

Chagos News

*The Periodical Newsletter of the
Friends of the Chagos*

No.13

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EDITORIAL

Coral Mortality

In February, Dr. Charles Sheppard and I spent 10 days, courtesy of the BIOT Administration, snorkelling and duck diving from ocean reef drop off point to the coast around the whole of the Chagos Archipelago. **80+% of Chagos coral has died.** Charles Sheppard has written a special report for this issue of Chagos News. Also in News 13 there is an article by the current Commissioner's Representative (Britrep) Commander Peter White Royal Navy and the Chairman's 1998 AGM statement.

Publications

Printers have just completed three Chagos books. Firstly the next two in the Chagos Natural History series are now on sale : *Plants of Chagos* and *Birds of Chagos*. The price for each of all four books is now £4 or \$7 to the public and £3 or \$5 (+p&p) to Friends of the Chagos. These are all available from the Treasurer: Nigel Wells MBE, 12 Monk's Orchard, Petersfield, Hampshire GU32 2JJ. Next *The Ecology of the Chagos Archipelago* edited by Sheppard, CRC and Seaward, MRD 1999. Occasional Publications of the Linnean Society, London. 350 pages. Price £39 is available from Smith Settle Ltd., Ilkley Road, Otley, West Yorkshire, LS21 3JP, UK Tel 01943-467958. Fax 01943-850057. Email sales@smith-settle.co.uk. Say you are a Friend. Come to the AGM and buy all three free of p&p.

Annual General Meeting

The AGM will again be held at the rooms of the Linnean Society of London, to whom we are most grateful for their hospitality, at Burlington House, Piccadilly, London W1V 0LQ on Thursday 7 October 1999. The AGM will start at 1700 and will include a presentation. Drinks will be provided in the Linnean Library at 1815. At 1915 those who wish will move on to have a Chinese meal in Gerrard Street. This worked very well last year when 18 of us continued Chagos and other talk around two large tables at the Fook Lam Moon. We are starting a little earlier this year so that those who have a train to catch will have plenty of time to enjoy the meal. Please let me know if you wish to attend (by note to 20 Lupus Street, London SW1V 3DZ, telephone 0171-834-3079, or Email johntopp@barclays.net) so that I can book enough space. Nominations for the Friends of the Chagos Committee should reach the Secretary Simon Hughes (29 Champion Hill, London SE5 8AL, Email fi28@dial.pipex.com or Tel/Fax 0171-738-7712) by 15 September. All are very welcome at the AGM, bring partner or friend and enjoy our annual chance to get together.

As our Chairman remarked: "All action is morally ambiguous; only inaction is unambiguously immoral."

John Topp

PARADISE LOST

Charles Sheppard

In February this year, I snorkelled for 15 minutes along the northern edge of Nelson Island on the Great Chagos Bank, and saw not a single living coral. The water was clear and calm, and at that part of the island the drop off lies close to shore. I swam, with the Chagos Conservation Adviser John Topp and others from a fisheries patrol vessel, from the edge of the reef flat out to the drop-off. With a lot of surface diving, we could see clearly to 20 m deep, maybe more. But no corals or soft corals were left alive. The corals were all there, just dead, standing upright in their positions of growth. Instead of providing a colourful and profusely varied scene, they were all standing like tombstones, covered in a film of greyish fuzz. Whether we looked in the shallows where the corals are mostly sturdy, digitate forms, or swam down to between 8 and 12 metres deep where large table corals densely cover a strip along the top edge of the drop-off, all were dead. As the ship's Chief Engineer put it, it was like seeing the reef in black and white instead of colour. A little further along to the West, there was a little live coral and my notes record a trace of soft coral too, but in a total of perhaps 45 minutes over what would have been a couple of acres of once vibrant reef I saw less coral and soft coral than once would have fitted in to a single one of my metre square quadrats. I had been looking at similar scenes for a week by this stage - it was similar on the seaward sides of all five islanded atolls, and on Blenheim - but Nelson was the final, depressing stop of this tour of the northern atolls. I remembered what we called the coral gardens on the southern side of this isolated island. This was one of the loveliest - and with dozens of sharks, one of the liveliest - diving sites of the 1970s. At the coral gardens I recorded about 6% of the substrate left living, mostly soft coral in this case with 1% of the stony corals left alive.

What caused this? In April and May 1998, the sea water of the Indian Ocean warmed a couple of degrees above normal, which was enough to do the damage. The effect was widespread. In our visit to Chagos this time we had no dive equipment so I do not know how deep this extends, but in the nearby Maldives the same mortality extends to 40 m deep, and one colleague has told me he expects that a lot of complete species extinction has occurred there. We don't know yet if this is true in Chagos too. Much of East Africa suffered similarly, as did parts of the Seychelles, while a couple of months earlier I had been diving in the Arabian Gulf where I swam over huge fields extending for miles of grey, lifeless and silted corals. This is a biological disaster by any standard, even more so when it is remembered that coral reefs harbour the most diverse fauna of any ecosystem in all the world's oceans.

What of the life forms other than the corals and soft corals? Nobody expert in other groups has been able to look yet, but my own notes recorded at site after site suggest that both numbers and diversity of fishes was a quarter or less of what I would have expected, compared with the same sites in 1996. It is true that there were several large schools of, for example, parrotfish, and once each of jacks and fusiliers. These still gave the impression of good fish life when they swirled around me, but most of the fish diversity and number was sadly diminished.

Did any sites survive? Lagoons fared better than the seaward reefs. Certainly those coral knolls in Peros Banhos lagoon where the 1978/9 expedition did so much diving also contained extensive stands of dead table and other corals. Indeed my own recollections of those knolls are of large expanses of golden coloured tables, but these are all dead now. But on the knolls there was much more left alive, and of varied forms and species. In Salomon lagoon near what has become the yacht anchorage at Ile Boddam, I could see much more living coral than dead, and the same appeared to be true at a site in the north of Salomon. In Diego Garcia lagoon near the accommodation area, most coral was living, though most was dead in sites around the small northern islets of this atoll. On average, the corals in lagoons were perhaps only 50% killed compared with over 95% killed on seaward reefs. I understand from a visiting US group who did manage to dive near the anchored ships deeper in Diego Garcia lagoon that coral survival was quite good. A curious exception to the

general mortality were the large brown domes of *Porites* corals – these appeared to be mainly living everywhere. Why lagoons fared much better when their water temperatures can rise more than open reef water is not known; maybe they warm a little every year and become adapted.

What happens to the reef when their corals die? Rounded corals increasingly resemble bare substrate as erosion and abrasion gradually rubs away their distinguishing surface features. Branching corals fragment and create a lot of mobile rubble. This has started already and the edges of table corals are gradually disintegrating. As countless small organisms burrow into the limestone skeletons which are now unprotected by living coral tissue, the structures weaken, and a big storm now will carry much of them away. When soft corals die they leave no trace at all, which explains the abnormally large proportion of bare substrate which I saw on all reefs. There is one site in SE Salomon which unusually was dominated by soft corals instead of hard corals both in the 1970s as well as 1996. Today it offers the unusual sight of large expanses of completely bare substrate. At the deepest site I recorded there in February (8-12 metres deep) I recorded 10% cover of soft corals and 3% of stony corals, leaving 86% of the reef covered with identifiable, dead corals or bare. Erosion and growth are closely balanced in a healthy reef, and erosion continues even when growth stops. A fine filamentous algae quickly covers all available surfaces, and it is this that gives the dead corals their fuzzy appearance.

What are the chances of recovery, and how soon? We don't know. The rubble now being generated creates a hostile habitat for new coral growth. If surviving corals are producing larvae (and they may not for a year or two anyway but simple experiments could easily discover this) newly settled young larvae may not survive the rolling rubble. Maybe the better survival of corals in the lagoons will provide the vital source of larvae for the future, but the rubble must mostly disappear before we will see much change. Simple experiments will help show how long it will be before recovery even starts in this respect, but so far, we just don't know.

Is this just a natural event which has happened before? Many of the corals killed were over one or two hundred years old (we can tell by their sizes). In other parts of the tropics where more work has been done, corals of 500 years old were killed – the oldest reported is 700 years, so it probably hasn't happened in centuries. Maybe this did happen before, in medieval times perhaps, but it is a mistake to suppose that if it did happen before, then it somehow doesn't matter now. As for whether it is natural or a consequence of man-made global climate change, that is a long and uncertain story. Weather patterns are changing (see references at the end), temperatures have risen, air pressure and cloud cover have fallen and UV radiation has probably risen too. UV causes stress to coral in a synergistic way with raised temperature. Unfortunately, few funding organisations in the world have considered it worth funding research into any of these issues (one important desk-bound dispenser of public funds told a group of us that he wasn't fooled by our proposals to try and find out the importance of this sort of thing – he knew we just wanted holidays in the sun), so many questions cannot yet be answered.

What about the islands? Not surprisingly after so short a time, I could see no adverse effects at all on the shorelines in February, and indeed the contrast of looking up from the water and seeing flocks of terns off Middle Brother, then looking down at the carpet of tombstones beneath me was very striking. If the reefs erode though, as clearly they might, shoreline changes can be expected. If the numerous smaller fish have suffered like I think they have, then what about the birds which feed on them? And then, what about the vegetation on the islands whose richness almost certainly depends in large part on the guano from the birds? Good questions, to which we do not have any answers. We should remember also that the total area of islands in Chagos is only about 50 square km (maybe 80 if we include areas which are awash, transient sandbanks and so on) while the area of shallow reef in Chagos is nearer twenty thousand square km. The islands and their life depend wholly on the reefs.

Will this happen again? Again, I don't know. But analysis of Diego Garcia climate records show a rise in temperature, and more importantly perhaps, increasingly severe weather oscillations (like the much reported El Niño). This may continue. If it does, the remaining corals may suffer severely, like giving a person one disease immediately after he has just recovered from another. Or else, maybe the corals which lived through it last time are resistant in a way that will allow them to live through other similar episodes. For example, the survivors may have contained a more heat tolerant strain of zooxanthellae which now may re-inhabit all new coral growth, thus making a much more resistant coral population.

Will the ecological balance recover? Again, we cannot tell yet. We do know from other places where stresses have killed more limited areas of reefs, that the reef ecology can settle and stay in what we call an alternative stable state – one which is not rich in biodiversity and which will not recover either, at least in a few decades.

Who can find out the answers to these biological questions, and where? The British and USA could in Chagos, the French can in Reunion, these being two of the very few well placed examples of who can help most with understanding this ocean-wide catastrophe and its consequences. (Catastrophe is not a word, incidentally, that I as a scientist would lightly use).

When might it all recover? Not in our lifetime anyway, if recovery is taken to mean restoration of the *status quo ante*. But restoration of a functioning reef system may well occur in a decade or two – perhaps. Again, we don't know. We do know that many reefs which have been killed before by pollution, dredging or dynamite fishing (on much smaller scales of course), develop populations of algae which happily stay there, out-competing the corals and preventing their return. We might expect also an explosion in numbers of grazing urchins (this has happened elsewhere too) due to the suddenly increased algae, but these urchins graze by rasping the surface and so instead of happily keeping the invading algae close-cropped, they manage to kill new coral settlers. Probably the most asked question is the one of when will it recover. Prediction is much harder than simple description, but I and a colleague have started modelling 'virtual reefs' in computer memory and 'hitting' them with severe impacts in order to see what the responses are, and over how long. Maybe we will have some answers sometime, but later rather than sooner if I cannot dig up a researchers salary for a year from somewhere.

Is there anything that can be done about this, and does it matter to us anyway? Yes, to both. A lot *could* be done. Not, however, in terms of trivial 're-planting' of corals and such like, as happens in a few tourist resorts and so on – the scale is too enormous. But although this needs a discussion too long for this article, bear in mind just these few points: Chagos is biologically central and a stepping stone to much of the Indian Ocean, and there are tens of millions of people in the Indian Ocean dependent on fish from coral reefs for their protein. Also, remember that most of these countries are heavily dependent upon western countries for aid, which will now increase because of this problem (billions of extra dollars are being talked about just now), and that everybody, us and them, need to know the scale and duration of the consequences. This is called planning ahead, which is something that is usually rather poorly done both in tropical countries, as well as in our own. I mentioned the virtual reef computer simulation, but its answers will only be as good as the data put in. We need that data to answer the questions. It may or may not help recovery itself, but it will provide information that the economists and politicians of Indian Ocean countries need, and they can't get answers which help if we don't get data on a wide range of related and integrated aspects.

It won't be magical diving in Chagos again in my lifetime. I don't think reefs repair that quickly. Personally, I have spent about a year diving there altogether, between 1975 and now. Dave Bellamy wrote a book about Chagos in the 1970s called *Half of Paradise*, but I don't agree with its title. It was fully Paradise. Now, I don't want to go back to Chagos again for the diving. But I do want to go back to help gather some of the information that I have hinted at here. The work will need several people, and work can be done in a few other countries too, with Chagos being central to it. We need to start soon too, a fact which is now recognised by numerous organisations. Chagos places the United Kingdom, astonishingly perhaps, well within the group of top twenty countries ranked by largest area of coral reefs, and it is Chagos also which elevates the UK into the group of most biodiverse countries in the world. Because, unusually, the reefs of Chagos have had much less human impact than most, the biological information contained in them is disproportionately valuable.

There is a book on Chagos due out about now which contains 25 chapters by over 40 scientists in all, describing the results of the 1996 research programme. The timing of this book and of the expedition itself is very fortuitous: here we have an account of the conditions and ecology immediately prior to the 1998 sea water warming which caused so much damage. It tells us a lot of what Chagos should be like and might be like again. We should build on it.

Sheppard, CRC and Seaward, MRD (editors) 1999. *Ecology of the Chagos Archipelago*. Occasional Publications of the Linnean Society, London. Published for the Linnean Society by Westbury Press, 350 pages.
Sheppard, CRC. 1999. Coral Decline and Weather Patterns over 20 years in the Chagos Archipelago, central Indian Ocean. Foreign & Commonwealth Office, London, circa 20 pages.

BIOT A PERSONAL VIEW

PETER WHITE

Like all recent BritReps John Topp offered me hospitality, accommodation and education during my FCO briefing period prior to arrival in BIOT. Like all recent BritReps he told me he would be asking for an article for the Chagos News before I left and like all recent BritReps he did and I have. My first recollection of John was of some-one baring my way in a London street, staring straight at me with hand outstretched saying "Peter White?" in that manner of his that demands an answer and it better be the right one. I followed him to his flat and before we got in he asked if I were interested in the environment as he was looking for a relief as BIOT Environmental Officer. I gave the heart felt response of a Naval Officer who has too big a garden and insufficient time to even mow the grass. That being that if it was green it should be cut down and replaced with green concrete. At least John knew the starting point.

We spent the best part of a week together including a very wet day at Kew Gardens and slowly he started the process of conversion and education. He also gave me some strong pointers and introduced me to the USN Natural Resources Management Plan, which is full of good words and plans but on which, sadly, no progress has been made.

My first view of Diego Garcia was from the cramped rear of a DC8 but what stuck in my mind were the colours, the greens, blues and all the different shades. I had fallen in love and John's careful briefing was not invain. I was assured by some of the old hands that these colours had not faded over the years and I resolved that they certainly would not fade in my time either. The first week passed in a blur of names and introductions. Graham had organised a great handover but all too soon I was on my own and the reality check came upon me.

I made a point of reading everything I could about the islands as quickly as possible. I had already consumed Richard Edis' book but now I found Paul Baker's Plantation guide and a whole host of other publications hiding in the office cupboard. I also started nosing around and quickly found the absence of Scavvy, lagoon side of the Chief's Club. This was the ideal opportunity to educate the new NSFCO on the effects of erosion. It has to be said the Scavvy was replanted within the month and further schemes to uproot Scavvy curtailed or reduced to access points alone. Next was the golf course where too many trees had been cut for the driving range. They have been replaced but will take time to develop. Plans to enlarge the golf course were curtailed for financial reasons and there is no plan to resurrect them. The much-promised golf club is still in the course of construction.

There have been no massive new build projects in my time; most new build has been limited to replacing structures already in existence. There have been several new huts built for the FilMau community. These are slightly bigger than the old huts and house 24 men as opposed to 20. The design is similar but the removal of a central corridor, building the walls up to the ceiling and giving every one their own access to the outside has improved

the walls up to the ceiling and giving every one their own access to the outside has improved the degree of privacy. The washrooms and toilet blocks unfortunately remain detached from the accommodation and the majority of the women are still housed in ageing caravans. Recently a great deal of demolition, of first generation US military buildings, has taken place. So much so that the area near Eclipse point now looks like parkland rather than waste ground and the Splendid is almost back in Splendidville. Heartening though this is there is still much to do. The main reason for the reduction in building and increase in demolition this year is hidden behind the change of contract. BJS, the current US Contractor, lost the bid to a new consortium called DG 21 and have until 30 September to complete the handover. The new team seems on side with regard to environmental issues and I am assured that Ground Maintenance will soon be attempting to replace the wretched Casuarina with more native species of tree. The nursery is also scheduled to be reopened in the near future.

In the lagoon a war of words has been conducted about hydro blasting of paint work and diving operations to scrape the bottom of vessels. Both of these actions release material into the lagoon. The natural waste from the bottom scraping may be benign but the heavy handed, industrial method of removal may cause paint and metals also to sink to the bottom. Hydro blasting produces a foul coloured water with a deposit of rust and paint chippings. Both these issues were spotted last year and were stopped. There is currently an environmental impact study underway by the USN. A team of Navy divers arrived in March and started the first phase by surveying several areas of the lagoon. It has to be said that they were astounded by the waters and were quickly on side with respect to pollution or potential hazards. Following closely behind the visit of Dr Charles Sheppard they were able to put a slightly more positive angle on the effects of coral bleaching on deep water corals which appear to have had a better survival rate than their shallow water colleagues. Several large oysters, 14" by 10", lost their lives in this research to investigate the presence of heavy metals and so impressed at the size of these specimens was the environmental advisor, Steven Smith, that he has taken the shells to a marine centre in Hawaii for study. The initial results were promised in May and then for the PolMil talks in June but still we wait. Perhaps things were not as benign as they had hoped?

Across in the Plantation nothing much has changed. The jungle continues its reclamation of any previous areas of habitation. It is a never-ending task trying to keep the jungle at bay around the plantation as everything grows so quickly. I was fascinated by Paul Baker's description of the Children's Graveyard. Attempts to follow the "clearly marked footpath at the rear of the Managers house" failed me during 6 months of persistent attempts. Finally I found it in February and it is now cleared again and the footpath re-instated. The Boobies are doing very well this year with a large number of nests and young; in fact all wildlife seems to be flourishing post El Nino.

Around the islands nature, with the exception of the coral, continues to abound everywhere. The signs of human habitation are disappearing in all the single islands and the Eastern half of Peros Banhos. I have made two sorties to the islands and hope for a third before my departure. The presence of the MV Pacific Marlin as the FPV since Nov 98 has greatly reduced the difficulty in getting to the islands. This vessel will remain on station until March 2000 and possibly longer. This has been a busy year for yacht visits with up to 56 being present in the islands at the peak of the season. A sacrificial anchorage has been

established at isle Boddam (Salomon Islands). Most of the "yachties" prove to be environmentally sound but the upward trend in numbers may cause concern in the future.

If I were to be asked what permanent mark have I left on the environment of the Chagos I should answer none! The colours have not faded in my time and I hope my successor Stuart Watt has as much success.

FRIENDS OF THE CHAGOS

*Annual General Meeting
6 October 1998*

Report by the Chairman

- Glad to be back in these august surrounds. We are very grateful to the Linnean Society for their renewed hospitality.
- A year ago, I accounted to the members of this Association for your Committee's progress in working towards the objectives you agreed upon in 1995. I propose to adopt the same format today.
- First, monitoring the environment. I am glad to report that we have established with the BIOT Administration an arrangement whereby the Committee receives a summary of the reports made by the Conservation Consultant following his annual visits to the Territory. We also hope that the Seminar following this AGM will throw up some additional ideas in this area.
- Second, scientific visits. This is another point which the seminar will be looking at. Meanwhile Charles Sheppard has been working hard at editing the full findings of the 1996 Expedition, which will be published by the Linnean Society early next year. I am sure that new proposals will result from that too.
- Third, links with other students of reef ecology. Charles Sheppard is pursuing this, and the circulation of the proceedings of last year's Conference will take the process forward.
- Fourth, monitoring what is being done by others in this field. Actually, much of this work is being done already by the World Conservation Monitoring Centre in Cambridge, with whom we are regularly in touch.
- Fifth, history of the Chagos. I have to confess that this item was relegated to the back burner this year. I will try harder next.
- Sixth, expansion of membership. Here, the old adage applies - you win some, you lose some. However, what we are seeing is a rising proportion of scientists in our membership, which we take as an encouraging sign. Once again however, I must ask

you, the members, to assist the Committee in our recruitment efforts. Simon Hughes or John Topp, who is standing in for Simon today, will be glad to provide copies of our "flier", specially designed to make joining easy.

- Seventh, educational and publicity material. Sales of our first two booklets did not go as well as we had originally hoped, but we think that the condition of our finances should, fairly soon, make possible the publication of two further titles - on Birds and Plants - which will contribute to fulfilling the purposes for which this Association was founded.
- Turning to other matters, the agreement with the UK Dependent - now Overseas - Conservation Forum, which I mentioned last year, has been brought into effect, I believe to our mutual advantage. I am very glad to report that the Forum's Chairman, Dr Mike Pienkowski, is with us tonight and will be participating in our Seminar.
- I should let you know that we have maintained our regular contacts with the BIOT Administration. Louise Savill, the BIOT Administrator, is the anchor person in this dialogue, but I have also had meetings with Christopher Wilton and his successor as Commissioner, John White. John is Head of the newly created Overseas Territories Department, which sees our problems in a rather wider context than the one we are familiar with. But I see no sign of change in the friendly and constructive character of our exchanges.
- Lastly, I should mention that the Chagos reefs have, for the first time in very many years, received attention in Parliament. In an Adjournment Debate at the end of the Summer Session, Tam Dalyell MP, drew attention to the problems affecting many reefs, including those of the Chagos. This is a most welcome new development, which we hope will lead to a more general parliamentary scrutiny of the Government's environmental stewardship of Britain's remaining Overseas Territories.
- In the coming year, your Committee will press ahead with its endeavours to safeguard this piece of Paradise, and we look forward to reporting further progress a year hence. Thank you.

Nigel Wenban-Smith, Chairman

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