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Chagos News

The Periodical Newsletter of the
Chagos Conservation Trust

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EDITORIAL

Chagos News is going electronic. This will be the last paper version sent to members, future editions will be emailed to you. There are several benefits to this: it saves CCT a great deal of money which can then be used on conservation efforts, there are the environmental benefits of saving paper and transport of newsletters around the world, and it means that you have an electronic copy which can be stored more easily. If you want a paper copy you can easily print it out. This time, along with this paper copy, you should also receive an emailed pdf. If you do not receive the pdf it is because we don't have your email address and you should let the membership secretary know by emailing membership(at)chagos-trust.org Conversely, if you receive this only as the pdf, it means that we do not have your postal address (or the postal service lost it) and you should similarly email the membership secretary to check.

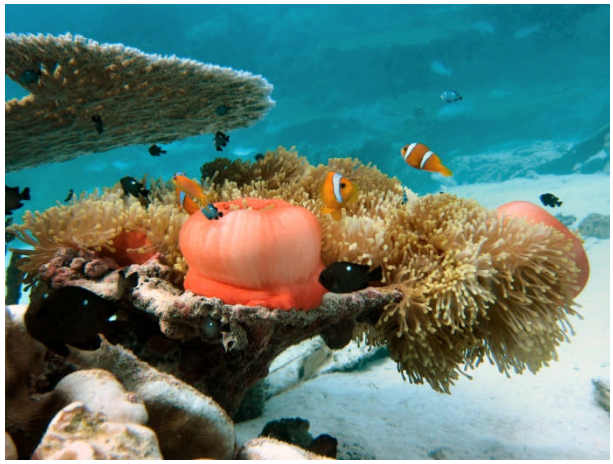
This edition of Chagos News has a historical conservation theme and the next edition will concentrate on very up to date conservation. William Marsden starts with the history of the preparations for the creation of the MPA and then we read about the history of the now thankfully banned whaling around Chagos leading on to a description of early, and unfortunately unsuccessful, conservation efforts in Chagos from Nigel Wenban Smith. We continue with a history of the earliest scientific research in Chagos from Charles Sheppard and then the story of the first of the modern scientific expeditions told by David Bellamy, ending with a short introduction to present day research also written by Charles Sheppard.

Something to look forward to in the future are the superb results from the 2006, 2008 and 2010 expeditions which are still in the process of being published. These will show that the scientific foundation of the Chagos MPA is rock solid. Newly emerging genetic data showing the biogeographical links that several groups of organisms in Chagos have with other areas in the Indian Ocean are particularly fascinating, as will be the fish biomass data shortly to be published.

It is clear that, while Chagos is firmly a part of the western Indian Ocean in its biological character, in terms of its recovery and resilience (resilience is a major theme of reef research now) it differs greatly after its post-1998 recovery, even from, for example, some of its nearest neighbours.

If we need reminding why it is important to protect Chagos then it is worth remembering that the convention on Biological Diversity suggests 10% of the world's oceans should be protected. This is about 32 million sq km and is less than many now argue is necessary. The median size of an MPA now is 1.6 sq km, so we would need 20 million such areas to achieve this.

In 2010, 260 leading marine scientists from about 40 countries called for a worldwide system of very large MPAs as "an essential and long overdue contribution to improving stewardship of the global oceanic environment." Chagos is leading the way.



Anne Sheppard

CCT AGM 2010

Simon Hughes
Secretary, Chagos Conservation Trust

Courtesy of the Linnean Society of London the Trust held its 2010 AGM in it's main meeting room on Tuesday 30th November.

The accounts for the year were in better health than usual due to a generous donation of £10,000 from the Ernest Kleinwort Charitable Trust.

The Chairman gave highlights of his annual report, which is also on the website in full.

John Topp, founder of CCT, Carl Lundin, Head of the marine section IUCN, Charles Sheppard, Warwick University, William Marsden, Chairman of CCT and David Bellamy *Photo Dick Goodwin*

Executive Committee Officers and Members were elected and now are: William Marsden (Chairman), Richard Martin (Treasurer), Simon Hughes (Secretary) and Members: John Topp, Pete Carr, Chris Davies, Taffeta Gray (Membership Secretary), Alan Huckle, Rachel Jones, Heather Koldewey, Sam Purkis, Pete Raines, Anne Sheppard (editor *Chagos News*), Charles Sheppard and John Turner.

Under the item Any other Business, the Chairman was thanked for his prodigious work in leading the Trust to the great success of the largest Marine Protected Area in the world.

After two short video clips of the underwater marvels of the Chagos shown by Jon Schleyer those present enjoyed three

Photo Dick Goodwin

presentations (covered elsewhere in this issue), followed by a brief talk from the Deputy Commissioner BIOT, Andrew Allen. A reception afterwards allowed much interesting discussion.

Chainsaw conservation training

At the CCT AGM, the RSPB, as a member of the Chagos Environment Network, were delighted to give Jonathon Isou, a representative of the Diego Garcian Society, a small memento, presented to him by Dr Vaughan Southgate, in recognition of his successful completion of the chainsaw course. Also participating on the course was Peter Carr, the environmental manager for DG21 on Diego Garcia. Chainsaw training is probably the most challenging introduction to conservation management so the RSPB were particularly impressed by Jonathon's determination and proficiency. Jonathon proved to be a natural so we hope he will return to complete his certificate and that he will be able to use his new skills to support conservation both in the UK and on BIOT.

Jonathon with the President of the Linnean Society, Dr Vaughan Southgate, who presented the certificate. *Photo Dick Goodwin*

Chagos Conservation Trust/Coral Cay Conservation scholars

In the last issue of Chagos News we announced the names of the two CCT/CCC funded scholars who were going to train to participate in a diving conservation expedition. In July of this the International Year of Biodiversity 2010, 18 year olds Louis Augustin and Pascaline Cotte joined Coral Cay's coral reefs conservation expedition in Charlotteville, Tobago. The two scholars joined a team of international volunteers and scientists and were trained to (a) help the Speyside community monitor coral reefs and (b) as members of the Diego Garcian Society (DGS), transfer their newly found knowledge, skills and enthusiasm for all things marine onto friends and family once back in Crawley, UK.

Pascaline and Louis during dive training.

Louis recording information during a research dive.
Photos CoralCayConservation

On Thursday 2nd September, at the end of their course, Coral Cay Conservation (CCC) and Environment Tobago (ET) hosted a leaving reception for Louis and Pascaline at the picturesque Rotunda at the Botanical Gardens in Scarborough, Tobago.

Louis and Pascaline had an unforgettable time diving and researching Tobago's reef systems. During the ceremony Louis said "I'm so glad I learnt to dive in Tobago, the coral reefs really are the most beautiful thing I've ever seen. I truly hope they decide to protect the reefs of Speyside and others in Tobago." Marie Smedley, CCCs Project Scientist added "it was so refreshing to see individuals so new to the world of marine science and conservation so passionate about our cause by the end of their month long scholarship." Pascaline clearly personified the change that can happen in an individual's perceptions when she said "by doing the CCC Skills Development Programme (SDP) I now feel ready to go home and teach others about the importance of the marine environment. The Chagos is so important to me as it is to my ancestors - I want to see it protected and appreciated."

At the CCT AGM at the Linnean Society on the 30th December, the two scholars were presented with framed certificates to commemorate their achievement.

Pete Raines, CEO of CCC, Pascaline Cotte, Louis Augustine and Dr Vaughan Southgate, President of the Linnean Society, who presented the certificates.
Photo Dick Goodwin

For more information see
http://www.coralcay.org/content/view/953/281/

Possible Jobs with the Trust

Two interesting (paid) jobs may become available with CCT. Following the creation of the BIOT Marine Protected Area (MPA), it is planned that The Chagos Conservation Trust will in practice provide the Secretariat for the Chagos Environment Network in supporting the Marine Protected Area.

If adequate funding can be secured, two part-time 'Assistant Secretary ' posts would be created to work together and with the CCT Secretary and Treasurer as the Secretariat for both CCT and the Chagos Environment Network. One post would require a track record on fund-raising/development; the other would require experience with 'outreach', notably media and the website. Both would require a real interest in nature conservation.

CCT has been run on entirely unpaid basis since its creation in 1992; so these appointments, seen as needed to provide consistent and active NGO support for the world's largest marine protected area; are a new step. The initial contracts are likely to be for one year from the second quarter of 2011 and mainly, but not exclusively, for working from home. Details will be published as soon as decisions are made.

Expressions of interest as or suggestions for candidates can be sent to Simon Hughes: secretary(at)chagos-trust.org

Email Alerts

Occasional information bulletins are sent out to members by email. If you would like to receive these bulletins (very occasional, you will not be plagued by them!), please send your email address to the membership secretary at membership(at)chagos-trust.org

Chagos News

We are always very pleased to receive submissions for *Chagos News* from members. Articles or photographs for consideration should be submitted to chagosnews(at)chagos-trust.org

Chagos Conservation Trust Website

The website is regularly updated with news. It is in the process of a major update at the moment, so log on regularly to keep up with events

Chagos endemic coral hits the big time

The Zoological Society of London (ZSL) has just launched its EDGE Corals programme which aims to generate conservation funding for 10 key species of coral around the world, identified at our workshop as evolutionarily distinct and globally endangered (hence the acronym). *Ctenella chagius* is one of the ones on the list. We have our flagship species! For more information see http://www.edgeofexistence.org/coral_reef/default.php

The Chagos endemic coral *Ctenella chagius*
Photo Anne Sheppard

2010: CHAGOS CONSERVATION YEAR

William Marsden CMG
Chairman, Chagos Conservation Trust

The new British Indian Ocean Territory Marine Protected Area

2010 has been an *annus mirabilis* for the conservation of Chagos. This year the designation of the whole of BIOT and its seas (with the exclusion of Diego Garcia) as an International Union for Conservation of Nature (IUCN) Category 1 no-take marine protected area (MPA) was announced by the Labour Government, and is being fully implemented by the Coalition Government. Britain, by protecting the Chagos in this way, has taken a conservation action of immense scale and significance. Ninety percent of the ocean's largest fish have disappeared over the past 50 years at the hands of commercial fishing, and the hunt for these, and especially tuna, continues unabated. Roughly one-quarter of coral reefs worldwide are already considered damaged beyond repair, with another two-thirds under serious threat. Through protecting the Chagos, the UK government has made a huge step forward on a number of globally agreed targets, such as establishing a representative marine protection network by 2012 and restoring depleted fish stocks by 2015 where possible. Much credit is due to the Ministers and officials involved.

Benefits of the new MPA

The Chagos Marine Reserve will safeguard in its entirety one of the world's most important and healthy ecosystems, deep sea, reefs and islands, and provide a bastion against this tide of destruction. It provides an essential reference site for future scientific research and study.

The MPA will assist in reducing the regional loss of biodiversity and in replenishing fish stocks for the benefit of food security, fish stocks and sustainable livelihoods.

Understanding the changes to ocean systems caused by pollution and over exploitation of fisheries is possible only if these effects can be compared with a part of the ocean that is comparatively unaffected by pollution and fishing. For the benefit of global science, the MPA provides a vital global scientific 'control site'.

The BIOT patrol ship *Pacific Marlin*
Photo Anne Sheppard

Coral reefs risk becoming the first global ecosystem to collapse and disappear because of climate change and ocean acidification. Maintaining the Chagos' pure and unpolluted waters will make an important contribution to helping the survival of coral reefs.

Cooperation for the long term protection of the Chagos

CCT, in cooperation with the Government and many non-governmental organisations, has been promoting the conservation of the Chagos Archipelago since 1992. Nature Reserves, Important Bird Areas, and Ramsar Wetlands of International Importance were created; but a much more integrated legal and practical conservation framework was needed to meet the long-term challenges. A Conservation Framework strategy paper was produced in 2007 by CCT with help from Royal Society for the Protection of Birds (RSPB) and others. The UK Overseas Territories Conservation Forum (UKOTCF) was at the same time encouraging the Government to support environmental conservation in the Overseas Territories more effectively. Public awareness of the damage being done to oceans and the value of Chagos was being raised by Professor Charles Sheppard, Professor Callum

Roberts, Frank Pope and The Times newspaper, Charles Clover with 'The End of the Line', and others. Some four years of expert and public consideration on Chagos protection followed.

In 2008 the Chagos Environment Network (CEN) collaboration was formed and comprises the Chagos Conservation Trust, The Linnean Society of London, The Pew Environment Group, The Royal Society, The Royal Society for the Protection of Birds, The Zoological Society of London, The Royal Botanic Gardens, Kew, The Marine Conservation Society and Professor Charles Sheppard of the University of Warwick representing a global forum of scientists.

In April 2009, CCT, supported by the Pew Environment Group and CEN, published *'The Chagos Archipelago: Its Nature and the Future'* putting forward the idea that the archipelago should become an integrated protected area comparable in importance with the Galapagos or the Great Barrier Reef. The National Oceanography Centre in Southampton organised a significant expert workshop on marine conservation in August 2009, which highlighted the scientific importance of the Chagos. In November, the Government launched a four month public consultation, in which leading non-governmental organisations (NGOs) and more than 270,000 people from over 200 nations and territories supported a Chagos no-take protected area. Over 90 percent of respondents supported greater marine protection for the Chagos. The leading organisations who wrote to support a no-take marine reserve included IUCN, Greenpeace UK, and Fauna and Flora International. The Zoological Society of London contributed greatly with both expertise and outreach to a wider public. The Pew Environment Group's instrumental support for the creation of an effective conservation framework was crucial throughout.

On completion of the consultation, the Government declared on April 1st 2010 that, having taken note of all the arguments for and against, it would make the British Indian Ocean Territory a no-take marine protected area. The incoming coalition Government then confirmed that it was going ahead with implementation of the full project. A substantial contribution of £3.5 million to the indispensable costs of paying for the patrol vessel in the absence of revenues from tuna licences has been raised by the Blue Marine Foundation from the Bertarelli Foundation and we are most grateful to Mr and Mrs Bertarelli for this. From 1st November this year, all commercial fishing within 200 nautical miles of the islands of the Chagos Archipelago in the British Indian Ocean Territory ceased.

Chagossians

The BIOT MPA was created "without prejudice" to the outcome of the legal processes relating to Chagossians and conservation arrangements could be modified if necessary in the light of a change in circumstances. CCT and other members of CEN are very glad to be working with Chagossians to help them to contribute to the future conservation of Chagos. In particular, CCT has promoted the involvement of the Chagossian community through training with Coral Cay Conservation (CCC) as well as projects with RSPB and the Zoological Society of London (ZSL). We have seen and admired the success of the Diego Garcian and Chagossian communities in Britain and their enthusiasm to be part of the success of the Chagos protected area. Allen Vincatassin, Leader of the Diego Garcian and Chagossian community in Crawley, and colleagues participated in a habitat restoration project at Barton Point in Diego Garcia. Pascaline Cotte and Louis Augustin, both 18 years old, participated in a CCC coral reef conservation training programme funded by CCT. We intend to take forward this cooperation and indeed extend it to other Chagossian groups who want to work with us on conserving these islands.

Management of the BIOT Marine Protected Area

The Government has made it clear that it believes that the Marine Protected Area is the right way ahead to further the environmental protection of the Territory and that it will also encourage others to take similar action in important and vulnerable areas under their sovereign control. It is understood that the BIOT MPA will be managed directly by the British Indian Ocean Territory Administration (as the Territory and its environmental protection have been managed since the creation of BIOT). There will also be a scientific advisory panel. Detailed arrangements for the management of the MPA are still under consideration.

The Scientific Research Expedition 'Chagos 2010'

The start of 2010 also saw another major scientific monitoring and research expedition led by Professor Charles Sheppard, covering all the five atolls of the Chagos. Key criteria for the work included the needs of the BIOT Government both for environmental management of the Territory and for the Government's compliance with international obligations; the health of the atolls; effects of sea level rise and erosion; illegal fishing; and the science of island vegetation and of the huge bird populations. Future scientific priorities are currently under discussion.

Resilient and well recovered reefs of Chagos
Photo Anne Sheppard

The Deep Oceans of Chagos

Another area for future attention by scientists will be the biodiversity of BIOT's ocean depths. The MPA includes an exceptional diversity of deepwater habitats formed by the separation of tectonic plates, fracture zones, sea-floor spreading, seamounts and ridges, 6,000-metre-deep (about four miles) trenches and vast deep-sea plains. Although these deepwater habitats have not been investigated or mapped in detail, research elsewhere has shown a close connection between a physically diverse sea-floor and high diversity among species.

Ocean fisheries and the BIOT Marine Protected Area

The Western Indian Ocean is a region with one of the most exploited, poorly understood and badly enforced fisheries in the world. Preliminary research indicates that the Chagos Marine Reserve provides a crucial stepping-stone and reservoir for many species of marine life in the Indian Ocean. It is hoped its protection will assist in the reduction of the regional loss of biodiversity and protein productivity, and that it will facilitate the dispersal of larval fish and coral species from the islands' ecosystem, replenishing populations depleted elsewhere.

Chagos, despite its remoteness, has not been immune to the effects of commercial tuna fishing in the area. About 60,000 sharks were legally killed in a five year period by long-liners fishing for tuna in Chagos waters. Of these, half were blue sharks, a near threatened species. It is estimated that in addition to all the sharks caught, about 60,000 rays were also legally caught, and these two figures do not account for all the other species discarded, mostly dead and dying. On 31st October 2010, all legal commercial fishing came to a halt, as provided for under the no-take provisions of the new Marine Protected Area. This will allow Chagos and its surrounding waters to provide a safe refuge and breeding site for migratory and reef fish, marine mammals, birds, turtles, corals and other marine life,

allowing them to play their full part in a vibrant ecosystem.

Young Hawksbill turtle *Eretmochelys imbricata* in Salomons lagoon *Photo Anne Sheppard*

The Tiny Islands of Chagos: Terrestrial Conservation

It is not just the BIOT waters that are teeming with life. While Indian Ocean seabird populations are subject to numerous threats and are at a fraction of their historic levels, the 54 tiny islands, although they cover in total only about 8 square miles, provide a safe haven for over 175,000 pairs of breeding birds. They are a home too for other vulnerable marine creatures such as threatened turtles and the world's largest terrestrial arthropod, the coconut crab.

In the course of the past year, good progress has been made with defining the priorities for 'terrestrial' conservation on the islands. Based on the 2010 Scientific Expedition, Dr Colin Clubbe of The Royal Botanic Gardens, Kew carried out 'flora' investigations on no fewer than 39 of the islands and, with Pete Carr, a member of CCT's Executive Committee with extensive experience of the Chagos islands, produced recommendations for ecological requirements and prioritisation of the islands for eventual restoration work.

CCT-US

In March 2010 I had the pleasure of participating in a CCT-US seminar on the BIOT Marine Protected Area, at the United States National Coral Reef Institute in Florida (where Sam Purkis, CCT-US Chairman, is an Associate Professor). So CCT-US is now up and running and its immediate plans are to develop a network and membership base in the United States and to initiate fund-raising. CCT-US has identified its initial fundraising goal to jointly finance, with the CCT, a habitat restoration project for a pair of islands on the north of Peros Banhos. Accomplishment of this task will serve as a step to return the native birdlife to its natural state. More information on the CCT-US and its goals can be obtained from its website (www.cctus.org).

The Chagos Conservation Trust's Future Role

The CEN and other organisations agree on the need for CCT to continue with its dedicated and coordinating NGO role for Chagos conservation, science and education with a strengthened 'Secretariat' capable of performing as the CEN Secretariat (as is set out in the CEN Memorandum of Understanding) as well as making its own contribution to the success of the BIOT MPA. Meanwhile Simon Hughes, as Secretary not only of CCT but also the Chagos Environment Network, and Richard Martin, our excellent Treasurer, continue to sustain our collaboration. Support from the Pew Environment Group and an important donation of £10,000 from the Ernest Kleinwort Charitable Trust as well as generous donations from some 'Friends' and Members subscriptions, enabled us to cover our increased costs in this recent active and very successful period.

Conference on Science of Chagos at the Linnean Society of London

Results from Chagos research will be presented at a full day meeting to be held at the Linnean Society of London, on Thursday 24th November 2011.

Also, reviews, interpretations and new results will be published in a volume by Springer, in their magnificently produced series of books on coral reefs of different regions, either late in 2011 or early 2012.

Words of Authority on the New MPA

Representatives of IUCN, the International Union for the Conservation of Nature (IUCN) and of the UK's Foreign and Commonwealth Office spoke at the Chagos Conservation Trust's meeting at the Linnean Society on 30th November.

Dr Carl Lundin (Head of the Global Marine Programme, IUCN) congratulated those involved with the creation of the Chagos MPA which was 'arguably the most important marine protected area in the world at the moment.' With this achievement we were embarking on 'a wonderful journey of discovery and a wonderful opportunity to show the world that it is possible with frugal means to create a great reservoir of biodiversity for the rest of the oceans'. The Chagos MPA should be looked on as an insurance policy against all the stupidities we are doing to the seas. It might provide the world with a way back from disaster, if human pressures were to be reduced and allow for recovery and replenishment.

Dr Lundin spoke about needs for effective management of the MPA. To start with, effective enforcement was the key; it must be made immediately clear that no-one infringing the MPA laws was immune from prosecution. Australia and others offered some positive examples for achieving this. An adequate revenue stream for the requirements of MPA management was also essential; given the pressures on government budgets. The MPA should have a good business plan to meet this. Some funding from very limited visiting, for example for diving, should not be excluded. And since the MPA would protect an outstanding reservoir of biodiversity and benchmark for science, an efficient programme of scientific monitoring and research should be developed, building on the good work of Professor Sheppard and others and exploring ways of doing this economically. Generally, there would be benefit in sharing best practice for managing large marine reserves with other large MPAs and countries like France which had similar interests.

Andrew Allen (Deputy Commissioner of the British Indian Ocean Territory) said that both the UK Government and the Government of the British Indian Ocean Territory (BIOT) were hugely enthusiastic about making the BIOT Marine Protected Area (MPA) a success and hoped it would set an example to encourage others throughout the world. It was with that broader picture in mind that David Miliband had made his decision on 1st April, and it was in the same context that William Hague supported, after undertaking a detailed examination of the situation and background.

The Deputy Commissioner confirmed that the last fishery licence issued had expired on 31st October and that from 1st November 2010 no legal fishing had been authorised.

Since there was now no income from fishery licences BIOT faced financial difficulty. He was, however, confident that negotiations with the Blue Marine Foundation and the Bertarelli family trust would make a serious contribution to the running expenses of a patrol vessel for which a tender had now been issued. Meanwhile, patrolling continued and 24 Sri Lankan fishers were presently in detention at Diego Garcia for poaching.

The BIOT Government was examining the need for effective management of the MPA and for any changes to laws.

There had been extensive discussion with the United States bearing in mind that BIOT had been created for the defence of the UK and US. Discussions had been positive, but there were inevitably some red lines.

The UK/BIOT Governments wished to involve Chagossians. There had been some discussions with Olivier Bancoult in which this had been made clear; but he had sought a Judicial Review of the consultation procedure and of the decision to create an MPA. This case was being strongly defended by the Government. There would be a hearing next year after the result of the case at the European Court of Human Rights (for resettlement and further compensation) had been heard, which was also being strongly defended.

In planning for the success of the MPA the BIOT Government was considering the impact on others with an interest including the yachting community. It would like to involve others in the Indian Ocean. Discussions had already started: with the Seychelles and Maldives there was positive engagement; with Sri Lankans some quite serious issues needed to be addressed relating to illegal fishing. In particular the Government wanted to find a way to work positively with Mauritius.

Andrew Allen closed by repeating that, while some patience was needed, the Government was 'strongly enthusiastic' about the new BIOT Marine Protected Area.

The Whaling Industry and the Chagos Archipelago

Dr Marina Carter
Nigel Wenban Smith CMG

In the mid 19th century, the settlements on Chagos were well known to the men who regularly cruised the Indian Ocean whaling grounds. In 1838, a British official sent to investigate the conditions of ex-slaves on the archipelago, reported, "Diego Garcia has plenty of water and fire wood as well as pigs and poultry, and it is much resorted to by whalers and vessels bound from England to India for supplies of that description."[1] Even Vincent Ryan, the Bishop of Mauritius, used the services of a whaling vessel when he visited the Chagos islands in the summer of 1859.[2] While not every whaler stopped at the Chagos for supplies, their presence was a familiar site around the archipelago for several decades. Scott writes that "during the 1860s and 1870s … and for a decade or so before and after, the seas around Diego Garcia were a favoured haunt of whalers, with some wrecked on its reefs."[3]

The log books of American whale ships from New England, covering years between 1834 and 1870, survive in large enough numbers to provide a record of numerous whale hunting voyages around, and occasional stopovers at, the Chagos archipelago. In general, the entries are frustratingly brief; nevertheless, they provide tantalizing glimpses into the locations and activities of the whalers in and around Chagos. A preoccupation of those whale ships intending to call at Diego Garcia for supplies was to find a way through the shallow banks and sharp reefs and to take soundings in order to secure a sound anchorage. The examples quoted below are typical. One major exception is that of the *Merlin* of New Bedford. Unusually, the surviving journals were authored by two American women, the daughter and wife of the ship's captain, and include an account of the family's stay at Diego Garcia in February 1870. Their account makes a valuable contribution to our sparse knowledge of the island's life during a period of ten years when no official visits of any kind were made to the Chagos. It will appear in a forthcoming history of the Archipelago.

Returning to 1834, Peleg Sanford's log kept aboard the *Herald* of New Bedford recorded on Sunday 18th March 'Diego Garcia in sight' and on Monday 19th March: 'Stood in for the harbour. Went in with the boat on survey returned on board and stood in to the harbour and come to anchor in 10 fathoms water hard bottom'.[4] The *Herald* spent over a week taking on supplies:

> *'Tuesday 20th to Thursday 29th. The boats are going on shore and bringing off barrels of water, also wood and 80 fowls and 1 hog. The crew are also allowed on liberty ashore. Friday March 30th 1834. At 10 got underway from anchorage and stood to sea at 4 pm last sight of the land'.*[5]

The *Tuscadora* also provided information of provisions procured at Chagos: the ship took on fish, bananas, fowls and eggs at Diego Garcia during a stop there in 1840.[6] Similarly, in 1846, the ship *Harbinger*, of Westport, Mass., mastered by Samuel Brownell, offers the following entry for Thursday 19th February "at 10 am saw the Island of Diego Grasha; at 11 am came to anchor at the said island in 10 fathoms of water". On Monday 30th March, the log again reports that 'Diego de Grachia in sight at sundown'.[7]

In December of the same year, we find a fuller account of whaling close to Diego Garcia.

The *Hector*'s approach was recorded as follows:

> *Wednesday 9th December at 1 pm saw the island Diego Garcia bearing SW dist 20 miles … at 7 am kept of SW for land at 10 am passed Middle Island at 12 am came to anchor at Mariana Establishment in 6 fathoms and furled the sails.*[8]

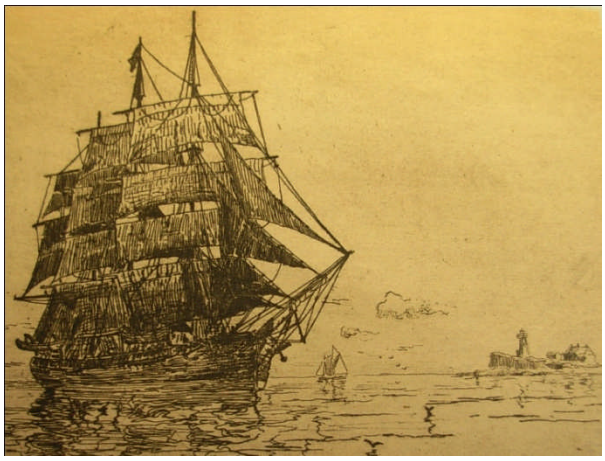
Between the 10th and 18th December the ship was 'employed getting wood, water & small refreshment', during which time the crew was given 4 days liberty, and a number of 'ships jobbs' were completed. On Sunday 20th December the *Hector* was ready for sea. Cruising nearby, at 6 pm on 31st December the crew "saw island Diego Garcia bearing WSW dist 20 miles middle and later parts light airs so ends this day in Lat 7.22 S and Long 72.45 E". Whales were evidently very close as the log for the next day records:

> *January 1st 1847 ... at 7 am saw a shoal of sperm whales at 8 lowered away the boats in chase at 10 starbord boat struck and parted line, larboard boat struck and killed waistboat likewise at 12 midday took one along side and kept ship off for the others so ends this day Lat 7 43 S.*[9]

On 2nd January the dead whale was taken alongside, cut and boiled, this work taking two days. The cruise then continued, and on the 6th, Diego Garcia was again sighted, along with 'a number of porpoises'. The entry for Saturday 16th January found the ship on Pitts bank and in view of the Six Islands. The next day, writes the journal keeper, 'at 8 am saw bottom on Pitts bank sounded and found 8 fathoms water'. On each of the following three days sightings of porpoises were recorded and on Tuesday 19th, the position of the ship was stated to be 'standing to NE Diego Garcia in sight bearing S dist 20 miles Lat 6.51 S Long 72.35'.

A more typically brief log entry was that of the *Montezuma* of New Bedford in 1848: "at sunset we made the island Diego Garcia" and on the following day "we were cruising off the island.[10] Mention of sightings and interaction with the settlements on Diego Garcia appear in a number of instances. The *Arab*, at Chagos in the mid 1840s, recorded passing East Point and Minimini establishments, the latter also mentioned by the *Harrison*, a decade later, under the name 'Minuminu'.

While Diego Garcia was important for supplies, the whole of the archipelago provided attractive hunting. During the cruise of the *Arab* of Fairhaven, between March 1849 and September 1852, the log recorded sighting Nelson Island, Peros Banhos, the Brothers Islands, and Eagle and Danger islands, as well as mentioning the names of Centurion Bank, Speaker bank north of the archipelago, and Swift's Bank.[11] At Danger Island she obtained turtle. In the late 1860s, the *Sea Fox* of Westport made several whaling cruises in the Indian Ocean, during which time Eagle Island, Salomon Island and Danger Island were reported as having been sighted.[12] The banks were also popular fishing grounds for the whalers, with a number of logs in particular mentioning fishing on Pitts Bank, while the *Alto* also fished off Six Islands.[13] The location of this latter place was given by the *Harrison* as Lat 6.34 Long 71.3.[14]



The bark Elisha Dunbar made a voyage to the Indian Ocean in the mid 19th century, and stopped at Mauritius, but makes no mention of Chagos alas. *Source, Dartmouth College, New Hampshire Rauner Library Special Collections Elisha Dunbar [bark of New Bedford] log 1858-62.*

The log of the bark *John Dawson* of Fairhaven, Mass., on an 1868 cruise, offers rather more information than the usual terse entries. After sighting the 'Egmont or Six Islands off the lee bow', on May 13th, and spending the next few days 'cruising on Pitts Bank', the ship arrived off the north west of Salomon Island on May 25th and anchored at 4 pm. A boat came to the ship, and the captain spent the night at a 'Frenchman's house'. The ship then anchored alongside the settlement on Salomon, it now being noted that the island was called Boddam by the French. Rafts were sent on shore and procured 100 barrels of water and 6 cords of wood 'given to us all out for nothing'. It was also noted that the head of the settlement, 'gives us all the coconuts that we want'. The log's entry for the next two days provides some interesting details about the activities of the crew on shore:

> *Wednesday May 27th 1868 There never was a ship here before as long as they have been here [12 years]. M Decoiring and wife and child dine aboard this PM. All hands went ashore this afternoon some gunning after shells and coral got large quantity of the latter, brought some pigs aboard there is great many of them also fowl.*
> *Thursday May 28th 1868 Brought aboard this morning three boat loads of coconuts, plantains fowl and pigs, a present from Monsieur N Decoiring got underweigh at 8 am. We had to tow with all the way out about 8 miles crossed the shoal about low water with 3 fathoms of water. Mr Decoiring accompanied us out over the bar. The boys gave him three cheers when he left. Entrance to these Islands are at NW. Our course is W by N … Peros or Banhos Isle and Three Brothers on our weather beam this afternoon and evening.*[15]

Whalers often possessed an ink stamp in the shape of a whale and would mark the number of whales caught in their daily journals each day with the stamp, adding comments, in this case 'A Stinker'. *Source New Bedford Whaling Museum.*

As elsewhere in the world's oceans, intensive hunting decimated whale populations. Fortunately, the discovery and exploitation of petroleum in Texas and elsewhere arrived just in time to save the whales from extinction, though not the whalers from bankruptcy. The effects of that intensive slaughter are felt in Chagos waters to this day. During the same period, petroleum, by replacing many end-uses of coconut oil, began to undermine the long-term profitability of the Chagos plantations. But that is another story.

Marina Carter trained as an historian, specializing in 19th century Mauritius, and holds a doctorate from the University of Oxford. She is the author of several publications dealing with the Southwest Indian Ocean islands.

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2. Ryan, V.W., *Mauritius and Madagascar: Journals of An Eight Years' Residence in the Diocese of Mauritius, and of a Visit to Madagascar*, London, 1864 p. 142.
3. Scott, R. Limuria. *The Lesser Dependencies of Mauritius,* OUP, 1961 [reprinted 1976 Greenwood, USA] p. 259.
4. NBWM ODH Log 770, *Herald* of New Bedford, Mass. , mastered by Frederick Ricketson, kept by Peleg Sanford, 1 July 1833 - 8 Mar. 1834.
5. Ibid.
6. NBWM KWM 390 Log of the ship *Tuscadora* [ship] Cold Spring Harbor, Edward Halsey, master 14 Feb 1840-13 May 1841, p 74.
7. NBWM ODH No 710, Log of Harbinger 2 Jan. 1845-1 Oct. 1847. Brief mentions of Diego Garcia can also be found in Kendall Whaling Museum [KWM] No 18 *Bevis* Bark of New Bedford Angles Snell master 4 Jun 1850-14 May 1853 and KWM No 22 *A R Tucker* Bark of New Bedford Daniel Lake Ricketson master Annie Holmes Ricketson keeper 2 May 1871-17 Oct 1874, p. 239; KWM No 148 *Montezuma* bark New Bedford William Allen master Prince Lawton keeper 15 Sept 1846-1849 p 103-6
8. NBWM ODH No 1052A, Log of the *Hector* (Bark) of Warren, Rhode Island, mastered by William Martin, on voyage from 8 July 1845 - 4 Dec. 1847.
9. Ibid.
10. New Bedford Whaling Museum [NBWM] Old Dartmouth Historical [ODHS] No 44, Log of the *Montezuma* of New Bedford, Mass., mastered by William Allen, kept by mate Joseph Clark Smith, on voyage 10 Oct. 1846-14 Aug. 1849.
11. NBWM KWM No 255 *Arab* [ship] at Fairhaven Samuel T Braley master 22.3.1849-12 Sept 1852, passim.
12. NBWM KWM No 182 and No 233 *Sea Fox* bark Joseph W Lavers master 25 Nov 1869-14 Feb 1871 p 55-7, and July 1867-21 Sept 1869, pp 49-51, 69-70.
13. NBWM KWM No 14 *Alto* [bark] of New Bedford Angles Snell master 1 June 1854-7 Apr 1857, p 70; KWM No 255 *Arab*, p. 62.
14. NBWM KWM No 259 *Arab* [ship] 22 Nov 1845-2 June 1849, p 180; KWM No 261 *Harrison* ship G T Branley master 15 Jul 1854-15 Sept 1857, p. 102.
15. NBWM KWM No 268 Bark *John Dawson* Captain Wicks, Log keeper, Frederic Taber Fairhaven Mass. 1868.

Historical Conservation Issues: 1774-1901

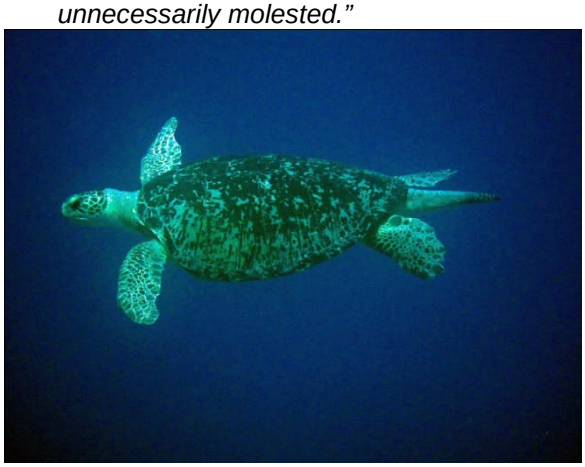
Nigel Wenban Smith CMG
Dr Marina Carter

Sailors had always taken note of what remote islands had to offer in the way of water and food, not only to provision their ships, but also with an eye to the possibility of eventual shipwreck. Hence the practice of leaving goats, pigs or chickens as living larders. This wisdom carried over into a prejudice against over-exploitation of the resources that presented themselves to new arrivals. In this brief survey, we see how these instincts were – up to a point – reflected in practice, as initial settlement of the Chagos developed into long-term economic exploitation.

<u>The sad story of the Green Turtle</u>

The first British investigation of Diego Garcia's suitability for settlement was made in 1774, when hogs, sheep and goats were left to fend for themselves. When the East India Company decided in 1786 to take over the island, their plans included instructions for comprehensive natural surveys and experiments with vegetable and fruit production. They also hoped – in vain – that the animals left behind twelve years earlier would, in the absence of obvious natural predators, have increased in number; in fact, they had vanished without trace. On the other hand, accounts by previous visitors had indicated that there were "large turtle on the western side of the island". Indeed, the French had constructed turtle pens on both the eastern and western limbs of the island and, on the eastern side had cut a track through the undergrowth, by which turtles could be carted from the shore to the pen. The leaders of the French settlement, absent at the time of the British arrival, later returned and explained that turtles, along with fish, formed the basis of their diet. The East India Company made a point of noting that "this important resource must be preserved", providing instructions to minimise disruption to the turtle population: since they were likely to

> *"desert inhabited places on being much disturbed, we desire you will not admit of one single turtle to be turned or caught beyond what will be from time to time immediately wanted for your people, nor allow their common haunts to be unnecessarily molested."*



A large green turtle *Chelonia mydas* swimming in deep water to seaward of Grande Ile Coquillage, Peros Banhos atoll *Photo Anne Sheppard*

Richard Price, leader of the expedition, made efforts to carry out this injunction. For example, encountering an English deserter from a recently visiting French ship, who had "exposed the haunts of the turtle without permission", it was decided that if he re-offended he would be kept a prisoner on board Price's ship till the expedition's supply ship, *Admiral Hughes*, sailed back to Bombay with despatches etc. One of the British officers from the latter also had to be told "not to turn so many turtle." Turtles were indeed abundant. As Price reported

> *"The turtle is to be caught in almost every part of the island … tho from 4 to 500 lbs weight it is nourishing and far from cloying … no care or attention shall be wanting on our part to prevent the disturbance of these animals, that seem to come upon the beach very near the year round, every 3 or 4 days – such numbers might be caught as to provision a few ships, were the island clearer and the communication more free, whereas at present we have but two places that roads are made to the outside".*

Like the French, the British found it necessary to kill the turtles for food and, four months after their arrival, their ship's surgeon cautioned against over consumption of turtle

which he believed produced excess of red blood, leading to distended veins. He attempted to cure this by bloodletting. However, few of the animals they had brought with them remained healthy; the hogs and fowls had survived, but did not produce many young, while most of the turkeys and ducks had died, those remaining being 'droopy and sickly'. It was not long before these and other factors led the British to abandon their plans for settlement; even the original French settlers seemed to be disposed to give up and leave the turtles in peace.[1]

Awareness of the vulnerability of the turtle population remained, at least on the part of government. In the early nineteenth century, under French and subsequent British rule, the settlement of the Chagos was continued by the grant of *jouissances* – concessions held at the pleasure of the Crown for 'fishing, gathering turtles and exploiting the coconut trees'. All of them included strict conditions "on pain of forfeiting the present permission" concerning the conservation of natural resources, in particular

> *"to ensure that the multiplication and reproduction of turtles and coconuts be in no way diminished or affected adversely by the measures used to harvest them. On the contrary, only ripe coconuts should be harvested, with enough new trees planted every year to ensure continuance of an undiminished crop. As to the turtles, all necessary measures should be taken to conserve their eggs and to save the emerging hatchlings from the voracity of the sea-birds which destroy so many."*

However, by 1826, when the first thorough survey of Mauritus' Dependencies was undertaken by the British authorities, it was noted that Diego Garcia "has for many years been the Depôt for Lepers and must formerly have been an eligible situation, as at one time great quantities of Turtle were taken, but latterly they have become extremely scarce." As explained in a previous issue of *Chagos News*[2]*,* a medically dubious theory that turtle meat might cure leprosy required the victims sent to the island to be provided with at least one pound of this flesh daily. Although there were fewer than 50 such sufferers, there was not enough meat to go round. It seems certain therefore that the conditions of the *jouissances* had been utterly disregarded.

With very few official visits to the islands, this state of affairs continued. When the Mauritius Surveyor General visited the Archipelago at the end of 1864, he commented as follows:

> *"So far as the fisheries are concerned, there are none which can be looked upon as affording an industrial employment; beyond the fish taken for the use of each establishment, and the capture of a few turtle between January and May, no labour is employed on such a pursuit – and as a freehold title for an island would include the benefit derived from taking the turtle I do not see that any particular arrangement for the fisheries could be made beyond perhaps the protection afforded to the turtle by a prohibition as to their capture except during certain months of the year."*

Unfortunately, his comments were ignored. The authorities were focussed on gaining funds for the depleted Mauritian Treasury by securing a one-off cash payment in return for giving the *jouissances* holders full property rights over their plantations; the new certificates of ownership were devoid of any obligation to conserve wildlife. In any case no further visit of inspection was made to any of the islands until 1875. By then edible turtles were a rarity and so they have remained ever since on Diego Garcia, where by 1900 workers were rewarded by a 6 rupee payment for each one they caught. They did however continue to be caught fairly regularly on other inhabited islands, particularly Egmont and Peros Banhos, while they remained numerous on Nelson Island. There they continued to provide a source of supply for the nearby Salomons, particularly in emergencies, such as the Second World War.

<u>Birds and other edible fauna</u>

In 1867, a new manager, James Spurs, had been appointed to run the East Point plantation on Diego Garcia. Son of the First Mate of a vessel wrecked on Astove Island in the Seychelles, he might have been more aware than most of the value of indigenous fauna. But he had in any case been asked by

the Paris-based owners, the brothers Liénard, to report on the birds, turtle and land crabs (cipayes) which formerly existed there in great numbers ; he had been obliged to reply that they were almost entirely destroyed, specially the birds. In fact, shortly after he first came he had actually seen hundreds of birds lying rotting on the ground, the men having killed far more than they could carry off. From that time Spurs had considered it his duty to take some steps to protect the few that were left and had placed a ban on all such killing. When Pakenham Brooks, the first magistrate to visit, arrived in 1875, he took the view that Spurs' action (as in other aspects of his management) was arbitrary and tyrannous:

> "*The owners of the other two Estates do not prevent their labourers from killing sea birds, and the fact of the owners of this Estate preventing the men from doing so does not in any way tend to augment the number of birds, and taking into consideration that the Owners only give their labourers a ration of dry rice, it appears to me a great hardship to deprive them of the opportunities they have to provide themselves with some other food.*"

His recommendation was that the islanders

> "*should everywhere be allowed to fish in their leisure hours, and to kill sea birds, but at East Point, Diego Garcia, are prohibited from doing so, and one fails to perceive that they receive any compensation or are procured any additional comfort instead.***"**

The following year, a newly-appointed magistrate, John Ackroyd (destined to become the most acute and respected of all the island magistrates), paid his first visit and questioned Spurs, who replied that he had told the men that he was compelled to do so to save the birds from complete destruction, but if they came back in any numbers he would allow a moderate quantity to be killed; and that since he had taken these protective measures, the number of birds has begun to increase. He then inspected the Minni-Minni estate, where the labourers are

> *"allowed to kill as many sea-birds as they please, but either from previous wholesale destruction, or other causes, there are very few left to kill. I did not see forty at most during my stay."*

More generally, he commented that

> *"I can assert that sea-birds are scarce at Diego and that the only place where I noticed any number of them was at East Point, but still in nothing like the numbers that I have seen on other islands".*

In 1877, Ackroyd revisited Diego Garcia.

> *"I visited with Mr Spurs that part of the island where the sea-birds generally build their nests, and as we remarked they were coming back in considerable quantities, Mr Spurs says he will next year let the men take a moderate quantity for food."*

Birds like this Sooty Tern *Sterna fuscata* would not be difficult to catch *Photo Anne Sheppard*

He seems to have done so, but that was not the end of his conservation efforts. In 1880, visiting the island again, Ackroyd was confronted by three workers, who complained that Spurs had docked their wages for killing birds. In a counter-claim, Spurs pointed out that he had taken this measure because the men had been sent to the three islets at the lagoon entrance precisely to ensure that the birds there were not molested. The magistrate found in his favour.

Ackroyd took an interest in the state of indigenous fauna and the consumption thereof in other parts of the Chagos. At Egmont,

> "*sea birds are plentiful on Iles Cipaye and aux Rats, and the labourers are not prevented from killing them. In certain seasons I am told great numbers of their eggs are found and are considered good eating*."

He made no mention of turtles there, but was also

> "*informed that crabs, crayfish and periwinkles or 'bigornos' are easily procured. There is also a large crab called 'cipaye', but it is not very readily caught*."

At Eagle Island, turtle could not be procured at all, except by sending men to the Three Brothers. It would appear, from his silence on the subject, that Ackroyd saw no serious problems over conservation at Peros Banhos or Salomon.

A large coconut crab *Birgus latro.* These globally threatened crabs have become numerous since the islands have become uninhabited. *Photo Anne Sheppard*

Fish also were, of course, consumed by all living in the Chagos. While visiting magistrates noted differences in the types of fish found at the different locations and the ease with which they might be caught, scarcity was nowhere a problem. Some managers were however readier than others to allow the free use of pirogues or nets belonging to their establishments and the magistrates urged liberality. Most striking however was the contrast they noticed between the results of fishing in the islands, compared with Mauritius itself (where the contemporary records are replete with constantly updated measures for improved conservation). Typical is the following account in 1877, again by Ackroyd:

> "*Fish is plentiful at East Point. I saw one morning three hauls made with the large net of the establishment and a great number of fish were caught quite enough for the whole Establishment and yet I was told the hauls were rather below than above the average. One day, while I was at Pointe de l'Est two men went out fishing in the bay, and from about 11 am to 3 pm caught 28 or 29 very fine fish, the smallest of which would be considered a very fine fish in Mauritius. I hear however that not more than one third of the men fish at all regularly and not more than 8 or 9 accompany the manager when he goes out fishing with the net, but still those who do not go out get their share of the fish caught, but of course after those who helped catch it have had their choice*."

The last two decades of the 19th century saw little mention of conservation issues in visiting magistrates' reports. Most depressing, with the wisdom of hindsight, was the lack of any mention of Hawksbill turtles, whose systematic destruction for their high value to the European fashion industry began in earnest in the 1890s. It may nevertheless be inferred that conservation remained a concern to some of those familiar with the Chagos. From 1899 to 1904, when a new ordinance was promulgated for the governance of the Dependencies, various drafts and proposals circulated among officials. One magistrate, L. Leclézio, drafted a comprehensive law, with detailed measures and penalties to

> *"forbid the destruction or attempt at destruction of trees, and for a certain time during the year the killing, selling, taking, or destroying or the attempt to kill, sell, take or destroy any wild fowl, sea-bird, sea-bird's eggs, turtle, turtle's eggs, found on or around the islands forming any part of such Dependency"*

..... Sad to say, this idea, although cast in terms which gave managers vast room for evasive manoeuvre, never saw the light of day.

1. A fuller account of this episode, based on the original records in the Maharashtra State Archives, is contained in the authors' forthcoming history of the Archipelago.
2. The Chagos Leper Colony, CN 35, January 2010

Scientific history of Chagos: Earliest times to the start of studies on the living reefs

Professor Charles Sheppard

Several accounts which could be fairly described as being of natural history in Chagos have been written ever since its occupation by coconut planters, about two and a half centuries ago. These range from descriptions of the problems with rats in the late 18th century to accounts of plants being introduced at various stages. But the start of the period of purposeful scientific examination may fairly be said to have started with Darwin's writing. By purposeful we mean those systematic attempts to understand the processes by which the atolls were made, how they sustain themselves, and how they work in a biological sense.

Darwin never visited Chagos, but corresponded with Moresby of the Royal Indian Navy, who in the mid 19th century made many Admiralty charts of exquisite detail, done mostly by soundings taken by crews in sailing ships and rowing boats. One recent exercise done using this data showed the scale of his work: it required digitizing the details from the complete set of Chagos charts, generating nearly 10,000 depth readings. These were mostly from Moresby's soundings (though some were duplicated on different scale charts, making perhaps 8,000 unduplicated soundings). Darwin had use of the charts amongst many others, and his 1842 theory of atoll formation by subsidence of a volcanic substrate was highly original and innovative. The atolls he discussed focussed to large extent on the Great Chagos Bank, and his ideas were eventually widely accepted. For several decades though, his theory faced competition from competing theories, and the reluctance to accept Darwin's was sometimes brought about by disbelief that the required huge scale of earth surface movements was actually possible. Darwin said: "If I am wrong, the sooner I am knocked on the head and annihilated so much the better I wish that some doubly rich millionaire would take it into his head to have borings made in some of the Pacific and Indian atolls ..." This was finally done by the US Atomic Energy Commission more than a century later in Enewetak atoll in the Pacific when, in 1952, the drill reached volcanic foundations after penetrating 1.4 kilometres of coral limestone. In Chagos, seismic work has indicated that there is cumulative reef growth of a similar thickness, before reaching a volcanic foundation about 45 million years old (which is young compared with many other areas). Much finer detail has since emerged with increasing knowledge of sea level changes caused by ice ages and by vertical tectonic shifts of land.

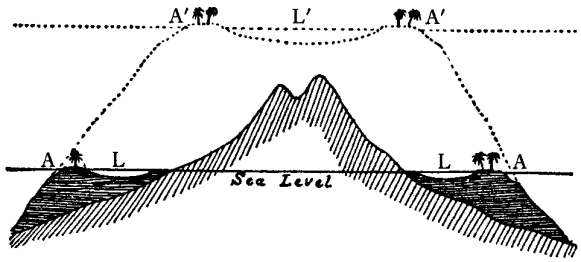
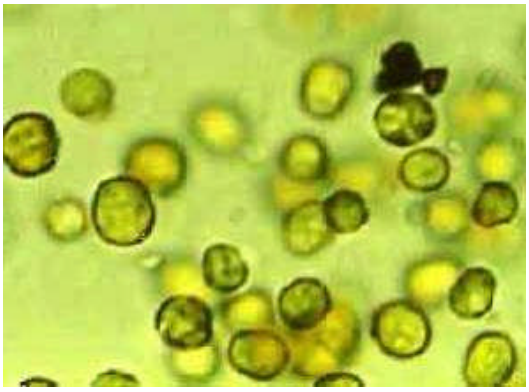


Diagram illustrating Charles Darwin's theory of atoll formation via coral formation on subsiding rocks.
Source Wikipedia

The naturalist G.C. Bourne visited Diego Garcia in the 1880s and wrote about its geology, mainly in the context of contemporary discussion about how atolls are made. He broadly opposed Darwin's conclusions saying that "most of the coral formations of the Indian Ocean mark areas of elevation rather than of rest; certainly they are not evidence of subsidence." Much of his papers explain why he thought this was so, which, because he was wrong in his basic understanding, has unfortunately led some to discount much else of what he said, which included some useful descriptions (if wrongly interpreted) of Diego Garcia. But he was certainly correct in some conclusions: "I challenge the statement that the destructive agencies within an atoll or a submerged bank are in excess of the constructive. It would be nearer the mark to say that they nearly balance one another." They do indeed and, in a healthy atoll, growth will obviously exceed destruction from both waves and eroding animals and plants. He was ahead of his time too when he discussed how geochemistry was key: "…a not inconsiderable proportion of the carbonate of

lime held in solution is redeposited in the form of crystalline limestone ….” And he affirmed: “… the growth of corals, and the consequent formation of coral rock within the lagoon is generally overlooked…” He also understood the importance of wave action piling coral debris up upon the lands, to grow and consolidate islands. All these factors are important, but it took many decades for details to be ironed out. One key point was that some of these early authors thought that corals grew by eating plankton, and so assumed that reefs could therefore only grow in areas of sustained currents which brought them food. We now know that the captive single celled algae which are symbiotic in reef building corals provide anything up to 90% or more of the coral’s energy needs, so that clear water and light rather than current-borne plankton are key. Such misunderstandings were bound to lead to some erroneous interpretations. Bourne said: “It must be remembered that we are very ignorant about the food of corals” and thought that they might even be “vegetable feeders” feeding on debris from the islands (which they are not). At that time, 130 years ago, Bourne commented on the erosion that was then taking place along some lagoon shorelines, and on the accretion elsewhere. This was at a time when it was not known just how much the sea level had risen and fallen at different times since the last ice ages, nor of the different rates at which this took place in different parts of the world.



The captive microscopic single celled algae, called zooxanthellae, found in many corals.

Despite some important observations, Bourne’s crystal ball gazing regarding its military opportunities was not very good either, given the future use of Diego Garcia. He said: "I have even heard that it is proposed to protect the island by some sort of fortification, but how this is to be done, and of what use it would be to fortify an island 10 feet high, which might be completely commanded by a ship sailing outside of it, I am at a loss to know". Probably nobody could know, back then.

Gardiner (1936) wrote extensive descriptions of other atolls in the archipelago, based on a visit made three decades earlier (he had been held up in his publication, he explained, by the war, illnesses and other matters). This was mainly descriptive work which lacked much synthesis, as was common at the time. It was important because it described atolls that had previously mainly been omitted and because by doing so, it provides information against which to compare changes that may have taken place subsequently. One feature that was striking at the time, and evident from some of his sketches, was the extreme narrowness of some of the oceanic reef flats (almost non-existent in some islands) protecting the islands and shores from the open ocean.

Several other brief encounters after this date all added small pieces to the jigsaw: an account by Kohn (1968) on molluscs and several papers on turtles by Frazier based on a visit in 1970 and on turtle trade statistics being notable, but, by and large, there was little scientific visitation for a while.

The next major compilation was a large descriptive and detailed work published in *Atoll Research Bulletin* by Stoddart and Taylor (1971), based on work and collections done during a visit to Diego Garcia in 1967. This, like much scientific work up to that point, was terrestrial and inter-tidal (meaning in this case the reef flats which can be dry or nearly so at low tides). Stoddart brought with him an unsurpassed, encyclopedic knowledge of the geography and geomorphology of coral islands throughout the world, which added greatly to both his understanding and explanations of Diego Garcia. Different authors in this volume compiled details of many groups of animals and plants, and of the geography of the atoll.

Stoddart expressed surprise at the large proportion of Diego Garcia atoll that was being used for coconut plantations: "…almost the whole area of the atoll (6250 out of 7488 acres) was being cropped for coconuts" Stoddart (1971, in the volume). These were known as the 'Oil Islands' for good reason. On land, in paper No 18 of this collection he comments: "Little attention has been paid at Diego Garcia to conservation: the atoll has simply been used as a supplier of coconut products, and to a lesser extent of dried fish and turtles, for Mauritius. Both the Green and Hawksbill turtle used to nest here in some numbers… The early settlers found the frigate birds, boobies, noddies, terns, herons and tropicbirds to 'breed on these islands. ... (They) are considered good eating; the feathers, too, make excellent bedding' (Anon. 1845, 483)". The island, in other words, had been (understandably in those days) severely damaged in ecological terms. Guano mining and habitat destruction accompanying the plantations had destroyed most birds, including some huge tern colonies, along with several species now listed in the Red Data book, along with most turtles and coconut crabs, along with the native vegetation. Given that the initial colonization was under a regime of slavery, none of this is at all surprising, and it mirrored many other islands in this ocean. At a later date, Stoddart says: "The first practical conservation measures were taken by James Spurs, when manager in the 1870s…" who prohibited capture of all these groups but: "… in the absence of enforcing authority or of any clear need for conservation it is unlikely that much attention was paid to it." From later visits to the other atolls, the same situation was seen to have applied to those islands as well, perhaps without even benefits from the rudimentary efforts of a James Spurs (see previous article).

This expedition was the last mainly terrestrial and intertidal survey of Chagos (so far!). Shortly afterwards came the first of a series of scientific expeditions characterized by two main differences: firstly, they were increasingly based around conservation science rather than straight description (though they contained much of the latter also), and secondly, they extensively used underwater breathing equipment, and thus started to reveal the real value of this archipelago, and it should be remembered that the submerged reefs are, after all, by far the greater part.

By this time, the British Indian Ocean Territory had been created, and the use of the atoll had changed, with far reaching consequences to the scientific value of the archipelago, and this controlled also the direction of future scientific work. Initially this began to explore the huge unknown area beneath the waves but later work veered towards research organized around conservation needs. As Stoddart (1970) had said in relation to his assessments of Aldabra (which at that time was also part of BIOT): "…the arguments for the conservation of Aldabra itself for scientific research rested, at least in part, on a comparative analysis of the ecological status of neighbouring islands". That kind of comparison is increasingly pertinent now to Chagos and its reefs because, as time has progressed, the rest of the Ocean's reefs have suffered greatly from over-exploitation, while those of Chagos stayed the same or have improved, leading to today's observed enormous difference between the reefs of Chagos and those in much of the rest of the ocean. The scientific expeditions that started the path to this conclusion are the story of the next chapter.

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The First Expeditions

Professor David Bellamy

My love affair with the Chagos Bank and with coral atolls began with a letter from the Royal Society asking me to lead phase six of their expedition to Aldabra in the Indian Ocean in 1969. Of course I said yes and was hooked.

With my eyes and mind opened wide by this experience I dreamed up the idea of tackling a basic survey of the Chagos Bank which I had read about at school. It is a much larger and complex atoll system about which very little was then known. Fortunately a letter from the Joint Services Expedition Group came asking me if I could find me a coral atoll that needed to be surveyed.

We got together and with the force of the forces, (the Army, Navy and Airforce) to support and provender our scientific team, so two expeditions diving in the tropics became a reality in 1972/73 and 1975 just at the time when the world was being warned of a catastrophic ice age just around the corner.

The Great Chagos Bank is a very large and lonely atoll slap bang in the middle of the Indian Ocean and we were soon on a very steep learning curve about diving in unsheltered water with big, and I mean big, sharks. A steep curve that every day reminded us of the fact that it was Charles Darwin who informed the world that coral atolls develop on the summits of extinct volcanoes that are slowly sinking below even the highest tides. Indeed they would disappear from sight but for the fact the corals like to grow in shallow water and so keep their heads above water.

My team had the fun of the diving, surveying and labelling thousands of specimens and thanks to the help of a student Zena Dinesen back at Durham University, and the expertise of Dr. Brian Rosen at the British Museum, all of them were given names, Latin of course.

We were pleased that our excited estimates of coral diversity were not too exaggerated.

The coral lists included at least fifty-six genera and sub-genera of reef building corals. Not bad for an atoll of which Darwin himself said “these banks consist of sand with very little live coral”. Of course we can forgive him as he was there when aqualungs had not yet been invented.

A temporary shelter for the expedition on Danger Island in 1975 *Photo Charles Sheppard*

Our survey showed that the most active reefs of the Bank are situated around and between the extant islands that are along the western and northwestern margins of the atoll where they are sheltered from the main blast of the Trade Winds. The most exuberant growths of corals are along the most sheltered side of the atoll.

Atolls are a many splendored thing, complex living communities existing tenuously between all the extremes that the environment can chuck at them. Extremes within which an amazing diversity of animals and plants find their niche in which they live and reproduce.

Too much bad weather can spell doom for any reef, likewise too little turbulence may result in sedimentation of the reef waters and hence death of the reef-forming corals. Between these extremes lies the whole living tapestry of the coral seas and this makes the fascination of becoming a fully submersible reef ecologist.

Fish

Sadly the fish populations of the banks were not studied in any detail. Nevertheless it must be recorded that they were rich both in species and in the abundance of large specimens, especially of top carnivores. The production potential of the fisheries in sheltered areas was made manifest by the abundance of fish that had made their home in the artificial reef created by the wreck of the *El Maren* discovered and surveyed by the team.

Ferals

Detailed land surveys showed that the copra farmers of the past had certainly had an adverse effect on the natural vegetation of all islands except Resurgent. Coconut plantations are in effect monocultures with few other species. However on all the islands, what natural vegetation still survived appeared to be holding its own and patches of original broad-leaved forest were making a comeback.

Of the feral animals known to have been introduced on the islands, today only rats are a real problem. They were only present on the two largest islands that we visited, Egmont and Eagle (though they exist also on many that these expeditions didn't visit). These islands are infested with them; hence the small numbers of nesting birds. Sadly these two islands make up more than 80 percent of the land area of these two atolls.

Birds

Detailed survey of the smaller rat free islands during the second expedition found them overflowing with birds with an estimated total of 116,562 pairs made up of populations of fifteen species.

From our knowledge of the relationship between the terrain, vegetation and the nesting birds it was possible to calculate the approximate number of each type of bird, which could move in and take up the nest site potential of Egmont and Eagle. If rats were removed it could be as high as 861,000 pairs. It is worth recording the fact that many of the species of birds showed minimal fear of the presence of *Homo sapiens*.

Bearing in mind the fact that the rat populations have not been subjected to any artificial control over the past fifty years, if indeed at all, it would seem feasible to effect their eradication using modern rodenticide technology. If this were accomplished it could create one of the best sea bird sanctuaries in the world.

Here is one place in the world where man has fought and has lost his battle for economic survival within the living ecosystem of the area. Here is one place in the world where nature need not be trained to live alongside man. I believe we can control the rat population and aid the recovery of the broad-leaved forest. Thus slowly and surely returning the Great Chagos Bank, back into its "natural" state.

It is also true to say that over the decades following these expeditions, the so called "decades of destruction" were beginning to take their toll, trashing both terrestrial and marine systems around the world. So much so that it is true to say that today almost all the main fishing grounds of the world are under the stress of unsustainable fishing.

Fortunately the Chagos Bank is thrice blessed thanks to its remote location in the centre of an ocean that is not renowned for its pelagic fisheries control. Chagos benefits from
(1) Lack of human activity, feet, nets and anchors smashing the reef flats that are the front line solar powered sea defences of all atolls.
(2) Lack of sources of non-natural silt that kill off the coral polyps that are the main architects and builders of the reefs.
(3) Lack of sources of eutrophicants that enrich the water allowing algae to smother the corals, killing the reef.

Take heed of the fact that the reefs of the Chagos Bank quickly recovered after the recent bleaching episode. Likewise other remote pristine atolls and reefs showed little damage and rapid repair after the Tsunamis. There is also evidence that El Niño and La

Niña cycles and tsunamis take greater tolls on stressed reefs than they do on pristine reefs. Likewise the stressed reefs take longer to revive and badly stressed reefs just crumble away.

The first people to bring the problems of the stress of over fishing to the public were Hans and Lotte Hass closely followed by Jacques Cousteau back in the 1960s. Loss of big fish opened the way to the take over of the Mediterranean by "weed" species like cuttlefish and more recently jelly fish as the plagues of factory ships take their toll.

That is why I stated at the end my book *Half of Paradise* that chronicled the findings of the first two expeditions.

"The whole of the Chagos Bank is worthy of consideration as a Marine and Terrestrial Nature Reserve of international importance. Local, regional and international agreement should be sought to that end to ensure its complete protection forever.

Subject to approval of the local and regional government (which is that of the British Indian Ocean Territories or BIOT) and the world bodies concerned with the conservation of Nature and Natural Resources, the rat populations on both Egmont and Eagle islands should be controlled in order to allow the local populations of nesting birds to expand to use the resource.

That a year long expedition is mounted which will go to the Group, its object being to complete the survey of the Great Chagos Bank, including the reefs and islands of Peros Banhos and the Salomons and the nearby, submerged reefs of Blenheim, Victory and Pitt Banks.

A comprehensive programme of management and study should be drawn up for the benefit for every ones futures."

Since those halcyon days much work has been done to make some of those dreams come true, culminating with the fact that the Chagos Archipelago is now the world's largest marine protected area. The present scientific programme is in the safe hands of Prof Charles Sheppard, along with his wife Anne, now of the University of Warwick (both of whom worked with me in the early days) and with the international team that they have helped to build up over 30 years.

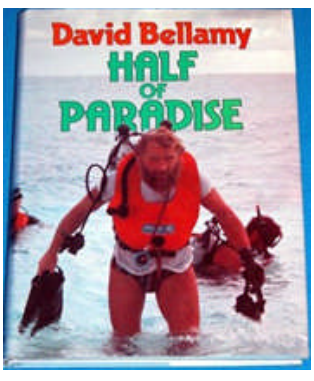
A youthful David Bellamy on Danger Island and the BBC *World about Us* team who made the film *An Island Called Danger* which was aired in 1975

Photo Danger Island Expedition

The birds on Chagos make wonderful subjects for filming as they are so tame

Photo Danger Island Expedition

Editor's note – for a fuller account of the expeditions read
Bellamy D 1979. *Half of Paradise* Cassell Ltd. London.



Present Research in Chagos

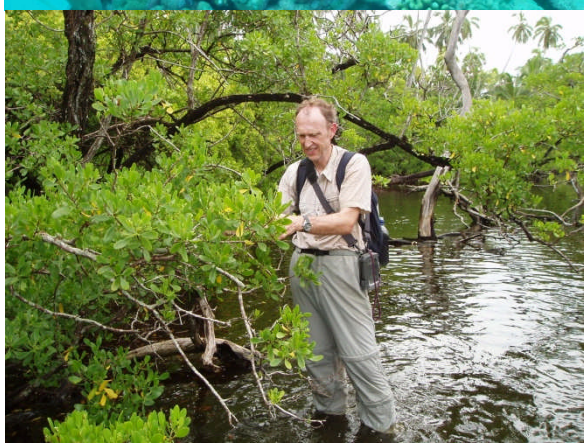
Professor Charles Sheppard

Taking research visits chronologically, following the David Bellamy expeditions and using the same theme of Joint Services Expeditions, his idea of a year long research visit took place in 1978/9, though because of issues of weather and support vessel availability, this actually had to be shortened to 8 months. The several scientists that took part have long since published a large number of scientific accounts, which are mostly listed amongst the downloadable lists in http://www.chagos-trust.org/extrapage.asp?id=5. This work has been talked about before but basically demonstrated, along with the earlier two in that decade, the richness of Chagos' reef system.

Probably at that time Chagos may have been little different to most other areas of that tropical ocean, but following the 1970s, during what Bellamy has called above the "Decades of Destruction", increasing pressures took their toll almost everywhere. Chagos, as we now know, clearly avoided such destructive pressures. In brief, and for completeness only since this later work has featured in earlier *Chagos News* already, no scientific visits were then undertaken following 1979, until 1996. This latter visit for the most part showed continued vibrancy in most marine aspects, although poaching was seen to have taken a toll in some target groups of species including sharks and sea cucumbers.

But then things changed across the whole Indian Ocean just two years later, when a substantial ocean warming event resulted in extraordinarily high mortality on reefs throughout. This was examined briefly in Chagos in 1999, and then in more detail in 2001, when Chagos was seen to have suffered at least as much as most other places with vast, completely killed areas. At that time it seemed, depressingly, to be no different to most other places. Most reefs seemed to have nothing alive growing on them showing vast areas of bare limestone, and – here is an unusual point – no seaweed covering the bare rock either. Bare rock in shallow tropical water is certainly very unusual. What it did have was continued large numbers of fish grazing the substrate.

But then, in expeditions in 2006, 2008 and 2010, we saw extraordinary recovery. Corals came back fast - Chagos showed substantial resilience. Results are mostly still being worked up, but it seems likely that the resilience was conferred by the simple fact that there were no compounding stresses such as over-fishing, nutrient enrichment and sedimentation, all of which are common and severe problems in most places. Resilience is now one major theme of reef research around the world – what does it mean exactly, and how do you get it, and how can you retain it to recover from the next major warming pulse which most marine scientists expect will arrive sooner or later? Whatever resilience is, Chagos has it, so that it now contains about half of the reefs in the Indian Ocean in good condition. The stories of the science of the last 5 years, however, are no longer history, but belong to a future issue of *Chagos News*.



Photos Anne Sheppard.

The Settlement at East Point, 1819; Dutch print by Lieutenant Verhuel.

History of the Chagos Archipelago

The history of the Chagos Archipelago has been short and chequered. The islands have been settled for less than 250 years and human activities have been conditioned, both commercially and militarily, from outside.

Although they were discovered by the Portuguese in the 1500s, the French, operating from Mauritius, were the first to establish sovereignty in the 1770s, and to exploit the islands' modest potential to supply fish and coconut products. Plantations were established in each of the main island groups under indefinite leases granted to a small number of individuals and groups of proprietors resident in Mauritius. The initial work force was provided by slaves imported from Mauritius or directly from Madagascar and southern Africa. Their descendants, enjoying steadily improved employment terms, came to form, with those in other minor dependencies of Mauritius, a community of islanders—the Ilois—distinct from the increasingly Indianised population of Mauritius. By the mid twentieth century the long term decline in the plantations' viability was reflected in their consolidation into a single company under Seychellois ownership—Chagos Agalega. The population of the Chagos rose gradually to a peak of 1,158 in 1952, declining to around 900 in the 1960s.

British sovereignty came in 1814 with the end of the Napoleonic Wars, but its impact on the distant Archipelago was only gradual—the consequence mainly of the abolition of slavery in 1835 and a slow increase in administrative supervision from Port Louis. From a military point of view, both Britain and France had been concerned to deny the other use of Diego Garcia's excellent (but vulnerable) harbour, which eventually proved an asset in World War II. This island's strategic importance, deriving from its mid-oceanic location, was however transformed by the changes in global power politics of the second half of the twentieth century.

As Britain yielded strategic influence to the USA, both countries took the view that their common military interests required the exclusion of the established population of the archipelago and closure of the plantations—measures undertaken with little consideration for the inhabitants themselves and leading to continuing distress, legal claims and political controversy. In terms of the Archipelago's history however, the effect has been to increase the transient population of service and support personnel in Diego Garcia to its highest number ever (some 2,400 with peaks of 6,000 at times of crisis), with one half of the island transformed into a major air and naval logistic base. The rest of the archipelago has reverted to a state of natural wilderness. Outside influence remains overwhelming.

For more history read ***Peak of Limuria***. This revised and updated edition of Richard Edis' book gives a lively account of the nature, discovery and development of the Chagos Archipelago initially for coconut plantations, focussing particularly on Diego Garcia and its military role, which from the beginning also attracted the attention of naval powers active in the region. It concludes by describing the gradual recognition of the ecological importance of the Chagos and the growing impact of climatic changes, which threaten the Archipelago's long-term habitability.

*If you would like more information on the publications (especially **Peak of Limuria**) or membership, please contact the Secretary (secretary@chagos-trust.org) or.*
visit www.chagos-trust.org

For this text CCT is indebted to Nigel Wenban-Smith CMG who is writing the definitive two volume history of the Chagos