Chagos News

The annual Newsletter from the Chagos Conservation Trust and the Chagos Conservation Trust US

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Contents

A Word from our Chair 3

Director's Report 4-5

Vegetation Management Plan Update..... 6-12

Why the Chagos Marine Protected Area Must Remain 13-17

Protecting the Reef Manta Ray Population 18-21

The Rare and Fascinating Chagos Mangroves..... 22-23

How to Grow a Coral Reef 24-27

No Place to Hide: Plastics in the Chagos Archipelago 28-30

New Edition of Chagos Birds' Published 31-33

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Front and back cover photo: Manta Ray © Simon Hilbourne, Manta Trust
photo p2: Diego Garcia, Barton Point © Jon Slayer photo p3: Hardwood forest of pisonia trees, Ile Petit Bois Mangue © Jon Slayer; photo p4: Fairy tern, Nelson Island © Jon Slayer; photo p5: Dascyllus over acropora garden , Diego Garcia © Jon Slayer

A Word from our Chair

This past year has been notable for CCT's participation in expeditions to the Chagos, and the articles in this issue of *Chagos News* provide insight into some current scientific research.

Dr Pete Carr continued his data gathering to inform the Vegetation Management Plan which complements the '*Healthy Islands, Healthy Reefs'* project. He details his latest trip to the archipelago in the first of this edition's articles, where his team determined the main vegetation management work could feasibly be finished in days not months. Dr Carr's other article is about the second edition of his book, *A Guide to the Birds of the Chagos Archipelago*.

Rachel Jones has been actively involved in the joint Zoological Society of London's and University of Swansea's various expeditions to detail plastic pollution in the Chagos. She provides us with a summary of their sobering findings on the impact of such pollution on sea turtle breeding,

but also how their studies have informed efforts to improve baby turtles' survivability, from targeted plastic waste removal, to reduction at source, and possibilities of recycling at site.

Dr Joanna Harris is in the forefront of research on manta rays in the Chagos. Her article outlines the current state of this fragile population, the importance of protecting the key Egmont Atoll habitat, and how increased seabird guano runoff (one of the aims of our '*Healthy Islands, Healthy Reefs'* programme) will benefit manta rays.

Dr Mark Spalding of the Nature Conservancy Trust and University of Cambridge, provides an informative description of the mangrove species and locations found in the Chagos. And I've hopefully outlined how coral atolls form over geological time to produce their distinctive shapes. Whereas Lottie Perkis, Secretary of the US-CCT, has eloquently summarised the history of the Marine Protection Area and its continued importance in localised and worldwide conservation.

This is sadly my last *Chagos News* foreword due to my term as Chair ending at the March 2024 Annual General Meeting, but I look forward to CCT's continued success and growth under a new Chair. We also welcome Dr Nicole Esteban and Ian Dunn as Trustees this year, in addition to the new 2023 Trustees James Clarke and Bry Wilson. We sadly say farewell to Trustees including the long-serving Rachel Jones, Sarah Havery, Jonathan Hunt, Rachel McGoff and Alistair Gammel, who has stepped in as Acting Chair when needed, which is why we acknowledged him at last year's AGM with lifetime honorary membership.

Dr Natasha Gibson

Director's Report

Since the last issue of *Chagos News*, the Chagos Conservation Trust turned 30! To celebrate, we held a post-Annual General Meeting (AGM) speaker event for all our members and supporters at the Zoological Society of London in March, to highlight the variety of work we are doing as a Trust.

This included an update on our key rewilding programme – '*Healthy Islands, Healthy Reefs*' – from the Chagos islands by its Project Manager Dr Pete Carr, who was on an expedition to the archipelago at the time, transporting our audience to where the work will take place.

Nigel Smith also launched his latest CCT-published book, *The Sad Story of the Conceição*; Pascalina Nellan introduced the new Chagossian community website she now manages, which was created with the help of the Trust; An overview of CCT's website revamp (due to be launched in 2024) was given by the lead developer Octophin's Filip Hnizdo; Recent research – including the Emergency Species Recovery Plan – on the endemic Chagos brain coral (*Ctenella chagius*) was explained by Oxford University's Dr Bryan Wilson, who has since become a Trustee; and three decades of stunning Chagos footage was shared by Jon Slayer, who supplies most of the images we use on social media and our website, as well as *Chagos News*.

The event also marked my one year anniversary as Director of the Trust, so the AGM offered a perfect opportunity to explain to all present (attending in person, and online) about the rest of the work we are doing, and what we plan to do in the immediate and long-term future.

This has been encapsulated in our new five-year strategy launched last August, which sets out our strategic objectives, and how we as a charity – in consultation with the Chagossian community – intend to achieve them. As well as our vision and mission to conserve, protect, and inspire a greater understanding of the precious and unique environment of the Chagos islands.

Media training by Dominic Riding for the CCT Board, and members of the Chagossian community.

CCT Director, Sarah Puntan-Galea, presenting the post-AGM Speaker Event at the Zoological Society of London.

We launched it via our social media platforms, which continue to announce the Trust's news – so follow us on Facebook, Instagram, LinkedIn, X and YouTube this year because we have lots of exciting work in the pipeline, including launching our new website, members' talks, an intern scheme, and a Director's Podcast.

We will once again be posting this year's AGM across all our social media platforms, scheduled for Wednesday 27 March 2024 at the Geological Society in London. If you have not had a 'save the date', please email our Membership Secretary Chris Davies to be added to the guestlist on membership@chagos-trust.org. Like last year, there will be a special members' event before proceedings, and then a speakers' event and reception afterwards – so be sure to attend and not miss out!

We also post about environmental issues of interest to the Chagossian and wider scientific community, as well as related conservation news, from other successful rewilding projects to scientific papers covering the waters off the Chagos Archipelago. Plus, we continue to advise regional networks, the media, the UK Government and Opposition, and anyone who requests information about the Chagos environment and scientific work we are carrying out there.

Which we also conveyed via speeches given by CCT Trustees and staff, including Dr Carr's presentation at Art Basel Miami's 'The Art of Saving the Ocean: How Island Restoration Saves People and Nature' hosted in conjunction with Art Basel Miami, and in collaboration between Re:wild and the Bertarelli Foundation's Marine Science Programme. We can achieve more together, so partnerships will remain key moving forward to helping us achieve our aims.

It's been a year of political uncertainty for the islands. Staying abreast of everything Chagos-related and lobbying all stakeholders is a key part of my role, so I can keep the Board up-to-date and advise on action that is best for the Trust. We remain neutral on any political issue, and ready to work with every and any like-minded organisation who want to protect and conserve the archipelago.

If you want to support our work moving forward, why not become a member? Or donate. We will also have a new Chair this year, and need to replace retiring Trustees. So if you feel you would like to be considered for a Board position, and have specific skills (as well as a few hours each week to volunteer, especially with fundraising), then do reach out to us via info@chagos-trust.org for an informal chat – Trustees not only attend meetings, but also gain invaluable skills, like the recent media training event we held at Somerset House in London. We look forward to another year of activity.

Sarah Puntan-Galea

Vegetation Management Plan Update

Research Expedition 2023

By Dr Peter Carr, '*Healthy Islands, Healthy Reefs'* Project Manager

Photo © P Carr

Photo above: The author preparing to conduct an island survey. The most important find of the expedition was the graveyard on Eagle Island, possibly not seen by anyone since 2006.

Photo © P Carr

Photo above: Finding and mapping the former settlement on Sudest, Egmont Islands, was an unforgettable and slightly unnerving experience. The derelict building on the right of the picture was thought to be the plantation manager's house.

In February 2023 *Chagos News* No 60 offered a three-part update on the Chagos Archipelago Vegetation Management Plan (VMP), a Chagos Conservation Trust (CCT)-led rewilding project to convert the invasive abandoned coconut *Cocos nucifera* plantations in the four northern atolls into habitat that will increase biodiversity. The project specifically aims to encourage breeding seabirds back to the islands as recent science has clearly demonstrated the link between 'healthy islands' and 'healthy reefs' (Graham NA *et al*., 2018).

The third part of the update highlighted that to write a comprehensive VMP, some questions had to be answered and these centred around the extent of forestry operations required and the most efficient way of achieving them. A key question in terms of logistics was whether the forestry operations could be conducted by heavy machinery, or if the work had to be undertaken manually (by chainsaw) – the answer to which would inform the planners whether the work would take months mechanically or years if manually. To answer these questions, CCT sponsored a research expedition to the northern atolls in July-August 2023. This article gives details of this expedition.

Mounting out of Male in the Maldives, Lieutenant Colonel John Fidler late of the Royal Marines – an expert in the management of landing vehicles and equipment on beaches from a mother-craft – and I sailed aboard the yacht *Jocara* south to the Chagos Archipelago. Professor John Potter and Caroline Durville were the skipper and crew of *Jocara* and are Chagos expedition veterans, providing *Jocara*'s services to the C-Rove expedition in 2021 and the CCT-sponsored '*Healthy Islands, Healthy Reefs'* expedition in 2022.

July and August are not favoured months for sailing in the central Indian Ocean due to the expectation of poor weather conditions, especially strong winds and rough seas. This was not the case for our transit south, where we motored for six days before arriving in Peros Banhos on Monday 17 July. The weather continued to be unkind throughout the expedition. Whilst working in the atolls we hoped for light winds in order to have a stable platform to work from and easy landings on the islands. This was not the case, for nearly all of our time in the atolls we were plagued by strong winds, electric storms and choppy seas. When the research had finished and we began our transit north back to the Maldives, the wind completely died and we had to motor all the way back!

As outlined in *Chagos News* No 60, our goal was to ascertain which islands forestry equipment could be landed upon, what extent of work was needed on the islands, and to map sites of cultural and biodiversity importance. It was apparent before the expedition that it would be impossible to visit and map every environmentally degraded island in the time allocated for the expedition. Therefore, we had to prioritise the islands we were to visit. Fortunately, the environmentally degraded islands had already been prioritised for rehabilitation in the VMP Feasibility Study (Carr P. 2023) and this was used to focus the research see (Table 1).

The top four priority areas were all visited and mapped (Eagle Island, Egmont Island atoll, Yeye/Manoel and Passe/Moresby in Peros Banhos). In order to capture the requirements of the remaining two priority areas (western Peros Banhos and Salomon Islands atoll), specimen islands that

Table 1.
The environmentally degraded islands of the northern atolls broken down into working components and prioritised for ecological rehabilitation with justifications and comments.

Priority	Component	Justification and Comments
1	Eagle Island, Great Chagos Bank	Minimal chance of reinvasion of rats after eradication due to isolation – the nearest rat-infested island is approximately 50km away. Situated in a breeding seabird-triggered Important Bird and Biodiversity Area with the closest breeding island being 3km away. Largest island in the northern atolls at 2.52 sq km. When rehabilitated it would increase the area available for breeding seabirds by approximately 75%. No access granted to visiting yachts.
2	Egmont Islands	Minimal chance of reinvasion of rats after eradication due to isolation – the nearest rat-infested island is approximately 50km away. Combined, when rehabilitated, Sudest and Lubine complexes would increase the area available for breeding seabirds by approximately 110%. Closest seabird breeding island is approximately 30km away. No access to visiting yachts. Both complexes of the Egmont Island atoll will need to have its vegetation managed in a single operation prior to rat eradication.
3	Yeye and Manoel, Peros Banhos	Both islands are situated in a breeding seabird-triggered Important Bird and Biodiversity Area with the closest breeding island being approximately 7km away from Yeye and 2km from Manoel. Both lay within a Strict Nature Reserve with no access to visiting yachts.
4	Moresby and Passe, Peros Banhos	Both islands are situated in a breeding seabird-triggered Important Bird and Biodiversity Area with the closest breeding island being approximately 3km away. Due to there being less than 20m between the two islands at high tide, prior to rat eradication, the islands will both require vegetation management in a single operation.
5	Western Peros Banhos	Access allowed to visiting yachts by permit. Therefore, if rehabilitated, there would still be the possibility of human disturbance to potential breeding seabirds. The large area of the western Peros Banhos group of islands suggest disturbance would be less than the smaller, enclosed atoll of the Salomons. Due to the minimal distances between islands along this chain, prior to rat eradication it should have its vegetation managed in a single continuous operation.
6	Salomon Islands	A small, enclosed atoll with access allowed to all islands by visiting yachts by permit. See western Peros Banhos. Due to the close proximity of islands and the enclosed nature of the atoll, prior to rat eradication, the vegetation management should be carried out as a single continuous operation.

typify the habitat of all the islands were visited and mapped – in this case we used Coin, Anglaise, Diamant and Grand Mapou in Peros Banhos as the representative islands.

At each island the team would first head ashore. After reconnoitring and assessing on land the likely landing beaches, John would rig his kayak with underwater mapping cameras and equipment and spend the following hours paddling the proposed route into the selected landing beach. This activity was weather dependent, because the cameras had to be relatively stable to produce accurate bathymetric charts.

Concurrently, I would be walking the interior of the island looking for and mapping sites of biological and cultural significance. In addition, I was ground-truthing the vegetation communities on islands identified previously by colleagues from Royal Botanic Gardens Kew through desk top research as part of a study in 2017 sponsored by CCT (Wilkinson T. 2017).

When the two sets of data are combined (bathymetric and terrestrial), an operational chart/map is produced, which will be used by coxswains piloting the forestry equipment ashore.

Each of the environmentally degraded islands of the northern atolls will now have the specific vegetation management required detailed in the VMP and will have associated maps for the forestry teams to work to. (An example of a terrestrial management map is at the end of the article.) The priority islands, those that are likely to be managed first, will have the same maps produced and where applicable, the associated chart for the delivery ashore of forestry machinery. Through the data gained on the research expedition, it is now possible to accurately cost the vegetation management required on each degraded island. When added to (the much easier to calculate) cost

Photo below: A surprise find on Diamant, Peros Banhos: a small wetland in the northwest corner of the island is now a large wetland covering most of the northwest end of the island.

Photo © P Carr

Photo © P Carr

An example of an island vegetation management map produced for the Vegetation Management Operational Plan. This example is of Yeye, Peros Banhos. The pale-yellow area is the entire area that could be managed. The red circles are indicative of where the foresters are to manage by clearing Coconut *Cocos nucifera* in 50m diameter circles (large circles), or 30m diameter circles (small circles) in the management area. The inset picture is an example of how to clear and store fallen or sprouting coconut nuts to prevent regrowth of the unwanted species. It should be noted there is a 25m buffer from the beach-head inland to protect the environmental services provided by coconut in the fight against coastal erosion.

of rat eradication operations on each island, it is now possible to calculate the funds required to rewild individual islands, clusters of islands such as in Table 1 or, indeed, all of the environmentally degraded islands together.

The research on the priority islands produced some highlights and surprises. For example, a small wetland in the northwest corner of Diamant, Peros Banhos, viewable on Google Earth, is now a splendid large wetland covering most of the northwest end of the island! It also held some rare wading birds, large shoals of fish fry and some large unidentified fish.

Similarly, on Sudest, Egmont Islands, a large wetland was known to exist, as were other much smaller open areas that possibly were ponds. What was not obvious from the aerial views available is that these areas are all connected

Photo © P Carr

The Black Mangrove *Lumnitzera racemosa* forest on Eagle Island is possibly drying out, as evidenced by the savannah-like grassy ground layer forming underneath.

by a water course. There are obvious implications to the drivers of forestry vehicles of these wetland features.

Interestingly, on the wetlands on both Diamant and Sudest, small populations of Common Moorhen *Gallinula chloropus* were found, presumed breeding on the latter. This species was thought to have colonised the wetlands of Diego Garcia as recently as the 1990s, and the birds found in the northern atolls were the first ever recorded there.

The Black Mangrove *Lumnitzera racemosa* forest on Eagle Island was another area that brought a surprise. Having visited this mangrove forest several times since 2008, it has always at least been wet underfoot. When mapping the circumference of the forest on this trip, it was a surprise to note the ground under the mangroves was drying out and starting to look like (grassy) savannah habitat. This very rare vegetation community in the Chagos Archipelago, being found only on Eagle and Moresby, has been mapped and ring-fenced in order not to be disturbed by forestry operations in the surrounding abandoned coconut plantations.

From a heritage perspective, it was very satisfying (and lucky) to find and map the graveyard on Eagle Island. This once inhabited island obviously held a burial ground but its exact location was not known. Possibly, the last time anyone had seen this heritage site was in 2006 when the rat eradication team lived on the island for several weeks. To have mapped this area to ensure it will not be

disturbed by forestry operations was a key piece of data to add to the management plan.

The other highlight and important area to have found and mapped was the former settlement on Sudest, Egmont Islands. This island was abandoned in the 1930s and is very difficult to move around in the interior due to the dense vegetation that has taken over in many areas. However, the settlement area was obvious from the sea due to the Takamaka *Calophyllum inophyllum* trees (used as shade trees in the settlements) towering over the abandoned coconut plantations. Walking through and mapping the large settlement area, finding what appeared to be the church and plantation manager's house and feeling the past all around was an unforgettable and slightly unsettling experience.

It is CCT's intention to liaise with the Chagossian community to share our findings and to seek advice on how they would wish the vegetation management to be undertaken, in order to not disturb or damage sites of cultural significance.

Perhaps the biggest surprise was the vegetation management requirement workload. On examining aerial photographs prior to the expedition, the feeling was that heavy forestry equipment will be needed on most islands – with the associated logistic challenges this method brings. On physically inspecting the islands this was not the case and this is extremely good news. Whilst all the islands over 1sq km will need forestry machinery landed ashore, some of the high priority islands such as Yeye and Manoel in Peros Banhos merely need a small team of foresters put ashore with chainsaws to conduct the management. This work, essential to enhancing the prospect of a successful follow-on rat eradication operation and for producing habitat conducive to breeding seabirds would need days, not weeks or months.

In summary, despite the hardships presented by adverse weather conditions (becalmed when we needed wind and windy when we wanted calm conditions!), the research expedition was a success. All of the top priority islands were surveyed and 'type' islands were surveyed that represented the bottom two priority clusters of environmentally degraded islands. CCT is now in a position, having completed the vegetation management Feasibility Study and Environmental Impact Assessment to write the Vegetation Management Operational Plan.

Commander John Topp RN, the founder of Friends of Chagos, the forerunner of CCT, bequeathed a sum of money that was to be used for botanical survey work in the archipelago (the John Topp Botanical Fund). Having personally known John both when he was the British Representative on Diego Garcia in the Royal Navy and after when he chaired CCT, I believe he would salute CCT's leadership in rewilding the Chagos Archipelago and consider the funding of the Vegetation Management Plan Research Expedition in July 2023 money well spent.

Finding and mapping the graveyard on Eagle Island in order that it is not disturbed by future forestry operations was a key moment in the VMP expedition.

Photo © P Carr

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Why the Chagos Marine Protected Area Must Remain

By Lotte Purkis, US-CCT Secretary

The Chagos Marine Protected Area (MPA) is located in the central Indian Ocean and spans an area of 640,000 sq km. It is the most remote MPA in the world and, for this reason, one of the most precious. Looking forward to the future, the Chagos MPA needs global support and international collaboration to maintain its status, and to preserve it for future generations.

The history of the MPA

It was in 1972 that Prof. David Bellamy, OBE, Hons FLS, headed the first Joint Services Expedition to the Chagos Islands. With enthusiasm for its scientific possibilities, he returned again in 1975 together with Prof. Charles Sheppard, OBE, PhD.

These inaugural expeditions provided a baseline prior to climate change having been noted to have visible global impacts. There were several smaller expeditions to Chagos over the centuries. The most important and detailed, beginning the 'modern' era is *Atoll Research Bulletin* No 149 'Geography and Ecology of Diego Garcia Atoll, Chagos Archipelago', by Stoddart and Taylor, documenting the 1967 US/UK expedition. That expedition took place in conjunction with engineering studies by the Royal and United States Navies, in preparation for the military development of the archipelago in the 1970s.

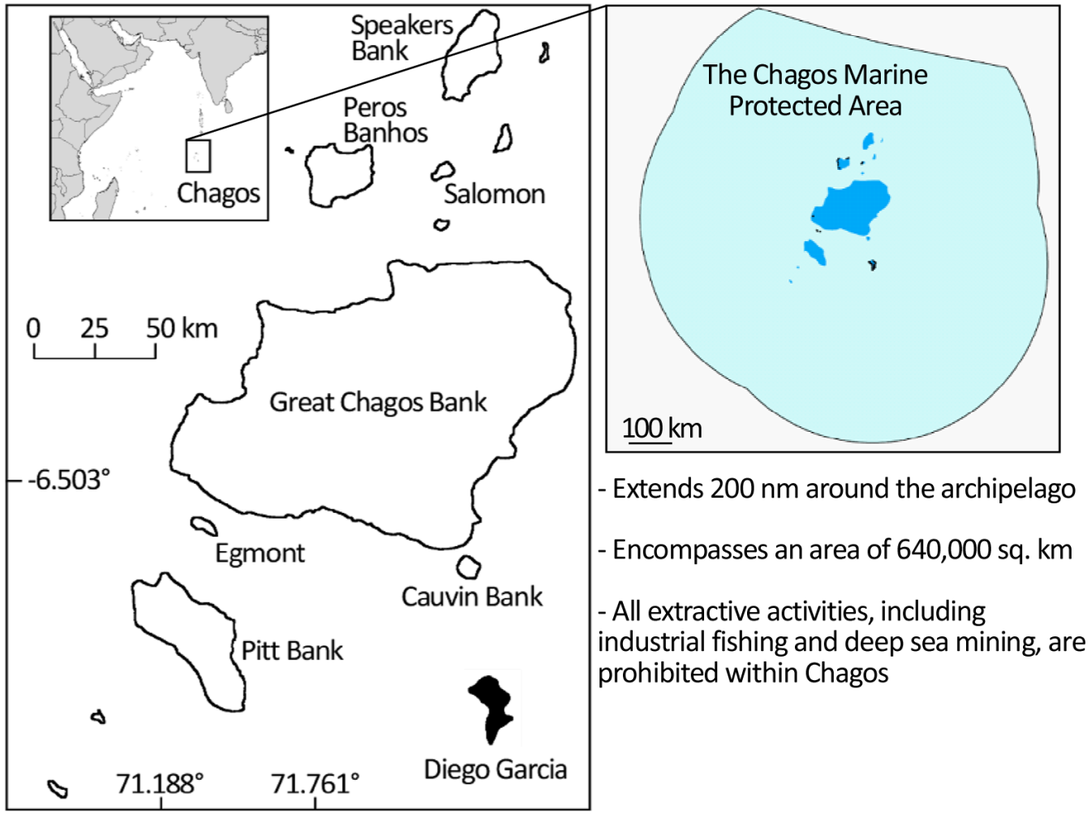
The Chagos Islands have a complex and disputed political history. As of today, the future is uncertain, but the US naval base on Diego Garcia remains and is likely to for the foreseeable

Sooty tern breeding colony © Archive of John Topp

future. In the context of the MPA, it's important to understand who the key players were. In 1984, Commander John Topp was appointed as the Royal Navy British Representative on Diego Garcia, who, together with Nigel Wenban-Smith, the Territorial Commissioner, began the issuance of conservation policies and directives for the islands and the surrounding waters. Steve Snell, Executive Officer of the US Naval Communication, was also stationed there in 1983 and 1984. Then, the following year, William Marsden CMG became Commissioner and remained as such until 1988, when he was succeeded by Richard Edis, who authored *Peak of Limuria*, which reignited conservation interest in the archipelago. These, among several others, including Ted Morris, the US Air Force liaison to the Territory from 1987-1988, first noted and drew attention to the exceptional beauty and the unique and isolated location of Chagos.

Their foresight was unprecedented, noting that conserving these islands and the surrounding waters could sustain food security for generations by providing a safe refuge and breeding site for migratory and reef fish. Other marine mammals, birds, and sea turtles would be able to establish populations unhindered by human activity. They noted the unique opportunity Chagos could provide scientists to distinguish and compare global environmental changes in isolation from anthropogenic influences. Whilst many contributed to the Chagos MPA, these particular individuals and their timely overlap together on Chagos, coupled with their motivation and collaborative efforts, began the journey towards the formal establishment of the Chagos MPA.

Figure 1: The Chagos Archipelgo lies in the centre of the Indian Ocean, occupying a southern extension of the Laccadive–Maldive ridge. While Diego Garcia, which is situated in the southeast of the Chagos, is one of the smaller atolls, at 28 sq km it hosts the largest emergent landmass, which accounts for 60% of the island area of the entire archipelago.



- Extends 200 nm around the archipelago

- Encompasses an area of 640,000 sq. km

- All extractive activities, including industrial fishing and deep sea mining, are prohibited within Chagos

Getting MPA status

In 2007, The Pew Trusts, an American NGO, was looking for locations worldwide where it might be possible to create large, fully protected (no-take) marine reserves. They supported the Chagos Conservation Trust (CCT) to produce a report on the importance and protection of the Chagos. It was at this time that William Marsden, the then chair of CCT, approached Commander Steve Snell, Prof. Sam Purkis, and Carol Garner to create the US arm of CCT, which is now chaired by Ted Morris. Carol worked closely with Pew in the US, and Alistair Gammell was working for Pew in the UK. These two were instrumental in creating awareness of the Chagos with Pew and brought together a campaign to persuade the British Government to declare the entire marine protected area a no-take marine reserve.

Parent and juvenile red-footed booby © John Topp

The Chagos Environment Network (CEN), as it was then known, was a collaboration of nine leading conservation and scientific organisations who collaborated to petition for the establishment of the Chagos MPA. The CEN members were: The Chagos Conservation Trust; The Linnean Society of London; The Marine Conservation Society; The Pew Environment Group; The Royal Botanic Gardens, Kew; The Royal Society; The Royal Society for the Protection of Birds; The Zoological Society of London; and Professor Charles Sheppard. They succeeded, and on 1st April 2010, the British Government established the Chagos Archipelago in the central Indian Ocean as the world's largest marine reserve, a 'no-take' zone larger than France or the state of California. The designation of these 640,000 sq km of ocean as an Environmental Preservation and Protection Zone (EPPZ) has had huge positive environmental impacts.

Furthermore, the Chagos MPA has 86 seamounts and 243 knolls that are protected from deep trawling (Yessen *et al*., 2011). These waters contain up to half of the healthy reefs in the Indian Ocean, making them one of the most ecologically sound reef systems on the planet. A legacy for both John Topp and William Marsden was the success in establishing the Chagos MPA. John Topp, the founder of the Friends of Chagos, now the Chagos Conservation Trust, left a significant sum that permitted CCT to continue its work. Since the creation of the MPA, the Bertarelli Foundation has funded crucial scientific work in the Chagos that has gone on to demonstrate the MPAs global value.

What is an MPA?

As a fully protected marine reserve, all extractive activities, including industrial fishing and deep-sea mining, are prohibited within Chagos. The Chagos MPA is a Strict Nature Reserve with IUCN Protection

Category I(a) that offers the highest level of marine protection to approximately 1.5% of the total global area of near-surface coral reefs. These are strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring.

Comparisons between more than 90 marine protected areas worldwide suggest that benefits increase exponentially with the accumulation of five key features: no-take zones being well enforced, length of time the MPA has existed (established for more than ten years), being large, and finally, being isolated by deep water. The Chagos MPA meets all five of these critical elements and is, undoubtedly, a precious resource, if we are not to lose and forget these coral reef habitats as one of our planet's primary producing ecosystems.

Why is it so important to maintain the Chagos Archipelago as an MPA?

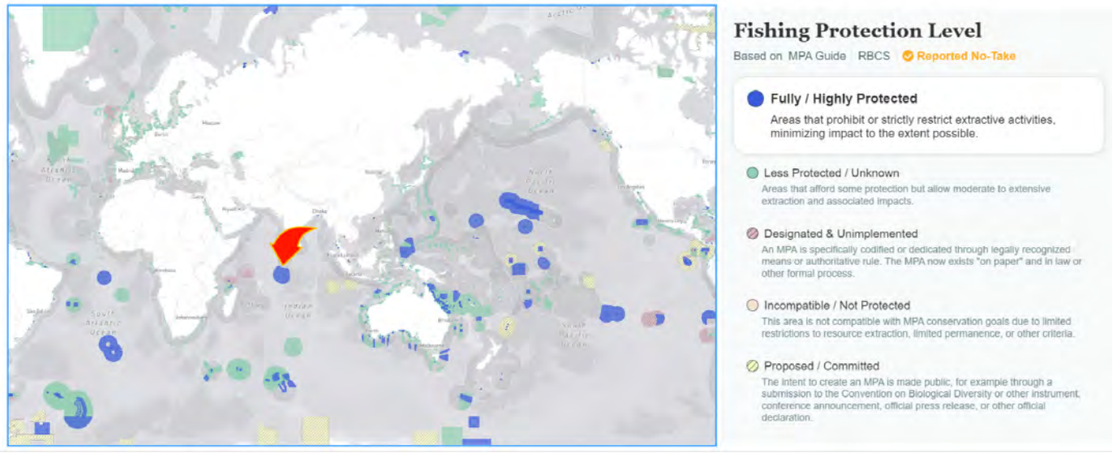
Isolated in the centre of the Indian Ocean, the Chagos MPA enjoys virtually no direct impact from human activities (aside from the single military base on Diego Garcia) and can be used as a valuable scientific reference site. The Chagos corals and marine environment offer an unparalleled opportunity to conserve and protect the vast coral reefs that reside elsewhere on Earth. Since climate change is global, the Chagos reefs are also being affected, but unlike the reefs of the majority of the rest of the world, Chagos is spared the added environmental pressures associated with human activity: overfishing, coral mining, invasive species, pollution, tourism, industry, and offshore development, sedimentation, and so on. For this reason, Chagos serves as one of the few places on Earth against which we can gauge how an undisturbed coral reef should function in the face of climate change. The Chagos Archipelago represents the last pristine set of reefs left in the Indian Ocean.

A key theme of the ongoing research in MPAs and particularly the Chagos, is the effort to understand how uninhabited and extremely remote ecosystems have the ability to rebound so well from disturbances that would lay more impacted areas to waste. These lessons on understanding resilience from Chagos are key findings that are now much better understood and give us the tools to tease apart the undeniable impacts that humans are having on coral reefs in other parts of the world.

What would happen if its status was lost?

Teeming with life, the Chagos MPA enriches and replenishes the ocean with the ecological goods and services on which millions rely. In fact, the Chagos MPA conserves marine life and, ultimately, the sustainability of much of the Indian Ocean. As caretakers, policymakers, and global citizens, it is paramount that the Chagos MPA is retained and maintained. It may not happen overnight, but the cumulative effects of losing such a resource will have a catastrophic effect on biodiversity and human life because livelihoods are intricately interconnected and dependent on the health of the Indian Ocean.

Figure 2: From Marine Conservation Institute (n.d.), showing the fishing protection level of the Chagos MPA.



Vibrant forereef with abundant Acropora coral cover © Anne Sheppard

Moving into the future, the preservation of the Chagos MPA will require vast international collaborative efforts. The more people worldwide who believe in maintaining the MPA, the greater the incentives and support for those honored enough to be charged with its caretaking. There will always be an excuse that this location is too sensitive and politically complicated to get involved in – but isn't that always the way with a valuable sort-after resource?

Express your support for the preservation of the Chagos MPA today by becoming a member of the Chagos Conservation Trust, or CCT-US.

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Protecting the Reef Manta Ray Population

By Dr Joanna Harris, Manta Trust's Chagos Manta Ray Project Director

Manta Trust © Simon Hilbourne

Reef manta rays (*Mobula alfredi*) are large zooplanktivorous elasmobranchs that live in small, geographically isolated populations throughout the Indo-West Pacific Oceans. These populations tend to have a limited home range and centralise most of their activities, such as feeding, at specific locations where they often exhibit aggregation behaviour. The species is listed as 'Vulnerable' to extinction on the International Union for the Conservation of Nature's (IUCN) Red List of Threatened Species (Marshall *et al*., 2022) and is under increasing pressure from a multitude of anthropogenic threats, particularly target and bycatch fisheries, which are most prevalent in the Indian Ocean.

Reef manta rays are commonly exploited for their cartilaginous gill plates; sieve-like structures used to filter their zooplankton prey from the ocean. Gill plates fetch a high price, particularly in Southeast Asia, where they are falsely marketed as having medicinal properties. As one of the least fecund of all elasmobranch species with the lowest intrinsic rate of population increase, they struggle to recover from exploitation (Dulvy *et al*., 2017). Furthermore, their geographic isolation makes them extremely vulnerable to regional extinctions, which have already occurred in the Indian Ocean with more expected in the next few years (Dulvy *et al*., 2017). As well as target and bycatch fisheries, habitat degradation, pollution and extreme touristic pressure threaten the species survivorship.

A population of reef manta rays inhabit the Chagos Archipelago, a region that has little development, no commercial tourism and is encompassed by a vast no-take Marine Protected Area (MPA). These characteristics make it one of the few locations in the Indian Ocean where the species are protected from many of the pressures that are driving them towards extinction, making the population a potential stronghold for the species. Nonetheless, illegal, unreported, and unregulated (IUU) fishing poses a substantial threat, and the possible future repurposing of the MPA could weaken its protective capacity and expose the local and global reef manta ray population to further risk of decline.

To mitigate the risk of fishing pressure it is essential that we develop a detailed understanding of how reef manta rays utilise the marine environment of the Chagos Archipelago on multiple spatial scales, to help prioritise current MPA enforcement activity and inform future spatial planning. For the last four years, this has been my mission as part of my PhD with the University of Plymouth and as leader of the **Manta Trust's Chagos Manta Ray Project**.

Before my research began, the reef manta ray population of the Chagos Archipelago was largely undocumented, but Egmont Atoll in the southwest of the archipelago was already recognised as an aggregation hotspot. Therefore, I primarily focused on this location using a combination of techniques including acoustic telemetry, advanced oceanographic technologies, and stable isotope analysis to monitor the movements and foraging patterns of a total of 98 reef manta rays. In collaboration with my supervisory team at the University of Plymouth (Dr Clare Embling and Dr Phil Hosegood) and the Manta Trust (Dr Guy Stevens) and with generous support from the Bertarelli Foundation and the Garfield Weston Foundation, my findings have provided a valuable insight into how the species utilise space on multiple scales [fine- (<1km), meso- (10 to 100km) and broad-scale (>100km)] and how this is associated with their foraging ecology.

Egmont Atoll is a critical habitat that is frequented all year round with reef manta rays spending, on average, 77% of their tracking days at the atoll, which is one of the highest residency levels ever observed (Harris *et al*., 2023b). A network of key habitats including twelve feeding areas and two cleaning stations were identified, at which peaks

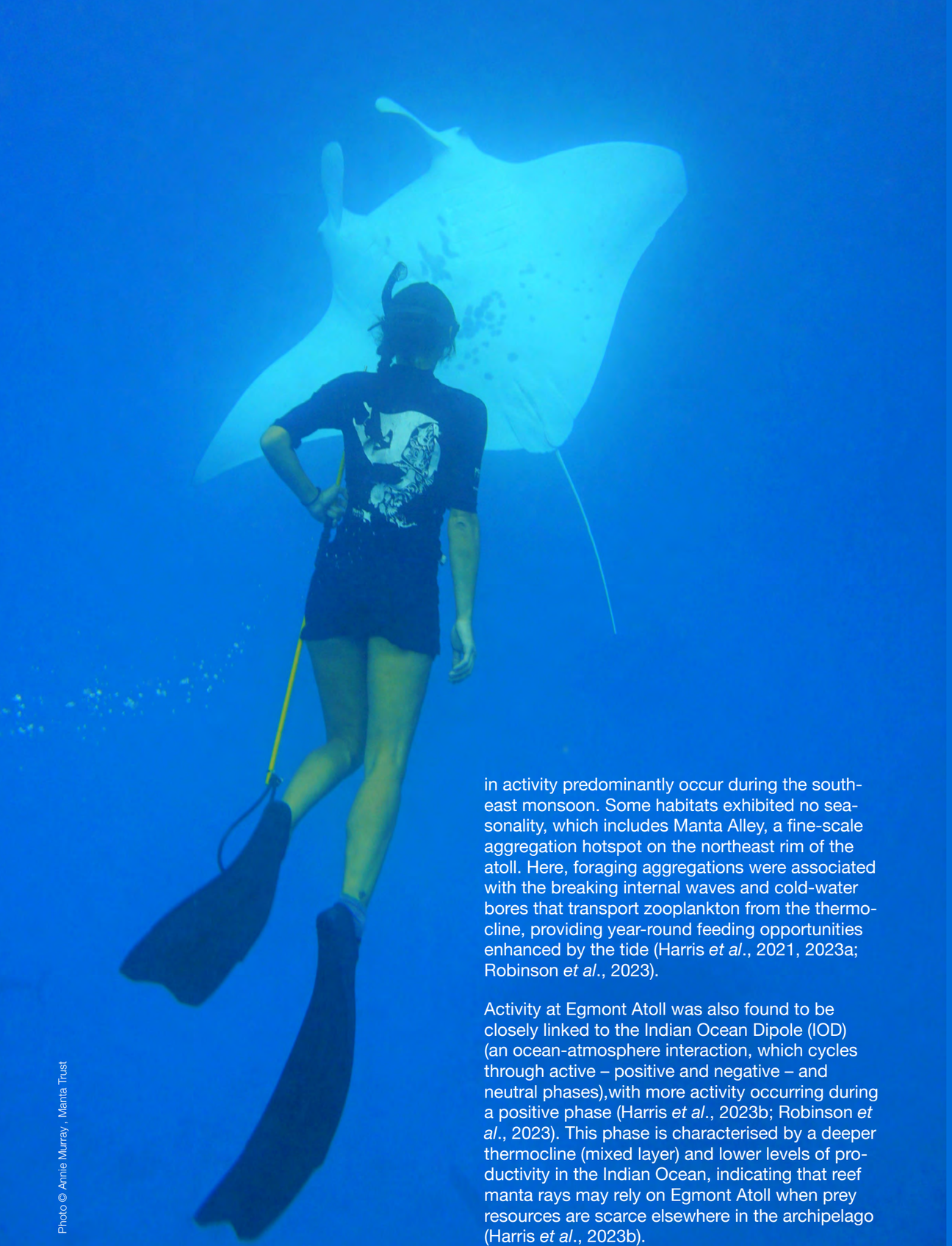

Photo © Annie Murray , Manta Trust

in activity predominantly occur during the south-east monsoon. Some habitats exhibited no seasonality, which includes Manta Alley, a fine-scale aggregation hotspot on the northeast rim of the atoll. Here, foraging aggregations were associated with the breaking internal waves and cold-water bores that transport zooplankton from the thermocline, providing year-round feeding opportunities enhanced by the tide (Harris *et al*., 2021, 2023a; Robinson *et al*., 2023).

Activity at Egmont Atoll was also found to be closely linked to the Indian Ocean Dipole (IOD) (an ocean-atmosphere interaction, which cycles through active – positive and negative – and neutral phases),with more activity occurring during a positive phase (Harris *et al*., 2023b; Robinson *et al*., 2023). This phase is characterised by a deeper thermocline (mixed layer) and lower levels of productivity in the Indian Ocean, indicating that reef manta rays may rely on Egmont Atoll when prey resources are scarce elsewhere in the archipelago (Harris *et al*., 2023b).

The Manta Trust

Formed in 2011, the Manta Trust is a UK registered charity with a vision of a sustainable future for the ocean, where manta rays and their relatives thrive in healthy, diverse marine ecosystems. The Manta Trust collaborates with affiliates around the world through research, education, and providing expert advice to drive the policies and practices necessary to conserve manta rays, their relatives, and habitats. The Manta Trust team comprises a diverse group of researchers, scientists, conservationists, educators and media experts, working together to share and promote knowledge and expertise. To find out more go to mantatrust.org and follow @MantaTrust.

Identifying other key habitats throughout the region is essential for developing broadscale protection strategies. Therefore, stable isotope analysis was used to investigate the population's foraging ecology and identify probable feeding locations throughout the Chagos Archipelago (Harris *et al*., 2023a). The findings revealed that reef manta rays primarily feed in nearshore environments, potentially in areas with enhanced primary production due to the coastal advection of nutrients in seabird guano during periods of high rainfall. Variations in isotopic values may be linked to changes in rainfall patterns associated with the IOD that may affect nutrient transport. Two distinct forging strategies were identified: local and wide-ranging, whereby reef manta rays limited foraging to Egmont and Diego Garcia Atoll in the south of the archipelago or foraged in both the south and the north (Peros Banhos and Salomon Atoll). Most individuals switched between strategies, indicating that they frequently move between atolls, aiding nutrient transport across ecosystems but also increasing their vulnerability to widespread IUU activities.

Collectively, the findings of this research highlight the significant role of Egmont Atoll in supporting the reef manta ray population of the Chagos Archipelago and provide evidence that can help inform current enforcement patrols and assist future spatial management that will also help to protect this important reef manta ray population.

This has now been recognised by the IUCN Species Survival Commission Shark Specialist Group, who have designated Egmont Atoll an **Important Shark and Ray Area** (ISRA) based on my research and proposal collaboration with Théophile Mouton. The ISRA approach includes four scientific criteria and seven sub-criteria that identify crucial three-dimensional habitats for threatened elasmobranch species, which will help inform conservation efforts and spatial planning for Egmont Atoll.

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The Rare and Fascinating Chagos Mangroves

Dr Mark Spalding, University of Cambridge
and Chagos Chief Scientific Advisor

© Harri Morrall

Mangroves are a group of trees that have adapted to grow in the intertidal zone, in waterlogged salty soil. It's a tough environment, and only a few species, from diverse plant families, survive here. They have evolved to exclude salt, and to live in soft oozing muds where it can be hard to remain stable, and where there is little or no oxygen available to their roots. While in some parts of the world mangroves can form great forests, in Chagos they are rare and somewhat diminutive, but still fascinating.

Like many remote islands, the Chagos islands do not host a huge diversity of terrestrial plants or animals. Its native species have all arrived across the ocean, by floating, rafting or flying. So, while mangroves are abundant and diverse on all sides of the Indian Ocean, only two species have made it to the middle, to Chagos: *Lumnizera racemosa* (the small-leaved mangroves) and *Pemphis acidula*. Both have formed small fringing forest patches around the margins of tiny closed lagoons, and being over 600km from their nearest neighbours in the Maldives, the Chagos mangroves may be among the most isolated mangroves in the world.

The Lumnizera mangroves on Eagle Island, showing their small aerial roots © Mark Spalding

Lumnizera has its best formations on Moresby Island, in Peros Banhos. Here a long, narrow, salty lake lies cut off from the sea by a narrow bar of rock and sand. Seawater overtops this bar on the highest tides and during storms, but for the most part the water is probably isolated and can be superheated on hot days. Some of the trees here grow with their bases permanently submerged in the shallow margins, but at the landwards margins others have one of the signature features of mangroves – aerial roots.

Not as impressive as many other mangrove species, nevertheless the strange loops of roots that rise out of the soil all around the plant are strange to see. These are critical pipelines, enabling the transport of oxygen to the submerged roots all around. Working out into the open water, the bottom of the pool is filled with a deep oozing layer of soft peat. Red-footed boobies often nest here, as the trees growing in water are less plagued by rats.

On Eagle island, the *Lumnizera* forest is very different – here the trees are in a waterlogged soil, but there are just a few patches of permanent water on the soil surface, and the mangrove trees grow amongst grassland ferns and other trees. It may be that this is a mangrove forest that is gradually being overtaken by terrestrial vegetation.

Pemphis is a short, shrubby tree, more opportunistic than other mangroves, it is sometimes found growing on rocky shores and even just above the high tide. Some experts suggest it doesn't 'count' as a true mangrove, and indeed you can find it growing on the rocky margins of some parts of Shark Cove in Diego Garcia. Still, where it grows on lagoon margins in Ile Anglaise, Salomon Atoll, it is entirely mangrove in its form. Here the lagoon is similar to Moresby, but there are three smaller areas of tree-fringed pools.

But there may be more regular connection to the sea, as fish can be seen – milkfish *Chanos chanos* and pompano *Trachinotus bailloni*. These fish are tough, they can survive the fluctuations of heat and salinity typical of the 'flats' or shallow waters of coral reef shores, and are likely trapped in these pools for days or weeks on end.

Elsewhere in the Indian Ocean recreational fly-fishers spend hundreds of dollars a day to catch and release these species because of their tremendous fight. Dragonflies can be found here too, but sadly, another sign of the occasional inundation is litter – plastic has drifted into these mangroves in large volumes from thousands of kilometres away and is now trapped among the low branches and leaves of the mangroves.

Sea levels are rising and it seems likely that these isolated mangrove lagoons will become more regularly connected with the ocean in future years. That won't necessarily hurt them – they may be able to trap sediments and accumulate more peat, helping them to 'keep up' with rising seas. Indeed, more regular openings to the sea may enable them to spread their seeds more widely, allowing the colonisation of other lagoon margin lakes and inlets.

How to Grow a Coral Reef

Dr Natasha Gibson, Chagos Conservation Trust Chair

Coral are a very successful and long lived species, having first appeared around 485 million years ago when the southern continents were joined together as Gondwana and colonisation of the land by plants had just begun.

The Chagos Archipelago comprises seven coral atolls above the high water mark, nine submerged reefs and banks, and the Great Chagos Bank which is regarded as the world's largest atoll – although the islands extend for around 140km, only 60 sq km of land exists.

Coral atolls are ring-shaped islands with a rim or reef made up of coral that partially or completely encloses a lagoon. These rims are the coral polys' excretions of the mineral calcium carbonate that form exoskeletons in which to live.

Such reefs grow best in warm, shallow, clear, and sunny water, and so occur in tropical to subtropical environments such as the Indian Ocean and South Pacific. There are very few in the Atlantic as it lacks the necessary basement geological platforms.

Salomon Atoll © Rob Dunbar

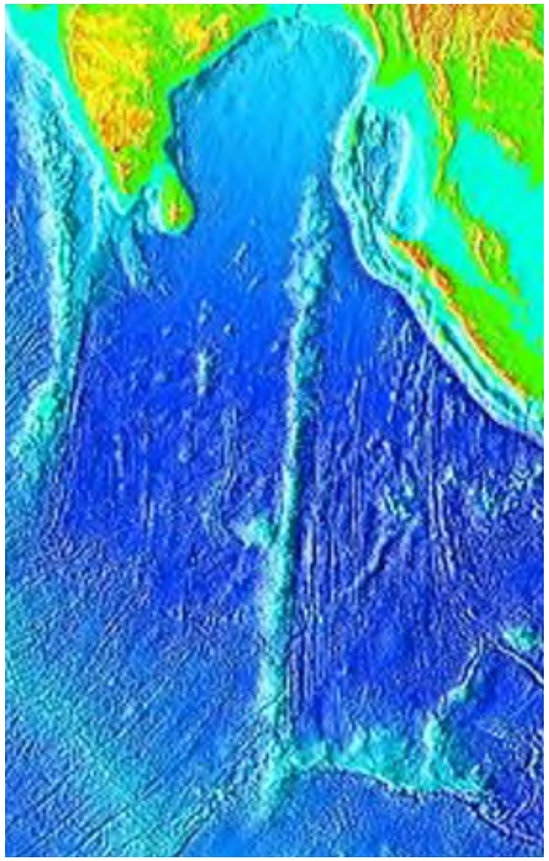


Figure 1: Magnetic image of Chagos-Laccadive Ridge

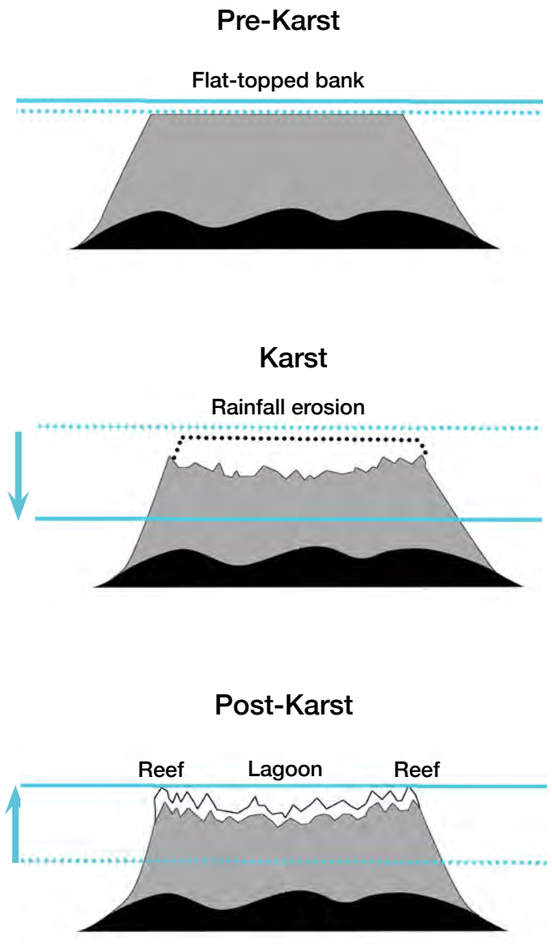
The Chagos corals rest on a volcanic base, which formed from a focused, isolated plume of hot magma that erupted to the surface as volcanoes. This 'hotspot' produced the Deccan traps in western India, the Laccadives, and the Maldives, and then much later Mauritius, Reunion, and Rodrigues. Volcanism of this type doesn't result from the hotspot moving, but rather plate tectonics, which in this case was the Indian subcontinent plate moving northwards.

When the Indian subcontinent moved out of the way, a clear north to south line of volcanics called the Chagos-Laccadive Ridge (CLR) resulted as shown in Figure 1. The CLR extends from approximately 10°S to 15°N, is asymmetrical with a steeper eastern slope, and an average depth of less than 1,000 metres. The islands of Chagos, Maldives and Lakshadweep are therefore the above-water areas of this Ridge.

The Chagos volcanoes formed between 60-45 million years ago, and were subsequently submerged below sea level due to the ongoing continental movements. Cooling of the volcanic rock caused contraction, which in turn resulted in subsidence of the islands. The islands are seismically active, and large magnitude earthquakes can cause subsidence or uplift. This explains why Coin du Mire in Peros Banos is five metres higher than the other islands, which are typically less than two metres above sea level.

Because the CLR is relatively shallow, over the long time period to present, marine organisms would have preferentially lived around these areas, and in death, enough calcium carbonate skeletons from shelled animals would have drifted to the bottom to form limestone. There were probably older coral reefs, as many formed during the period from five to two million years ago when the Earth's climate was relatively warm and sea levels constant.

Figure 2: Formation of atolls from dissolution of limestone bases



Typically limestones and most coral reefs are horizontal formations, so if the sea level drops for any reason, then the top flat is exposed to weathering and more importantly, rain. Rain is slightly acidic, so calcium carbonate dissolves, which is the process that produces caves. In an oceanic setting like the Chagos, the rate of dissolution of the exposed limestone is lowest along its rim and the highest in the centre, which over time forms a depression. If a structure was circular in the beginning, such as a coral mound, then a saucer-shaped island with a raised rim results.

When sea level falls and submerges the island again, this rim provides a rocky core on which coral can preferentially grow as they are closer to the sea surface and light. Over hundreds of thousands of years, this produces the distinctive atoll rim shape with the flooded bottom as a lagoon. This process is illustrated in Figure 1. Drilling investigations in the Maldives show that coral atolls started forming in this area around 500,000 years ago (Droxler, A.W. & Jorry, S.J. 2021.)

Which comes to the last piece of the puzzle – the influence of the Ice Ages, which have occurred around every 100,000 years for the last two and a half million years. These advances and retreats of polar glaciers alternately lock up or release water, resulting in significant sea level changes. The relative variation in sea level has been particularly marked in the last 500,000 years, just when we see atolls forming, with a range of up to 135 metres being found in the Maldives' investigations.

It should be pointed out that the corals of the Chagos today are geologically young, having been formed in the last 10,000 years after the end of the 'last Ice Age' (around 11,700 years ago) and the final melting of ice to produce a related sea level rise.

If you are interested in the most recent relevant science of coral atoll formation, this article is a good start – Droxler, A.W. & Jorry, S.J. 2021. 'The Origin of Modern Atolls: Challenging Darwin's Deeply Ingrained Theory'. *Annual Review of Marine Science* 13.

And if you are wondering about the reference to Darwin, he proposed that atolls represent eroded volcanic cones, but he didn't know about the influence of glacial sea level fluctuations!

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Figure 1: Available at: Wikipedia: Chagos–Laccadive Ridge

Atolls like Peros Banhos, illustrate how shallow some Chagos Archipelago reefs are © Jon Slayer

No Place to Hide: Plastics in the Chagos Archipelago

By Rachel Jones, Zoological Society of London's Marine Science Programme Manager

The Chagos Archipelago has, on the face of it, plenty of factors that should provide protection from plastic pollution. It is immensely remote, meaning hundreds of kilometres from centres of human population. The only resident population lives on the naval facility on Diego Garcia where waste is tightly managed, rarely leaking into the natural environment. Throughout the wider Marine Protected Areas (MPA) there are strict controls on resource use and potential sources of pollution. Transiting cargo vessels are even forbidden from disposing of plastic waste at sea.

And yet, wherever you look, the plastic is there… lots of it. Strewn across the beaches, piling up at the strandline, congesting under the Scaevola hedge at the top of the beach and consolidating into the sand column deep underground.

It is a disconcerting truth to face that no degree of protection of this incredible place can stop the plastic washing up, every high tide bringing in even more. So where is it from, how did it get here, and what solutions might we employ to tackle this seemingly endless problem?

Teams from the Zoological Society of London and Swansea University have been studying these questions for the last four years. The starting premise was to assess the degree that plastics interact with and potentially impact sea turtles. At the most significant point in their life history turtles, like plastic, can be found at the interface between land and sea. Digging deep pits at the top of the beach, females navigate a complex route through obstacles to create the perfect incubation chamber. Eggs are laid there, developing deep underground at carefully calibrated temperatures before tiny vulnerable hatchlings emerge and make the journey in reverse.

At each point in that sequence of events turtles are forced to interact with plastic debris on the shore and in the sand column; females may abandon nest pits when their digging efforts hit buried plastic in large quantities, nest temperatures may be affected by sub-surface plastics, and juveniles may encounter macro plastic obstacles to their short but perilous journey to the ocean. Research has shown that there is a close overlap between those beaches most used by turtles for nesting and those where plastic is aggregated in the greatest concentrations. These findings provide a challenge but also an opportunity. While we cannot clear every beach, all the time, we can target beach clean efforts in areas most used by turtles and at the times (the breeding season) when that has the most impact. Stressing the benefits of beach cleans for turtle nesting is a great way to keep volunteers engaged in the face of a relentless stream of new plastic arriving every day.

Our surveys across the archipelago have revealed detail on the composition and source of much of the plastic – useful information when looking for solutions. Somewhere between 60-80% of the beach debris recorded on any transect is composed of plastic – of this the majority falls into just three categories: polystyrene pieces, flip flops and drinks bottles. The latter category may comprise more than 40% of the plastic recorded overall, and the majority of the bottles would have contained water prior to finding their way into the ocean.

Bottled water has been a drinks revolution in the last 50 years – from a complete innovation to the dominant packaged drink globally. In areas where safe drinking water is not available, bottled water has been a health benefit, but single use water bottles are now a significant contributor to global pollution. However, the bottles themselves can tell us quite a story.

Packaging details, the design of the bottle shape, the label, the lid all contain information on where the bottle was made, when and by whom. This gives us an idea of when it was in use and an estimate of its transit time from point of use to its destination on a turtle nesting beach in the Chagos MPA. Top contributor to identifiable bottles on beaches in Chagos is Indonesia – the world's second biggest plastic polluter, with immense

Turtle in nets in the Indian Ocean (NB: stock image, not taken by author in Chagos) © Maxoidos

Plastic bottle on beach © Rachel Jones

coast lines, large populations and poor waste management infrastructure. Lying upstream of Chagos for much of the year means that despite the vast distances there is a direct transit route west and south aggregating and carrying plastic debris in huge quantities directly onto the beaches in Peros Banhos or Egmont Atoll.

Even more specifically the bottle data can point the finger at companies and brands – with a few key names coming up again and again. These data can provide a useful way into difficult conversations with companies about their environmental responsibilities, not just on their doorsteps but hundreds of miles away in threatened and protected ecosystems.

With a major plastic treaty currently in negotiation at the United Nations, environmental non-governmental organisations are working hard to make the voice of biodiversity heard in those discussions. Obligations coming from this treaty once signed and ratified will be the best way of turning off the plastic tap upstream and reducing the waste going into the world's ocean.

Finally, the plastics team are looking for end of life solutions – ways to deal with the plastic that is already here and that will continue to wash up daily for the foreseeable future. On islands like those in the Chagos Archipelago, and around the world, this is an outsized issue. Island communities have to deal with huge quantities of waste not of their own making, with limited waste management resources.

Our research is exploring new technology such as a 'board press' that can create a panel from 35kg of mixed beach plastic to be used in place of plyboard. The aim is to trial this tech. on the ground in places like Chagos, and provide ways for local communities to tackle their plastic problem and create a useful product out of it.

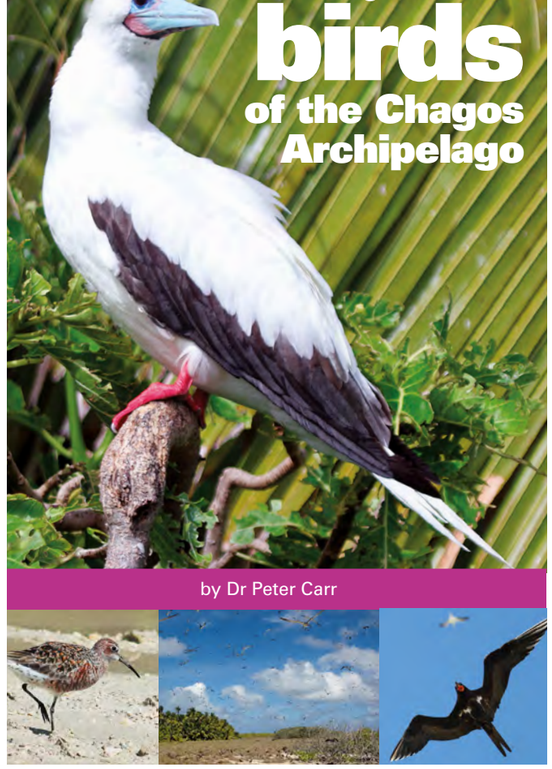
All science teams working in the Chagos Archipelago work hard to minimise their environmental impact, and this means reducing single use plastic right down as close to zero as possible. It's a simple and effective way of making a positive contribution to environmental quality and one that can be delivered wherever you are.

New Edition of Chagos Birds' Guide Published

By Dr Peter Carr, '*Healthy Islands, Healthy Reefs*' Project Manager

The first edition of my newly published book – *A Guide to the Birds of the Chagos Archipelago* – was called *A Guide to the Birds of the British Indian Ocean Territory* and was designed by NatureBureau of Newbury and released by Pisces Publications in 2011. It was one of the books in a planned series covering the birds of the United Kingdom Overseas Territories, sponsored by the Royal Society of the Protection of the Birds, and financed through the now defunct Overseas Territories Environmental Programme.

Figure 1: The front cover of the second edition of *A Guide to the Birds of the Chagos Archipelago.*



Writing the first edition was a labour of love, having lived and worked on Diego Garcia from 2008 to 2013. It took four months to write, and two years to gather all the photographs!

Whilst the writing of the text was completed in the allocated time, the gathering of the photographs took much longer – and it turned into a public relations exercise on Diego Garcia, after I put out a call to the island community for pictures of birds and many on-island answered. After this initial gathering of what was readily available, the search then started for the 'missing species', and a small team of dedicated photographers took it upon themselves to fill these gaps. This eventually led to all but eight of the photographs in the First Edition being of birds photographed in the Chagos Archipelago by people working or serving on Diego Garcia.

The second edition – chapters 1-3: The science

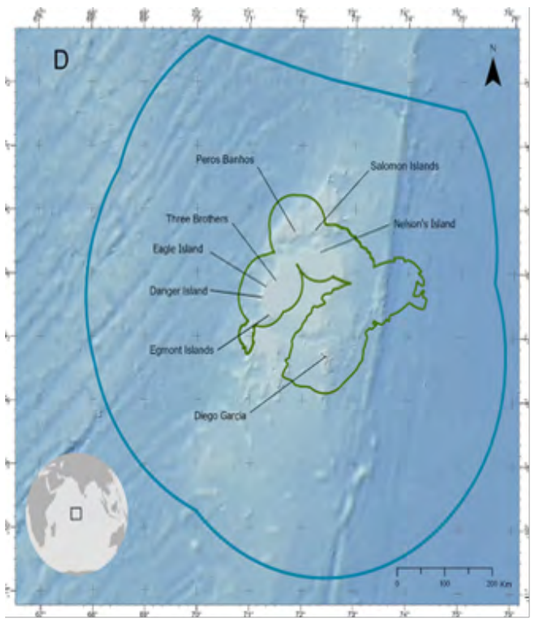
Since the First Edition, there has been a surge in scientific research undertaken in the Chagos Archipelago. The early science expeditions were funded through the Darwin Initiative, a UK government grant scheme. Latterly, funding has been primarily through the Bertarelli Programme in Marine Science. One thread of this research was the internationally important breeding seabirds of the archipelago.

I have been gathering records of birds, especially breeding seabirds since the publication of the First Edition. These records have been the foundation stone of much of the terrestrial research. In particular, they facilitated a review of the status and distribution of the breeding seabirds that in turn allowed a review of the terrestrial Important Bird and Biodiversity Areas (IBAs) and, for the first time, a search for marine IBAs. The Chagos Archipelago has had proposed the 11th largest marine IBA in the world that covers approximately a 10th of the c. 65,000 sq km marine protected area (Fig. 2).

Figure 2 (bottom left): Part of the recent scientific research that is included in the second edition. This is the newly proposed marine Important Bird and Biodiversity Area (mIBA) that is based upon seaward extensions to breeding colonies and pelagic feeding locations of red-footed Booby *Sula sula*. Blue border is the marine protected area, green border is the proposed mIBA.

Figure 3 (top right): Since the first edition there have been new additions to the checklist of birds found in the Chagos Archipelago. Here is a cotton pygmy-goose *Nettapus coromandelianus* found on 18 June 2018 by the author on Diego Garcia, a first for the Territory.

The seabird records also contributed to the science, which has given us a better understanding of the importance of seabird colonies on remote, oceanic islands and how these are beneficial – not just to the islands, but also to the surrounding marine environments. The records have also highlighted the plight of seabirds on islands that have introduced invasive rats, and have had their natural vegetation communities cleared for coconut harvesting. As a result, these records have been key to the Chagos Conservation Trust



starting their '*Healthy Islands, Healthy Reefs*' rewilding programme to eradicate rats and convert abandoned coconut plantations in the four northern atolls to make the habitat conducive to breeding seabirds.

As a result of the scientific research, the first three chapters of the Second Edition, have been entirely re-written, and now include a precis of the science and how it has enhanced our knowledge of the breeding seabirds, plus our ability to protect and conserve them.

The second edition – chapters 4-6: Birds and birding

Chapters four, five and six of the second edition are the meat of the new edition. The fourth chapter is essentially a 'where to watch birds' in the archipelago, with emphasis on Diego Garcia. Diego Garcia had its birding hot-spots identified in the first edition, and these have been reviewed since, because this island has been further modified by man, losing some key spots such as the airfield sewage works, but gaining others such as the Coral Sands Golf Course lake.

The fifth chapter identifies 50 species likely to be encountered in the Chagos Archipelago, broken down into the categories of Introduced Species, Seabirds and Landbirds. Each of the 50 species has a photograph with accompanying text and there are also thumbnail extracts, often with a photograph, of all other species in these three categories that have been recorded in the Territory. Chapter six is a checklist of the birds of the Chagos Archipelago, including their status and dates of occurrence.

Chapters five and six have been updated since the first edition, reflecting both the change of status of species, and the finding of new species for the area – many found by me. The change of status of the majority of (non-seabird) species have been brought about by a greater recording effort, exposing a species true status rather than an increase or decrease in numbers.

The newly-published second edition

The new *A Guide to the Birds of the Chagos Archipelago* is a welcome addition to the Territories' natural history literature. Similar to the first edition, it is more than a bird book. It is an introduction to the islands and atolls of the archipelago told with a passion for their birds and their conservation. There is a blend of understandable science, mixed with conservation requirements overlain by a thorough introduction to the birds of the Chagos Archipelago. The book will be especially useful to visitors to the Territory, particularly those stationed or working on Diego Garcia. It will also be a good 'armchair' read for those wishing to know more about the terrestrial environment of this remote and restricted access UK Overseas Territory.

The second edition was entirely funded by the Chagos Conservation Trust, and can be bought via their website e-bookshop.

Cotton pygmy-goose © P Carr

Brown booby, Nelson Island © Jon Slayer

Noddy terns, Nelson Island © Jon Slayer

The Chagos Archipelago is a rare haven of beautiful reefs, diverse wildlife and clean waters, located in the midst of the Indian Ocean. The Chagos Conservation Trust is the only UK-based charity dedicated to protecting and conserving it.

For more information, visit **chagos-trust.org**

If you would like to contribute to the next issue of *Chagos News*, please email **chagosnews@chagos-trust.org**

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