Maldives Marine Newsletter

Issue no 3. January 2015

IN THIS ISSUE

OUR MISSION

IUCN, the International Union for Conservation of Nature, helps the world find pragmatic solutions to our most pressing environment and development challenges by supporting scientific research; managing field projects all over the world; and bringing governments, NGOs, the UN, international conventions and companies together to develop policy, laws and best practice.

Our vision is a just world that values and conserves nature.

Our mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

The world's oldest and largest global environmental network, IUCN is a democratic membership union with more than 1,200 government and NGO member organizations, and almost 11,000 volunteer scientists and experts in some 160 countries. IUCN's work is supported by over 1,000 professional staff in 45 offices and hundreds of partners in public, NGO and private sectors around the world. IUCN's headquarters are located in Gland, near Geneva, in Switzerland.

IUCN has been undertaking and supporting environmental conservation and addressing development challenges in the Maldives since 1985 through its global and regional programmes. Currently, IUCN's work in the Maldives is supported by the Asia Regional Office based in Thailand and the Global Marine and Polar Programme based in Switzerland.

EDITORIAL

A recipe for killing coral reefs

By Dr Ameer Abdulla, Senior Advisor, Marine Biodiversity and Conservation Science, IUCN Global Marine and Polar Programme

Dear colleagues,

Have you ever been really overworked, without enough rest or sleep, feeling exhausted and then, of course, predictably, you get ill? And the more tired you are, the more difficult it is for you to recover from your illness? Well, coral reef ecosystems react exactly like you. Natural and human-induced impacts can take them down to their proverbial knees. Reef ecosystems, like humans, can turn out to be overworked and driven to a point of ecological exhaustion where they succumb to disease and death (See Figure 1).

Have you ever killed a reef? Do you know how to kill a coral reef? If you were wondering, the recipe for killing a reef is in fact very simple and quick: increase sedimentation by dredging channels, modifying the beach and developing the coast; add nutrients to the water through sewage effluents and agriculture fertilizers; remove top fish predators and herbivores by fishing; and finally, increase the temperature and cook until well-done. Voilà! Whether coral reefs are able to recover from these impacts or not will depend on many factors that, together, make up their signature resilience.

Resilience is the ability of biological or social systems to overcome pressures and stresses by maintaining key functions through resisting or adapting to change. In coral reef habitats, resilience is the capacity of a reef to absorb impacts such as ocean warming and acidification, dredging, sedimentation, pollution, and overfishing, and to rebuild to coral-dominated communities instead of deteriorating to algal-dominated reefs or barren rocks *(see article on resilience page 15).*

Understanding the dynamics of fishing is important in assessing the potential resilience of a coral reef

Beyond the importance of keeping coral reefs healthy because of their inherent beauty and high biodiversity, enhancing and maintaining reef resilience is crucial for human welfare and national and local economies. Coral reefs protect the coast from storm surges, wave action and erosion from the rise in sea-levels. They are also the key to food security for the most vulnerable communities, as they are the source for artisanal fisheries and revenue from marine tourism. A recent synthesis of over 80 studies on the economic value of coral reefs[1] concluded that they

1 TEEB (2010). *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB*.

may represent a value of up to US$ 1.2 million per hectare per year, which is the result of providing services of food and material ($6,000 ha/yr), climate regulation, waste treatment, shoreline stabilization and storm buffering (up to $35,000 ha/yr), cultural and tourism services (up to $1.1 million ha/yr), and maintenance of genetic diversity (up to $57,000 ha/yr).

Although estimates of the value of coral reefs vary from place to place (see Figure 2), it is clear that these ecosystems have a significant value. The coral reefs of Kish Island in Iran have been valued at $14.6 million per year[2]. The total value was attributed to recreation (62%), followed by conservation (23%) and coastal protection and waste assimilation functions (10%). In the United States, $3.4 billion of value is generated from reefs per annum[3]. As the eighth largest in the world[4], the coral reef ecosystem in the Maldives covers 4,513 km^2 and its destruction would mean up to $500 billion a year in loss of ecosystem services.

The economic value of coral reefs is strongly associated with the quality of the ecosystem[5]. Divers in the Northern Red Sea, for instance, are willing to pay an extra $2.60 per dive for an increase in coral and fish abundance and diversity. Enhanced water quality is also valued and divers are willing to pay an extra $1.20 per dive for each 1 metre increase in visibility. In general, environmental improvements and higher quality reefs were valued at $2.3 million per year in Sinai, Egypt.

Needless to say, healthier reefs are more valuable reefs - in the short, medium and long term. Managing for coral reef resilience in the Maldives thus becomes the most important priority and management strategy for a country that depends on this ecosystem in everyway. Managing coral reef fisheries and not overfishing them is critical because herbivorous fish play a key role by feeding on and reducing the amount of algae that settle on the reef *(see article on parrotfish, page 17)*. These algae are dangerous to the reef be-

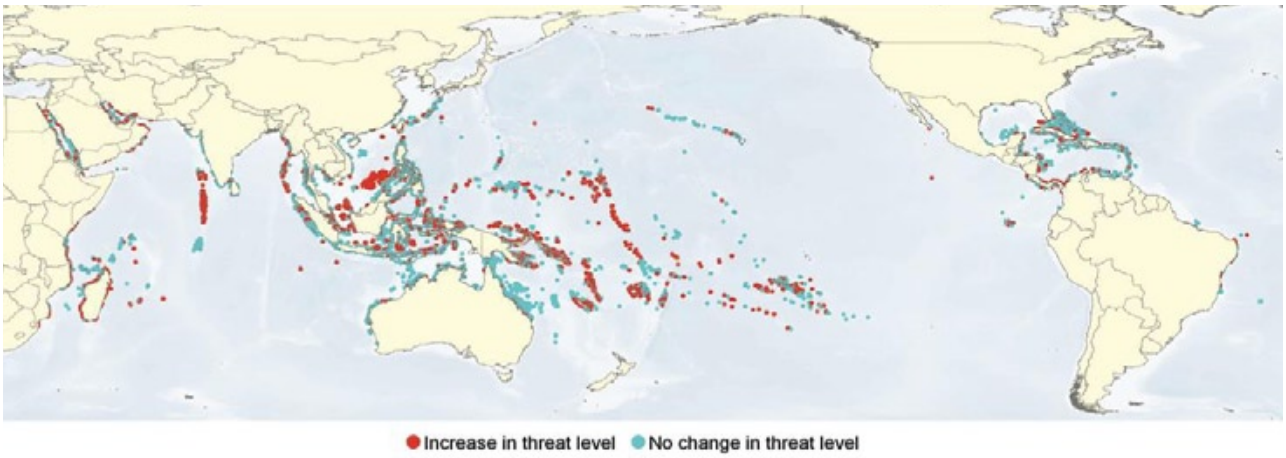


Figure 1. Change in local threat between 1998 and 2007. Threats include coastal development, overfishing and destructive fishing, marine and land-based pollution, temperature increase, and ocean acidification[6] . Maldives is listed as one of 27 most vulnerable countries to reef threats globally.

2 Madani, S., Ahmadian, M., Khalili Araghi, M., and Rahbar, F. (2012). Estimating Total Economic Value of Coral Reefs of Kish Island (Persian Gulf). *International Journal of Environmental Research*, 6 (1), pp. 51-60.
3 Brander, L.M. and van Beukering, P. (2013). *The total economic value of US coral reefs*. National Oceanographic and Atmospheric Administration (NOAA) Coral Reef Conservation Program.
4 Marine Research Centre (2011a). Coral Reef Research Programme. Marine Research Centre. <http://mrc. gov.mv/356/crrp/#more-356>.
5 Wielgus, J., Chadwick-Furman, N., Zeitouni, N. and Shechter, M. (2003). Effects of coral reef attribute damage on recreational welfare. *Marine Resource Economics*, 18 (X), pp. 225–237.
6 Burke, L., K. Reytar, M. Spalding, and A. Perry. *Reefs at Risk Revisited*. (Washington, DC, USA: World Resources Institute, 2011).

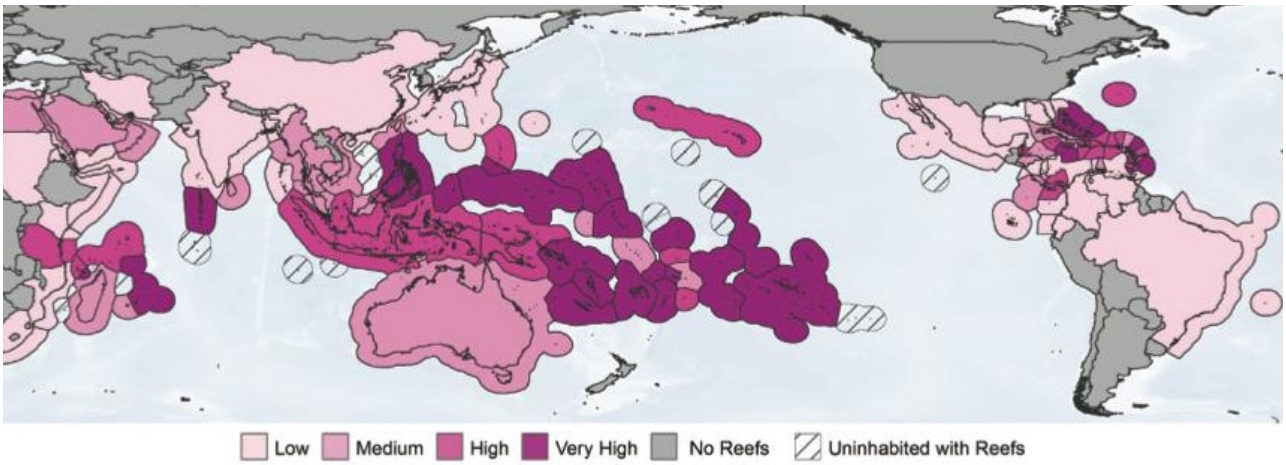


Figure 2. Social and economic dependance on coral reefs worldwide. As shown, Maldives' dependance on its coral reefs is "Very High"[7].

cause they impede young coral settlement and recruitment or compete with adult coral growth and survival. Increasing the amount of nutrients on coral reefs gives algae a distinct advantage by enhancing their growth and increasing turbidity, which inhibits coral growth. This is why managing the amount and content of land effluents is one of the key management considerations. These management issues should therefore be integrated into the governance and practices of people living on resorts and community islands. Shining examples of best practice are emerging (*See articles on Green Fins and on Kuramathi resort, page 7 and 11).* The survival of coral reefs of the Maldives for the next generations is up to us and will depend completely on how we treat them.

So let's treat and manage coral reefs with their real value in mind.

With warm regards,

Ameer

7 Burke, L., K. Reytar, M. Spalding, and A. Perry. *Reefs at Risk Revisited*. (Washington, DC, USA: World Resources Institute, 2011).

SUBSCRIBE TO OUR NEWSLETTER

FACEBOOK

We encourage contributions to our newsletter
For more information, send an email to:
Monique Borboen, Communications Officer, at
monique.borboenabrams@iucn.org

MEET A FELLOW MARINE CONSERVATIONIST

Ismail Shareef, dive guide

By Ms. Adele Verdier-Ali, writer, Malé

From May 17th to 19th this year, the Liveaboard[8] Association of Maldives (LAM) hosted the country's largest Marine Expo in Hulhumale'. During the weekend's array of events, the winners of the Maldives first Boating Awards were announced. Amongst the diving community, there was one award in particular that caught the crowd's attention: the accolade? Dive Guide of the Year 2014. When one considers that the Maldives is home to the largest fleet of liveaboards in the world and that it has over 1,000 people diving every day, you understand why competition for the title was fierce. Ismail Shareef from the Maavahi liveaboard ultimately took the award home and it was my pleasure to sit down with him a few days later and witness the enduring shock that the win had clearly induced in him. During a thundery afternoon in the capital, I got to learn what it takes to be a guide in the Maldives' thriving diving industry and caught a glimpse of what life on the water really involves.

As we settled down over a Lavazza coffee, I asked Issey what he thought was the reason why he was chosen for the award and watched him clearly struggling for an answer. "That's a difficult question", he finally responded. "It is the first year of the awards so maybe people did not know about them. Maybe that's why they only chose me?" I searched his face for signs of false modesty and found none. He was genuinely perplexed as to why he had won. Yet, after almost two hours of listening to stories that would make even the most seasoned diver envious, it became clear to me that providing unforgettable memories for his guests is what really gets him out of bed in the morning. Issey is not only one of the Maldives' most experienced divers, he was

Photo © Ismail Shareef

also a born guide. Big fish, small fish… Issey has seen them all, but his unaffected warmth is what makes him instantly likeable.

Hailing from Sh. Lhaimagu island, Issey began his diving career in the compressor room of the Conrad Rangali resort in South Ari Atoll. As he watched the dive dhoni[9] leaving every morning, he quickly understood that he was on the wrong side of the jetty. Each day, he would assist with the running of the busy dive centre whilst each night his dreams of dive guiding would slowly intensify. As he patiently sat next to the compressor slowly refilling over 100 tanks, Issey would pore over the pages of the Professional Association of Diving Instructors (PADI) manuals. He studied diligently and in 2002, at the age of 25, Issey was certified as a PADI dive master. He continued working in the resort for another three years until he turned his attention to liveaboards.

Issey has escorted guests throughout the Maldivian atolls over the past decade on some of the country's busiest boats. Although each day has a similar routine, he explains that no two days

8 A Liveaboard is a small (normally 3 to 25 cabins) cruise boat offering lodging and tours to its passengers
9 Maldives traditional wooden boats.

and no two dives are ever identical. “I never get bored,” he explained. “There’s always something new to see, somewhere new to go and someone new to meet”.

Despite often falling into bed at well beyond midnight, Issey explained that he wakes up without an alarm every morning at 6am. “There is much to do and it is my responsibility to do it”, he says, simply. After a “Good Morning” to his guests, Issey gulps down a strong coffee before the morning briefing at 6:30am. Apparently, there is no such thing as a lie-in on a liveaboard. The day’s deepest and most challenging dive follows shortly and by 8:30am, the guests are back on the boat. Breakfast is Maldivian. Stories of the morning’s dive are swapped over tuna with coconut, freshly grilled ‘roshi’ and sweet, local bananas as Issey leads the debriefing. Another dive follows in the mid-morning and lunch is enjoyed during the surface interval. In the early afternoon, Issey might join the guests as they wander around a local island but by 3pm, they are back in the water. The day’s final dive is the most relaxing. He is always careful to choose a good drift dive site so that guests can bob along without much effort.

Of the many thousands of dives that Issey has logged over the years, there are a few in particular that stand out. Being greeted by a rare Mola Mola fish at 30m outside Nilandhu Kandu in February this year easily tops the list for Issey. Two close encounters with adult tiger sharks and seeing swarms of hammerhead sharks in Gaaf Alif Atoll follow closely behind. And lastly, Issey explained, there’s nothing quite like the feeling of diving very early on New Year’s Day. The magic of descending at sunrise when all the resorts are still sleeping after their festivities never loses its appeal for him.

Yet, liveaboard life is not without its glitches: Issey always keeps one eye on the compressor. It is the heart of the boat, he explained. If something goes wrong when you are miles away from the capital, the whole cruise can be disrupted. Luckily, the time he spent in Rangali’s compressor room has stayed with him and he can often avoid any serious problem.

“What about troublesome guests?” I asked, hoping for a juicy story about wayward foreigners causing mischief. Issey looked at me disapprovingly and left me unsatisfied. He is genuinely happy to spend time with new people every week. “It’s better when the guests are not shy, though” he said quietly. Yet, as a grin involuntarily spread across his face, I began to suspect that behind his mild exterior he might not be averse to causing some mischief himself. My suspicions remain unconfirmed, however; Issey is not giving anything away.

Likewise, when encouraged to reveal his secret methods for attracting the best wildlife, Issey remained tight-lipped. When he eventually offered, “I’m good at finding frog fish” as an answer, I can’t help but feel somewhat fobbed off. Obviously, to be the best dive guide in the country you cannot divulge certain things.

So what can aspiring dive masters do to become the best? In Issey’s opinion, being proactive is crucial. “Don’t ask too many questions,” he said bluntly. “Just do everything for yourself. Check the equipment, check the current and check the landmarks. One person’s explanation is worth nothing compared to experiencing the site for yourself”. The key is your attitude, for Issey. “Always have one hand up to your leader” is his advice.

When I asked him what he will do when he stops diving, the question puzzled him. “I don’t think I can ever stop,” said Issey. “It’s hard work and I miss my family but I can’t imagine doing anything else”. He is clearly in no rush to keep his feet on dry land. If Issey is anything to go by, life as one of the Maldives’ pioneering dive guides is as good as it can get and being able to continue for years to come is the only prize Issey is really interested in taking home.

LAM website:
http://www.liveaboardassociation.mv/lam

Maldives Marine Expo website:
http://www.marineexpo.mv/

MANAGEMENT

Kuramathi – The story of a 'green island' and a 4 star resort

By Mr. Mohamed Fairooz, Sales and PR coordinator, Kurumathi resort

The big boom of travel in the Maldives in 1972 opened up paths to both entrepreneurs and stakeholders to get their slice of touristic goodness in the newly found industry. Kuramathi is counted amongst the first few resorts that opened up on 1 October 1975.

Today, Kuramathi Island stands out as a renowned brand under the Universal Resorts umbrella. With its advantageous land size of 1.8 km, it hosts a number of services and facilities including 9 choices of Guest Villas, 3 main restaurants and 7 restaurants à la carte, each offering a unique dining experience along with 6 bars all conveniently placed on different areas of the island. One key aspect of Kuramathi is its coherent ability to blend with nature.

Set aside the luxurious demands of discerning travellers and you will be exposed to a nature-inspired atmosphere with lush foliage, clean roads and pathways with green bins to discard rubbish, and even glass bottles branded with the Kuramathi logo containing potable water distilled from the island's own premises. Guided tours narrated by a resident horticulturist will give you interesting facts about growing plants in water, after which you will be proudly showcased the resulting harvest made of herbs and salads: mint, lollo rosso, coriander, green basil, purple basil, sage, dill, lemongrass, rocket and cherry tomatoes. Nature appreciation programmes are sited in different locations and include the Botanic Walk -a winding path dotted with tropical plants and information boards giving out interesting facts about the local flora, and, the Nature Trail- a piece of Maldivian tropical forest kept intact that doubles up as a fascinating trail.

The Eco Centre, formerly known as the Bio Station, was established in 1999, after the El Niño year, with the primary purpose of studying the cause and effects of coral bleaching, and how to best protect the fragile ecosystem. A key achievement was the discontinuation of the popular night fishing in 2002, with Kuramathi becoming one of the first resorts in the Maldives to do so.

Nowadays, the Eco Centre is led by a small team of professionals including a resident marine biologist and horticulturist. Operating all year long, it plays a vital role in providing the guests with an enriched experience of the Maldives. On display at the Eco Centre is an eleven metre long

Hydroponic farming

sperm whale's skeleton as a key exhibit as well as an array of natural organisms found on land and underwater. From a wide range of informative presentations to guided snorkelling tours and enlightening topics covered for children in collaboration with the kids club, the Eco Centre stands as a building with a strong purpose in the resort. The Eco Centre also plays a key role in ensuring safe snorkelling practices are followed. Multilingual snorkelling information materials are provided to all guests and clear entry and exit channels are marked along the reef to avoid damage to the delicate coral reefs. Snorkelling lessons are also offered on request.

Over the years of development in the island, eco-friendly technologies have been implemented in various operations of the resort. In addition, the sewerage treatment facility used on the resort premises is of a world class standard, and contributes recycled water for WCs as well as recycled grey water for gardening purposes and irrigation. The initiatives led by the resort's Environmental Committee are devoted to eco-friendly methods to sustain safe environmental practices. The ideas generated in this group are then implemented into the resort operations. To mention a few concepts brought into practice: regular island and reef cleanups, motivating team members to save energy and water, and celebrating environment related events and occasions throughout the year. Educational talks are held regularly to provide insightful knowledge about the fragility of the environment to guests, team members and also the students of Rasdhoo.

A milestone in 2014 was the elimination of stingray feeding, which the resort had practised for over 20 years. Despite being a big attraction for guests, feeding wild animals in general can cause risks to humans and change the animals' natural behaviour, so it was decided to end it. The project was spearheaded by the Eco Centre after careful planning, which involved slowly reducing the quantity of food given to stingrays from February until August, to allow for the stingrays to readapt to their natural behaviour.

Even with such a drive, remaining eco-friendly implies a few hardships and facing challenges. The lack of proper resources to recycle paper, glass and batteries are some of the difficulties faced by remote destinations such as the Maldives. For this very same reason we encourage guests to take back home their used batteries, plastic bottles, etc.

Kuramathi blends in well with the eco-friendly concept it brandishes. A 'Naturally Maldives' experience is guaranteed, where guests take the time to appreciate the array of stimulating activities on offer. From education and awareness on the environment addressed through interactive presentations for guests, team members and even kids, the green island's philosophy proves to serve as a surefire and unique selling point for the popular 4 star resort in Ari Atoll.

More on Kurumathi's environment programme: http://www.kuramathi.com/environment.html

The Kurumathi Eco Centre

MANAGEMENT

Can GIS improve environmental management and conservation in the Maldives?

By Ms. Fatimath Nishtaran, GIS Officer, IUCN Maldives Marine Projects

Geographic Information Systems (GIS) are a very powerful tool that can help decision makers to manage, decide, analyze, and display large amounts of data for various planning activities.

In the Maldives, IUCN's government partners in Project REGENERATE[10] have identified the need to maximize the use of GIS and asked that part of the project's effort focus on assessing the current use of GIS in the country, increasing the GIS capacity of government staff and better integrating data management into the existing National GIS. To this end, IUCN hired a GIS specialist, Fathimath Nistharan, and the expertise of Esri[11] India.

IUCN Maldives Marine conducted the very first ArcGIS training workshop for the Ministry of Environment and Energy (MoEE), Environmental Protection Agency (EPA), and Marine Research Centre (MRC) in August 2014. This eight day training, led by Mr Krishna Rao, Dr Shashi Kumar and Mr Vishal Garg of Esri India, was hosted at

GIS training workshop

10 Project REGENERATE (Reefs Generate Environmental and Economic Resiliency for Atoll Ecosystems), aims to better protect and manage marine systems, especially the coral reef life affected by climate change and human activities. It is funded by the United States Agency for International Development (USAID).

11 Geographic information system company.

the Ministry of Housing, Land Survey Authority's GIS Lab. Successful participants received an Esri certification upon completion.

The workshop was attended by eight participants: Ms. Aishath Huma, Mr Moosa Zeeban and Mr Ismail Ajmal of MoEE, Ms. Aiminath Fizna and Mr Ali Nishan of EPA, Mr Ahmed Fazeel of MRC, Mr Gabriel Grimsditch and Ms. Fathimath Nistharan from IUCN. The workshop consisted of four parts: An Introduction to GIS, Essential Workflows, Performing Analysis, and an Introduction to WebGIS.

The aim of this workshop was to help attendees realize the potential of GIS for their work and to give them the technical means to use GIS to further develop and utilize the existing National GIS (NGIS) platform. NGIS can significantly help staff and decision makers create management plans, model future scenarios, and monitor various activities based on geospatial information.

Here are a few examples of how NGIS could be utilized:

Management and Planning:

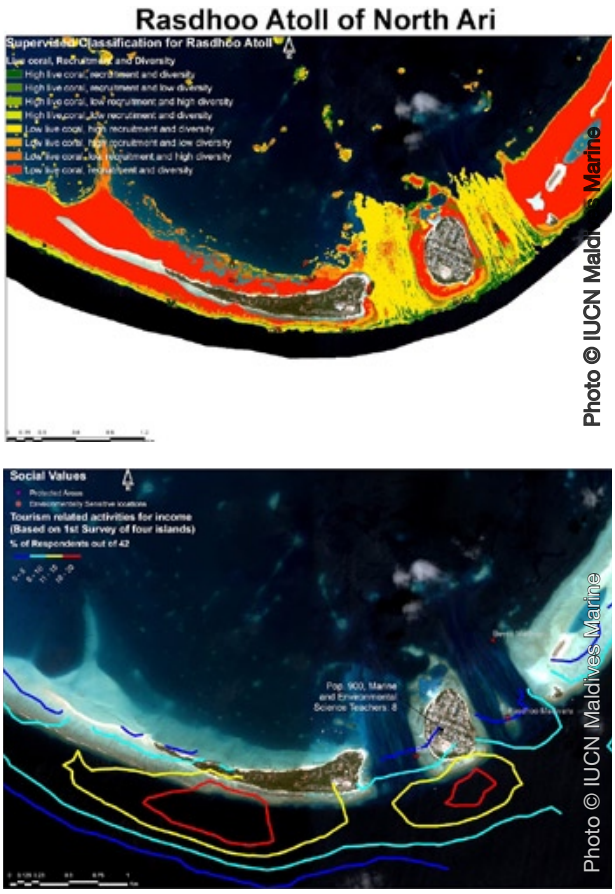
- Web based delivery of government geospatial information services
- Spatial planning for marine protected and sensitive areas
- Navigation and port facilities management
- Long-term land lease planning
- Coastal environmental/hazard assessment
- Coastal management/strategic planning
- Coastal mapping

Monitoring and Modelling:

- Environmental monitoring
- Model sea level rise scenarios in the Maldives
- Disaster preparation & response in the Maldives
- Climate change monitoring and modelling
- Coastal ecological modelling
- Coastal process modelling

Once GIS capacity increases within the government departments' staff, the NGIS platform will provide a solid base to support the Maldivian government to operate as an E-Government (like in Singapore, for example, as can be seen in http://www.onemap.sg/index.html). This has the potential to enable easier and more effective sharing of information and services with the public, and so address many of the challenges faced at present.

As a follow-up to the training workshop, the IUCN GIS officer is now working in collaboration with the MoEE, EPA and MRC to add their data layers to the NGIS and also performing a spatial analysis for IUCN projects under Project REGENERATE. Some GIS work carried out under Project REGENERATE includes the mapping of social surveys conducted by IUCN for North Ari Atoll to help understand how resources are being used by the survey respondents. Other work carried out includes the mapping of habitat classifications, coral and algae covers, high potential resilience areas, etc., all based on IUCN marine biologists' surveys.



Mapping the resources and their use can guide effective management. These mapping examples show coral coverage in which live coral, density and recruitment are assessed, and the community use of the resources for tourism revenue.

CONSERVATION

Green Fins - A unique approach to marine conservation

By Mr James Harvey, Operations Manager, The Reef-World Foundation

When you are trying to conserve and protect a species or an ecosystem in any environment, you want the people who are using and depend on it daily at the very forefront of your conservation strategy. This is exactly the approach a new initiative aims to achieve when trying to protect coral reefs, and who better to be involved than the SCUBA diving industry. In collaboration with the United Nations Environment Programme and UK based NGO The Reef-World Foundation, the Green Fins initiative works with both the public and private sector in a unique way to harness the enthusiasm and knowledge of this important sector. The tourism industry is without a doubt the most important sector when it comes to providing jobs, food security and growth in general for the Maldives but it must be done in a sustainable way and in a direction that looks at ensuring the continued arrival of international tourists for years to come.

Green Fins started in 2004 in South-East Asia as an awareness and education programme whilst enhancing compliance to best practice. At the very core of Green Fins is a set of standards called the Code of Conduct that is a set of 15 'ideals' for dive and snorkel centre management to follow into the very ethos of their business practices. This ranges from limiting what waste, both solid and chemical, enters the marine environment to ensuring that their staff carries out critical environmental briefings to their guests before they enter the water, reminding their guests to not touch, break or take any corals or marine life when underwater. In return, participat-

Photo © Green Fins

ing businesses are given green certificates and promoted on the Green Fins website, with the Top Ten members with the lowest impact being showcased on the home page. They are also promoted through international media releases, dive shows and social media.

Internationally coordinated by The Reef-World Foundation, Green Fins aims to provide certificates to those who take part and undertake the annual training and environmental evaluation where the business is provided with three areas to improve on for their next annual assessment. This form of project monitoring allows Green Fins Maldives to see successes and highlight challenging areas. This approach to conservation is unique in that it successfully combines the strengths and abilities of the public and private sectors, managing to relieve threats and stresses to coral reefs in the six participating countries since 2004. Green Fins Maldives, as with all countries, takes direction from a National Team and is headed by a government department, the Environmental Protection Agency (EPA), with a team of trained assessors who visit dive centres to provide a 45 minute presentation to staff and management. This time allows the exchange of ideas and suggestions, providing the national team with an insight into the threats and issues on the ground. This is followed up with a dive trip with customers to observe standard practice.

Crucial to supporting the continued success and growth of Green Fins Maldives is the participation of NGOs, community groups and local champions, and the IUCN Maldives Marine is no exception. Under Project REGENERATE, which aims to create a network of marine managed areas in critical hotspots, IUCN is supporting the Reef-World Foundation and EPA to enhance knowledge sharing through this public-private partnership within the North Ari Atoll. IUCN wants to engage the public and the tourists themselves to support citizen science by the reporting of non-expert data on threatened marine species such as Whale Sharks, Turtles and Mantas. Green Fins is the perfect tool for this and in August 2014, 12 new Green Fins members signed up to pledge their support for reducing their impacts with continued requests to join from other businesses.

Using the tourism industry means that collectively we can target emerging and growing threats such as a mass increase in Asian tourists who are often unfamiliar with the fragile nature and importance of coral reefs whilst increasing the support for more traditional issues such as solid waste management, in particular plastic. EPA, Reef-World Foundation and IUCN Maldives Marine are confident that Green Fins can overcome these issues 'one business, one island' at a time, resulting in less stressed and more resilient coral reefs, which would ultimately allow them to cope with other threats including bleaching events from climate change.

If you would like more information, please visit www.greenfins.net or email directly to maldives@greenfins.net

Green Fins onboard to conduct Environmental Assessments of dive operation practices

Certification for Island Divers - Dhigurah presented by James Harvey - Green Fins International

CONSERVATION

The impact of ghost nets on marine species in the Maldives

By Mr Martin Stelfox – Olive Ridley Project Director

The Olive Ridley Project (ORP) has been studying the effects of lost, abandoned or discarded fishing nets (otherwise known as ghost nets) on our marine fauna since July 2013. As more people are becoming aware of the problem, reports of ghost nets found in the Maldives have grown significantly over the last year.

The predominant species in the Maldives that appears to be most affected by derelict fishing gear is the Olive Ridley turtle with 61 entangled cases in just one year. However other species such as silky sharks and various reef fish have also been recorded entangled. The reason why this species of turtle seems to be the most affected species remains largely unknown but most entangled individuals (n= 47, equivalent to 77%) were immature sub adults or juveniles, (i.e. 60 cm curved carapace length or smaller). This gives us clues as to why the Olive Ridley turtles appear to be most at risk as at this stage in their life cycle they are largely pelagic, often interacting with many high sea fisheries. In addition, the North East monsoon, peak period for finding entangled Olive Ridleys, coincides with the mass-nesting season for Olive Ridley turtles known as the arribada on Orissa, India, increasing the probability of encounters between adult individuals and ghost gear.

About the ghost nets found in the Maldives

Fifty-nine ghost nets made up of 170 individual nets[12] were recorded in the Maldives, between July 2013 and July 2014. All ghost nets were found near shore (and all were removed from the water) or on the beach. Measurements were

This ghost net contained 5 Olive Ridley turtles: 3 were still alive and were released, 2 were unable to reach the surface to breathe and died

12 Due to ocean currents, debris are often found amassed together.

taken in an attempt to identify the type of net and its point of origin. Of these, 21 (28%) were found with an Olive Ridley turtle entangled. Stretched mesh sizes of the nets ranged from 2 mm to 1,200 mm. Turtles were found entangled in mesh sizes between 35 mm and 590 mm. All of the ghost nets found in the Maldives were multifilament nets (n=170). They all were made from either high-density polypropylene (HDPP) or high-density polyethylene (HDPE) twine and have the potential to remain in the ocean unchanged – posing entanglement risks - for extremely long periods of time. Many of the entangled turtles were found still alive, but emaciated and weak; and too often the flipper caught in the net was already severed or was so damaged that it needed to be amputated.

Where are these nets coming from?

As fishing with nets is not allowed in the Maldives, the nets come from afar. Ocean currents' strength and direction help identify the paths along which ghost nets may drift in the Indian Ocean. In the tropical Indian Ocean, the NE Monsoon and the SW Monsoon have significantly different current patterns and the Maldives, lying north-south across the east-west flow of the monsoon currents, act as something of a trap for drifting objects. During the SW Monsoon, currents flow predominantly from West to East and strong currents are observed in the Arabian Sea and the western Indian Ocean, particularly North of the Seychelles and near Somalia and East Africa. The use of Fish Aggregating Devices (FADs) by purse seine fishermen is common in these areas and several ghost nets found in the Maldives had FADs attached to them; these nets had mesh sizes considered the most dangerous to turtles (i.e., 35 – 590 mm).

Ocean currents during the NE Monsoon predominately flow from East to West. Current magnitudes are strongest on the eastern and southern coasts of Sri Lanka and India, along western Indonesia, and nearby the Lakshadweep Islands. Many ghost nets recorded in the Maldives during the NE Monsoon were recovered along the eastern side of the country. Makeshift flotation devices, such as plastic bottles, attached to ghost nets provide clues to their origin.

Where do we go from here?

The majority of abandoned fishing gear found in the Maldives was unmarked. In addition, very few organizations are working on the problem of ghost gear in the Indian Ocean. Without a clear understanding of ghost net distribution, identification of fishing gear used amongst fishers and lack of gear loss reporting at ports by fisheries, the problem will persist in the ocean for many years.

After centralizing the ghost net reports data, the Olive Ridley Project strives to pinpoint the origins of the nets using the clues mentioned above, complemented by currents modelling maps. If the fisheries from which these nets came are identified, efforts to reach out to these fisheries and talk about solutions to limit the loss of nets can be initiated.

The Olive Ridley Project has now joined forces with the Global Ghost Gear initiative (GGGI) founded by the World Animal Protection that brings together NGOs, government bodies and private sectors from around the world to talk about ghost gear and how to combat the problem on a global scale. In association with IUCN and thanks to funding from Global Blue, the first year of results in the Maldives were showcased at a workshop in November 2014, contributing to efforts towards finding sustainable ways to address this worldwide problem.

For more information and to contribute data, please visit: http://oliveridleyproject.org

A plastic bottle in a ghost net washed in during the NE Monsoon - with India manufacturer.

ECOLOGY

Resilience and coral reefs

By Mr. Gabriel Grimsditch, Senior Project Officer, IUCN Maldives Marine Projects

Resilience is a powerful word. It encapsulates that quality that allows us to bounce back from difficult times, to survive, and to thrive. Without resilience, we would succumb to our injuries and struggle to carry on. But a resilient individual, or a resilient society, can overcome the challenges thrown at them. A definition of resilience is often quoted as 'the ability of biological or social systems to overcome pressures and stresses by maintaining key functions through resisting or adapting to change'. This rather dry definition touches upon some important concepts: the concept of pressures and stresses, the concept of key functions, the concept of change, and the concept of adaptation – all important in understanding how we can maintain the resilience of the very ecosystems that we depend on for our own survival.

Coral reefs are resilient, yet delicate systems. They have persisted and thrived for millions of years, creating structures large enough to be observed from outer space and yet their basic component is the humble coral polyp. They have survived changes in climate and sea level in the past; but today they are facing one of their greatest challenges – the 'anthropocene'; an environment dominated by human activity. Since 1950, 19%[13] of the world's coral reefs have effectively been lost due to bleaching events, destructive fishing, overfishing, nutrient overload, sediment overload, pollution, coastal development and increased hurricane activity. Some of these pressures are short, acute bursts of mortality, for example bleaching events or hurricanes; while other pressures such as overfishing, nutrients overload or pollution tend to be more long-term chronic causes of mortality that erode the resilience of a coral reef over time. Like all systems, coral reefs can bounce back from the acute, sharp pressures if they are in a healthy state. If a coral reef is free from nutrient overload and overfishing, and has healthy populations of fish with good water quality, the chances that it can bounce back and recover from a bleaching event are higher. Managing the chronic long-term stresses can give the coral reef a better chance of long-term survival.

In the case of the Maldives, the survival of coral reefs is key to the survival of the nation. IUCN is therefore working with local communities, the government and the private sector to understand what factors are driving coral reef resilience and degradation in North Ari – the Project REGENERATE demonstration atoll – and how to address them. Coral reefs are complex systems, so this involves gaining an understanding of many interacting components.

Surveys of coral reef resilience

13 Wilkinson, C. (2008). Status of coral reefs of the world: 2008. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia, 296 p. http://www.icriforum.org/sites/default/files/GCRMN_Status_Coral_Reefs_2008.pdf

Scientific ecological surveys capture information about coral communities, fish populations and substrate dynamics. We can learn how different components of the reef are linked, i.e. how the functionally important herbivorous fish or coralline algae can help to create suitable conditions for coral growth. Herbivores such as the parrotfish and surgeonfish are key in keeping algal growth down and therefore giving space for corals to grow, and coralline algae are key in consolidating the substrate and making it firm enough for corals to settle and grow. This is one component of resilience.

Understanding the ecology of the reef is nevertheless only half the story. Just as important is the need to understand how humans interact with the reef – where, how and what people fish; where and how many nutrients enter the water; where and what tourism activities are taking place; which islands are being reclaimed and where construction is taking place, etc. In addition, understanding how temperatures are changing in the water around the reef, and how they have caused bleaching events in the past and could cause bleaching events again in the future, is also key in understanding where the most vulnerable areas are. Together, the ecology, the human impacts and the physical environment can tell us a story about which parts of the coral reef we need to be worried about and pay most attention to. Mapping these factors can allow us to identify vulnerable areas, and to develop interventions to protect them. Certain activities in certain crucial parts of the reef could then be managed to reduce pressure and allow for recovery.

We know that the coral reef system is not a static environment, it is ever-changing. By identifying and monitoring key functions and key threats, we can devise plans and management interventions to give it the best chance to adapt to changes and remain healthy for the benefit of all.

Conducting surveys to assess social resilience of communities

ECOLOGY

Parrotfish

By Monique Borboen, Communications Officer, IUCN

With their bright colours, their relatively large size and their mouths looking like they were adorned by lipstick, Parrotfish delight visitors to the Maldives. They are regularly present on the reefs, sometimes in large groups. Upon seeing them, one could think that they derive their name from the bright and bold colours they exhibit. Actually, it is their teeth that give these fishes their name: they are arranged as tightly packed tiny tiles on the outside of their jaw, forming a parrot-like 'beak'. Parrotfish are known as grazers or excavators, using this 'beak' to scrape algae from the surface of rocks, corals and other hard surfaces. Some species actually break pieces of coral off and swallow them, digesting the algae inside the polyps and then breaking down the hard skeleton into sand and excreting it. They play a unique and key role in the reef's biological processes: preventing the spread of algae, promoting coral growth and contributing to the production of sand.

Parrotfish are abundant in and around the tropical reefs of all the world's oceans. This group of fish includes nine genera and over 80 species. Taxonomic studies are ongoing: while traditionally they were grouped in their own family – Scaridae – they are now often considered to be a subfamily, Scarinae, of the Labridae (wrasses) family. Colouring and patterns vary a lot between males, females and juveniles of the same species, making identification and classification arduous. In just about all species, individuals change their gender at some point in their lives. Adult parrotfish range in size from less than 1 to 4 feet (30 to 120 cm) in length. Individuals can move long distances between feeding and sleeping grounds, and at night some of them envelop themselves in a cocoon made of mucous that they secrete, which protects them from predators and has certain healing properties.

Some 23 species of parrotfish have been recorded in the Maldives. While most species are clas-

Two-colour Parrotfish juvenile (Cetascarus bicolour).

sified as Least Concern on the IUCN Red List, the Humphead Parrotfish *(Bolbometopon muricatum)* is listed as Vulnerable[14] - while common in some part of its range, fishing pressure has depleted populations at other locations. Although most parrotfish species remain common, their overfishing is of concern for the negative impacts this can have on the reef's ecological balance. In the Caribbean, a 2014 report by the Global Coral Reef Monitoring Network (GCRMN), IUCN and the United Nations Environment Programme (UNEP) titled Status and Trends of Caribbean Coral Reefs: 1970-2012 shows that the loss of parrotfish and sea urchins – the area's two main grazers – has been the key driver of coral decline in the region. The report contains the analysis of more than 35,000 surveys conducted at 90 Caribbean locations since 1970.

A 2011 study showed that, unlike many reefs in the Caribbean, reefs around the Indo-Pacific island of Moorea, French Polynesia, have consistently returned to coral dominance following major perturbations without shifting to a macroalgae-dominated state. A rapid increase in populations of herbivorous fishes, notably parrotfish, following perturbation was noted, with their grazing preventing the establishment of macroalgae. As parrotfish use nursery habitats within the lagoons before moving to offshore reefs later in life, the study underscores the importance of connectivity between the lagoon and offshore reefs for preventing the establishment of macroalgae following disturbances, and highlights the importance of protecting nearshore nursery habitat of herbivorous fishes to maintain reef resilience (Adam ***et al.*** 2011)[15].

Beyond macroalgal control, parrotfish play key roles in removing both live and dead corals and in the removal and transport of sediment, which

Two-colour Parrotfish adult male. (Cetascarus bicolour).

are critical processes for the replenishment and recovery of corals. In a 2012 study, using parrotfish as an example, Bellwood[16] ***et al***. examined how coral reef fish populations respond to escalating fishing pressure across the Indian and Pacific Oceans and noted that 'the depletion of fishes causes differential decline of key ecosystem functions, radically changing the dynamics of coral reefs and setting the stage for future ecological surprises'.

Monitoring the abundance of parrotfish, as well as tracking the fishing pressure on reef fish are therefore important to assess the coral reefs' health and resilience, and to manage this ecosystem properly.

Read more:

2012 IUCN study - assessment of parrotfish: http://www.iucn.org/fr/presse/kits/?10474/Latest-IUCN-Red-List-assessment-finds-parrotfish-and-surgeonfish-facing-heightened-risk-of-localized-extinction

For id photos of Maldives parrotfish species, consult the book Fishes of the Maldives, Indian Ocean by Rudie H. Kuiter. Note that the book is now available as an eBook at www.atolleditions.com.au or www.fishesofthemaldives.com.

14 Chan, T., Sadovy, Y. & Donaldson, T.J. 2012. Bolbometopon muricatum. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 08 December 2014.

15 Adam TC, Schmitt RJ, Holbrook SJ, Brooks AJ, Edmunds PJ, et al. (2011). Herbivory, Connectivity, and Ecosystem Resilience: Response of a Coral Reef to a Large-Scale Perturbation. PLoS ONE 6(8): e23717. doi:10.1371/journal.pone.0023717

16 David R. Bellwood, Andrew S. Hoey, Terence P. Hughes (2012). Human activity selectively impacts the ecosystem roles of parrotfishes on coral reefs.. http://rspb.royalsocietypublishing.org/content/279/1733/1621

SCIENCE EDUCATION

North Ari celebrates Maldivian marine life

By Mr Ali Nizar, Communications Officer, and Rifaee Rasheed, Social Sciences and Outreach Officer, IUCN Maldives Marine Projects

On 20 September 2014 the island of North Ari Atoll Mathiveri hosted a brand new event named *Moodhu Maakandu Fest '14* organized by IUCN in collaboration with the Maldivian Ministry of Environment and Energy (MEE), Ministry of Fisheries and Agriculture (MoFA), Marine Research Centre (MRC), Environmental Protection Agency (EPA), the Alif Alif Atoll Council, Mathiveri Council, and with the generous support of USAID.

Moodhu Maakandu, meaning the sea and the open ocean in Dhivehi language, Fest '14 was an event designed to create a fun and engaging ambience encouraging participants to learn more about the status of the natural resources of the Maldives while allowing the local authorities to showcase their spirit of marine conservation and environmental management.

In attendance at the festival was then U.S. Ambassador to the Maldives Michele J. Sison, USAID Mission Director Sherry Carlin, Project REGENERATE Director Dr Ameer Abdulla, State Minister for MEE Mr Mohamed Ibrahim, State Minister for MoFA Ms. Zaha Waheed, Permanent Secretary for MoFA Dr Abdulla Naseer, plus other representatives from both MEE and MoFA, USAID and the atoll Council. In addition, over 700 participants from five islands including the host island attended the festival. These included students from across ages, parents, teachers and the wider public.

After a welcoming speech by the President of the Mathiveri Island Council Mr Ismail Athif, festival attendees had a multitude of activities on the menu for the morning session, including a trio of discovery activities, in which experienced instructors guided primary and secondary grade students into swimming, snorkelling and scuba diving. Scuba diving was carried out with the gracious assistance from the local guesthouse *Casa Mia*. At the island school, a first aid training

Kids learning about the marine world

course took place, courtesy of volunteers from Maldivian Red Crescent.

The main festival area was populated with several stalls including one set up by the Maldives National University, and a cinema stall where nature documentary videos were looped. The stalls were open to visitors throughout the Festival. One corner of the festival grounds was taken up by a large line-art mural that was being filled in, paint stroke by paint stroke, by old and young festival visitors.

Participants barely had time to grab a lunch and dry themselves up (those who chose to wade in for the discovery items), before the afternoon session began with a highly competitive contest of marine species miming. Participants were up to the challenge, even the student who picked up the Octopus card. The student team from Ukulhas won this competition.

After any such outdoor event comes the necessary but laborious task of cleaning up, but this festival twisted things up with a beach cleaning competition. Separated into four groups, students and teachers rushed to collect any rubbish they could find – not an easy task, since the islanders had done a clean up in time for the festival. The IUCN team and representatives from USAID joined in as well.

The panel of judges weighed the collected rubbish and Mathiveri won with the biggest haul, though others were not far behind.

For the final contest, the groups were asked to recycle items from the rubbish they had collected into something reusable. Out of the rubbish, some amazingly creative items were crafted; the hardest task of the day was choosing a winner from among those exhibited. Once again, the final winner of this invention game was Mathiveri.

The festival came to a close with speeches by the U.S. Ambassador and the participating State ministers. The poster that had slowly filled up during the day was finally unveiled, showing a network of citizen scientists working towards managing areas of the atoll, which represented a large portion of the work under Project REGENERATE with local communities. The poster will remain at the harbour of the island as a beacon of the project.

The festival ended with some vibrant Boduberu music of the Maldives organized by the Mathiveri Council.

The Moodhu Maakandu Fest is to be held every year in a different island of the North Ari Atoll for the lifetime of the project.

Marine Festival activities.

SCIENCE EDUCATION

What IUCN's internship/apprenticeship partners are saying

By Mr Richard Rees, Maldives Whale Shark Research Programme (MWSRP) Director

The MWSRP is very proud to be one of the first NGOs in the Maldives to benefit from two fantastic initiatives coordinated by IUCN Maldives Marine. The first one involved the MWSRP hosting an intern from the Maldives National University. In August 2014, Maesha Mohamed, an Environmental Science undergraduate, joined MWSRP for 2 weeks. Maesha was exposed to every aspect of research and outreach activities, gaining valuable insights into the day to day operations of a research and conservation organisation. Maesha returned to university with a real practical experience that she could then apply directly to her theoretical studies.

Following on from such a positive internship experience, we leapt at the opportunity to get involved in the IUCN's Apprenticeship scheme. This scheme enabled us to look closer to home in our search for a local citizen who could fulfil the role of an in-field research assistant. After carrying out a number of recruitment sessions among the Dhigurah youth, Nasru Ali was selected. Nasru is a dive master who was very keen to learn more about research and marine biology as a whole. It seemed to be the ideal match between role and candidate, and I am delighted to say that after two months working together, Nasru has become an important part of the team. We see the six month apprenticeship as an ideal period of time during which young people can mature into their role by expanding their experience and mastering new skill sets while also exploring what a career in marine biology and research entails.

From the MWSRP's point of view, both the internship and the apprenticeship schemes are elements of the programme of which we are hugely proud and very grateful for. They allow us to continually meet and work with a range of young, talented Maldivians, increasing the level of integration of our programme within both the local and wider community. In doing so, we feel like we are taking great strides towards our eventual goal of becoming a Maldivian-run research programme.

Photo © Maldives Whale Shark Research Programme

Intern Maesha Mohamed

For more information about this fellowship programme, please contact agnese.mancini01@gmail.com. This programme is part of Project REGENERATE

For more information on the MWSRP, please visit http://maldiveswhalesharkresearch.org

SCIENCE EDUCATION

An inspirational internship

By Irthisham Zareer, student

When I found out about the internship through the IUCN Maldives Marine Projects Facebook page, I was immediately interested to apply as I always aspired to study marine biology. From a young age, I have been fascinated by the indispensable ocean and I wished to learn more about it to help conserve it. I saw this internship as a golden opportunity where I would get to work alongside marine biologists and get some hands-on experience.

During my first eight days as an intern, I was fortunate enough to work with Dr Mike Sweet, a lecturer from Derby University, and Sly Lee, founder of The Hydrous. The scientific officers from Korallion Lab, Giuditta Bonetti, Nicole Monfredini and I, helped Sly with his project, which included 3D coral reef mapping to accurately measure coral growth, disease and bleaching over time. This is a world first for a project of its kind with technology opening the door to limitless possibilities in coral reef science and education.

The five of us travelled around Lhaviyani and Baa atoll to collect data for fish surveys and water sampling and analysis while Sly mapped the coral reefs of these islands. Fish surveys were carried out by Dr Mike Sweet to find out the diversity and abundance of fish, as well as water sampling to analyze the pH, amount of nitrates and ammonia dissolved in the water. To account for depth as a variable, measures were taken at 5 m and 10 m deep within the 25 m by 5 m transects. The data gathered from these surveys will be analyzed to compare the differences in coral growth, fish diversity and water quality between populated and unpopulated islands.

I also learned about bio-eroders and observed them under a microscope, which showed sponges, worms and mussels inside the coral skeleton, indicating that the coral skeletons were weak.

Tourists from Atmosphere Kanifushi and Komandoo resorts visit Vavvaru twice or three times a week. A presentation about coral life is made, followed by a tour around the Korallion Lab. The lab has a separate pollution section, which I present to the tourists and explain how pollution threatens marine life in the Maldives.

Irthisham doing underwater work.

Another thing I learned was how to carry out video transects. We used transects of 10 m by 1 m. A video is taken along the length of the transect and GPS points taken at the start and end of each transect, along with a compass heading. The depth at each metre is also noted for the 10 m, at 1 m intervals. The different types of coral along the length of the transect is noted, along with the type of diseases found among the corals.

Coral transplantation is another thing I did in Vavvaru. To battle the erosion problems occurring at the Northwestern back side of the island, we collect healthy coral fragments from the front reef, take zone. We make nubbins by mixing equal amounts of bi-component glue and then attach coral fragments to tube caps using this glue. The nubbins are then kept in the aquariums for the glue to dry. Then these tube cap nubbins with corals fragments are attached to the tubes that are secured into the concrete bags which are placed in the sea at about 1 m – 2 m depth in the Northwestern back reef. The growth of these corals is monitored regularly.

I believe that the practical skills I learnt through this internship will be really useful in my future studies. I also strongly believe in learning through experience and that what you experience for yourself will stay with you much longer than what you study in a textbook. I think of this internship as a stepping stone towards further studies and a career in marine biology.

It was truly an inspiration and a remarkable learning experience to get to work with individuals that are extremely passionate about the ocean and the environment. I left the Korallion Lab content and happy. For me, it was highly satisfying to get to work for, and towards something I truly care about.

I would like to thank IUCN Maldives Marine Projects for this opportunity and I strongly encourage other young Maldivians to apply.

To apply, contact agnese.mancini01@gmail.com

In the lab.

Educational display.

HIGHLIGHTS

Project REGENERATE highlights

Reefs Generate Environmental and Economic Resiliency for Atoll Ecosystems

Project REGENERATE, a partnership between the Government of the Maldives, IUCN and the United States Agency for International Development (USAID) - the development arm of the U.S. Government, aims to better protect and manage marine systems, especially the coral reef life affected by climate change and human activities. Project REGENERATE is helping environmental management and conservation in the Maldives and has a number of activities that you might mind find relevant and useful to your work.

To help government and managers make important decisions about managing the natural environment, Project REGENERATE is mapping coral reefs, marine species, and the way people use natural resources in North Ari atoll. These maps are important in identifying sensitive areas and areas of multiple or high use that need to be managed carefully. Along with this mapping, Project REGENERATE is working with the Government of the Maldives to use advanced mapping software as an integral component of their decision-making. This will be useful in using spatial analysis for natural resource management, an important step for optimizing the way people interact with our environment sustainably.

In order to produce these maps, Project REGENERATE has been collecting data in the field. Social surveys have been conducted in 8 community islands to understand how people rely on natural resources for their livelihoods, and how they interact with their natural environment. Ecological surveys have also been conducted in three resorts in North Ari, collecting valuable information on coral reef health and biodiversity. The information collected with these ecological surveys has been used to develop management plans for these resorts and provide best practice guidance to dive centers and resort management, so they are best able to minimize their impact on their coral reefs from their daily operations.

REGENERATE
Enhancing Resilience of social-ecological coral reef systems in the Maldives

In an effort to advance scientific knowledge, ecological monitoring and conservation in the Maldives field guides for monitoring whale sharks, manta rays and other sharks have been produced. The field guides can be used by citizens around the country to record encounters with these magnificent creatures and contribute to data collection to help understand population size and species distribution which will ensure better management and conservation for these species. If you're interested in learning more about marine science in the Maldives, regular seminars have also been organized at the Maldives National University where national and foreign scientists present their work. We invite all readers to come to our next lecture! All these documents and links can be found in the Maldives Conservation Portal - http://www.maldivesconservationportal.org - a one-stop shop for information, science and events related to marine conservation and science in the Maldives. We invite all our readers to look out for the official launch soon, and then to visit the website and to please let us know what you think!

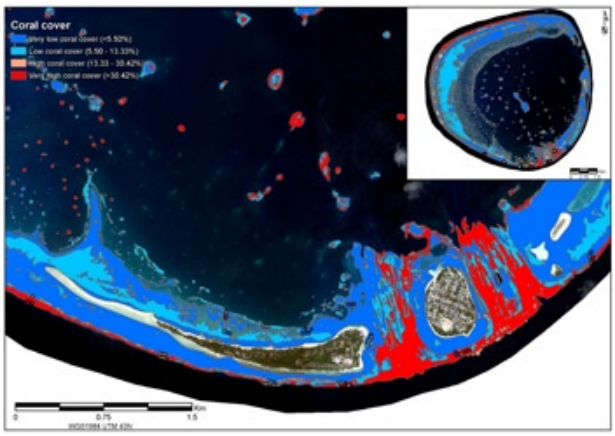
Finally, we can't forget the future generations, and one of the activities that will empower youth in the Maldives is the Fellowship Programme. This programme will support young Maldivians to attend university and find professional placements as apprentices and interns in environmental fields.

All in all, it's been a very busy year for Project RENEGERATE and we look forward to a productive 2015! If you would like to be involved in any of these activities or receive more information, please contact Dr. Ameer Abdulla at Ameer.Abdulla@iucn.org.

HIGHLIGHTS

Developing marine managed areas

IUCN has been working on developing a framework to improve and extend the management of marine resources in the Maldives for a number of years in collaboration with the Government of Maldives. One approach is to partner with resorts to develop management plans, which outline a roadmap to reduce stress to the marine environment and enhance the ecological resilience of resort house reefs and greater reef system. In order to understand the needs and to develop the plans, ecological surveys and surveys of resort operations are carried out. Areas of high ecological value are identified with GIS-generated maps, a resources-use zoning plan is devised, and resorts operations are reviewed in order to provide recommendations on environmental best practices.



The management plans form the basis for developing Marine Managed Areas (MMAs), which will allow greater protection and increased health of coral reefs. As Project REGENERATE gains increasing support from resort managers and other stakeholders, a network of MMAs can be established across the atoll(s). A network of effectively managed marine areas can substantially increase coral growth and resilience and increase fish stock, thus providing social and economic benefits to the people of Maldives.

IUCN Global Marine and Polar Programme

marine@iucn.org | www.iucn.org/marine

Photography courtesy and copyright of: Carl Lundin (cover page), Rifaee Rasheed, Ismail Shareef, Kurumathi resort, IUCN Maldives Marine Projects, Green Fins, Dave Bretherton, Jillian Hudgins - Olive Ridley Project, Gabriel Grimsditch, Rudie Kuiter, Maldives Whale Shark Research Programme, Giuditta Bonetti, Irthisham Zareer.

This newsletter is developed and printed thanks to the generous funding of USAID