key Stage 2 enthusiastically participated in an engaging workshop aimed at instilling the importance of soil and water for sustainable living, coupled with an education on native plants in the Maldives.

A significant aspect of the day was the hands-on experience of planting, with a total of 100 plants from 10 different varieties finding their home in the Native Plant Nursery at Six Senses Laamu. The varieties included beach lettuce, corkwood, fish poison tree, lemon grass, and basil. This initiative not only contributes to the preservation of the Maldivian environment but also fosters a sense of environmental

responsibility among the younger generation. Six Senses Laamu remains committed to such collaborative efforts, nurturing a sustainable mindset for the well-being of our community and our planet.

 **13** local students participated



FESTIVE FUN

A festive filled December. Earth Lab hosted 8 specialty sustainability activities for the little VIPs of Laamu. We went on garden and resort tours, explored different ways to recycle products, make amazing nature-based artworks and said hello to our Kukulhu (chicken) ladies. A special twist was introduced into some of these workshops, during our garden tour we collected herbs to make our own teas. Soap making involved adding in dyes to give colourful and vibrant soaps. And during the nature-based artworks we created our own inks from native flowers and plants. In total, 39 children joined in the activities, making it one of the busiest (and most fun) 10 days of Earth Lab.



We also collaborated with the Garden Team to make a "Bodu Mas", a traditional woven 'big fish' that is a regular part of Maldivian local island celebrations. The Bodu Mas was showcased several times during Festive season, including at the MUI Under the Sea Cocktail party, New Years Eve countdown party and the MUI Tales by the Bonfire.

WE COULD NOT HAVE DONE IT WITHOUT YOU!

We are tremendously grateful to the multitude of donors who so generously donated funds to the MUI team's research projects; we are indebted to you all.

A special shout-out to our friends who donated \$10,000 USD and more:

Jeffrey
Andy and Amy
Erin and Don
Take Two London
Sabine and Guy

We look forward to sharing with you the achievements that you made possible.

To learn more about marine conservation and sustainability initiatives at Six Senses Laamu please contact:

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To stay up to date with the latest news, events and visiting experts follow the Maldives Underwater Initiative and Six Senses Laamu on social media.

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