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EDITORIAL

This Special Issue brings together four differing perspectives on the outlook for the Archipelago. It is occasioned by the present active examination of the feasibility of resettling the northernmost atolls. Yet this prospect coincides with fresh information about the likely effects of rising temperatures and sea levels. The views of our authors are their own. Our purpose is to make a timely contribution to better informed discussion. We believe that, in David Bellamy, Tam Dalyell, Charles Sheppard and David Stoddart, we have found contributors of unrivalled experience and distinction.

During 2002, the results of the second round of feasibility studies will become known. These will be of great importance to the Chagos islanders and to the governments responsible for taking decisions about their future. It is vital (literally) that the environmental aspects should not be lost from view. This Association will therefore use its Annual General Meeting on 3 October to provide a forum in which discussion of the relationship between human settlement and the atolls' ecology can be taken forward dispassionately and free from political or commercial motivation. We shall publish the arrangements in the August edition of *Chagos News.* Meanwhile, we invite readers to send in their own views – and to keep free the evening of Thursday 3 October.

But first, as an introduction to the discussion of re-population, here is an account by our regular historical contributor, Donald Taylor, of the very first settlement on Diego Garcia. It aptly illustrates how, from the beginning, this remote atoll has been touched by international as well as natural forces**.**

Nigel Wenban-Smith, Chairman

THE RIVALRY BETWEEN FRANCE AND BRITAIN OVER DIEGO GARCIA

During the eighteenth century, the French pursued two divergent policies in the Indian Ocean. There were those "who believed that [their] position in India could be sustained by command of the sea, secured by island bases, and those who believed that the command of the sea would follow the achievement of armies in India, island bases being for the most part an unnecessary commitment… The interaction between the two schools of thought made French policy in the Indian Ocean indecisive throughout the eighteenth century and for a decade thereafter."[1] And the French fascination with Diego Garcia during the eighteenth century reflected this indecision, so that although they showed interest in the island, they hesitated in taking possession of it in the name of France.

The British also were not too sure what to do about Diego Garcia and the islands of the Chagos Archipelago. They regarded it as an area to be avoided, because of the inaccuracy of the charts and of the uncertainty of the number of islands there were.

French naval vessels, however, had been charting the lagoon of Diego Garcia and the cluster of islands of the Chagos Archipelago since the 1760s, and it was not long before favourable news of the resources of the islands reached Mauritius. By 1770 a Frenchman of Port Louis, Mauritius, had been showing interest in the island, but it was not until 1780 that another Frenchman, Sieur Lenorman[2], asked permission to be granted Diego Garcia as a concession. He owed the Royal Purse vast sums of money, and thought that if he were allowed to exploit the resources of the island, which he heard consisted of large quantities of wood, and a great number coconut palms, he would soon be able to pay back what he owed. He was given verbal permission to do this on the understanding that the authorities in Mauritius were not giving him a concession, but simply allowing him to exploit the coconuts without any fishing rights or rights over the turtles that came to the island.

Amazingly, the French Governor General in Mauritius gave Sieur Lenorman this permission both without a written contract, and before Diego Garcia belonged to France. For neither had any French captain claimed Diego Garcia for the French crown by then, nor had any erected a stone of possession there.

Sieur Lenorman then put up half a dozen huts for a handful of slaves whom he sent there and left to gather coconuts, and from time to time he would send a small vessel there to collect a cargo of nuts for Mauritius. The agreement was that he was to provide a plan of the place as well as an account of his expenses. But he seems to have omitted to do this, and in 1783, the Governor General in Port Louis drew up a formal document outlining Lenorman's rights and responsibilities.

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[1] Scott, Sir Robert, *Limuria: the Lesser Dependencies of Mauritius*, Oxford University Press, 1961, p. 53.
[2] Another spelling for his name was le Norman

However the Governor General still did not regard this document as a formal concession, and said he would forward it to the Minister of Marine in Paris for ratification. In the meantime no one else would be granted the island as a concession.

But in April 1786, while Sieur Lenorman was in Mauritius waiting for a reply, six British ships suddenly appeared in the lagoon.[3] This was the expedition organised in great secrecy by Rawson Hart Boddam, the director of the British East India Company in Bombay, the purpose of which was to claim Diego Garcia for the British Crown. Boddam wanted to set up a viable staging post for British ships that were sailing between India and the Cape of Good Hope, especially those that were using the longer route, which took them from the Cape towards the Dutch East Indies before heading north to India.

Richard Price, the leader of the British expedition, was surprised to find Sieur Lenorman's slaves on the island. They dutifully presented him with a letter from their master, explaining that the island was under his management. But Richard Price ignored the letter, deeming that it did not constitute a formal act of possession in the name of the King of France. Instead, on 4 May 1786, Richard Price took formal possession of the island and all its dependencies in the name of King George III. He then assumed the title of British Resident of Diego Garcia, and ordered that the ships should unload their cargoes.

The expedition had brought everything necessary for a permanent settlement, landing the passengers, including some soldiers as well as skilled craftsmen for building a small fort and settlement. They also began to land stores and topsoil, which they spread around in the vicinity of the settlement. They had brought too a large number of domestic fowls and animals. Once the buildings had been set up, they began digging up the sand and laying down the topsoil in order to plant vegetables and other crops.

Boddam had also arranged that a small number of naval officers should accompany the expedition in order to carry out an accurate a survey of the island. The survey was entrusted to Lieut. Archibald Blair, who proceeded to draw up a map of the island. He also recorded the daily temperature and rainfall, and made observations of the eclipses of the moons of Jupiter.[4]

Then, on 7 August 1786, a French brig, *Petit Cousin,* Captain Louis Francois Raquin, arrived at Diego Garcia, unaware of the British occupation. After some discussions between his second officer, Joffre, and British representatives, he was allowed to take the coconuts gathered by the slaves, and return to Mauritius, where he informed Sieur Lenorman of what had happened. Lenorman was alarmed at this news, as he knew that the French had never formally claimed the island for France, and that there was no stone of possession there. He immediately

[3] The ships were *Admiral Hughes, Drake,* and the survey ships *Experiment, Viper, Scorpion,* and *Atlas.* Details of the expedition can be found in Richard Edis' book, *Peak of Limuria, 1993.* The original sources can be found at the British Library, Oriental and India Office Collection.

[4] Details of his survey can be found in Alexander Dalrymple, British Library, Shelfmark G 2198.8

informed the Governor General of Mauritius, Viscount de Souillac, who in turn sent a corvette, *Minerve*, to Bombay to lodge a complaint[5].

In the meantime, Richard Price had been sending adverse reports about Diego Garcia to Boddam in Bombay. The rain had caused all the topsoil to be washed away, and most of the domestic fowls and animals were dying. Boddam, for his part, had been receiving angry reports from the Court of Directors of the East India Company in London, complaining about the unnecessary expense of the expedition. So, afraid to start an international incident that might have sparked off another war with France[6] and wanting to assuage the anger of the Directors in London, he wrote to Price in August 1786 and told him to dismantle the whole expedition, reload the ships and return at once to Bombay. Price and his men wasted no time in doing as Boddam had ordered and, by the end of October 1786, the whole expedition had left.

On his return from Bombay, the captain of the corvette, *Minerve*, called in at Diego Garcia. He found no sign of the English expedition[7], so he erected a stone of possession in the name of the King of France[8] and left once more for Mauritius. France therefore claimed possession of Diego Garcia at least six months after Richard Price had claimed the island for Britain.

Thus was war averted between France and Britain over the possession of Diego Garcia, and the scene of the rivalry between the two nations moved to other larger tracts of land during the next few years.

Donald Taylor

Dr. Donald Taylor (whose research degrees are in theology and social anthropology) was born in Mauritius and visited the Chagos Archipelago in 1963. He has a longstanding interest in the history of the area and is currently completing a study of the role of the Anglican Church in the history of Seychelles.

[5] It is not certain whether Viscount de Souillac sent the *Minerve* to Bombay to lodge the complaint, or whether he complained through the Ministry of marine in Paris.

[6] The years 1783 to 1793 were one of the rare periods of peace between France and Britain.

[7] In fact, Lieut. Archibald Blair was still in the vicinity, having moved his survey team to Salomon during November 1786.

[8] Presumably Price had removed the flagstaff upon which he had flown the Union Jack when claiming possession of the island for Britain.

LANDFALL AT LAST?

My interest in the Ilois – the people of the Chagos Archipelago – goes back more than thirty years. I did not, it is true, meet them before their forcible removal from the islands where many of them were born. But I began to get to know them in Mauritius soon afterwards. What I have fought *against* during all these years is the injustice that was done to this harmless and peaceful community. The extent of that injustice was finally exposed before the High Court in the first months of this new millennium. It was exposed again before Parliament in the debate I initiated on 9 January last year. What I have fought *for* and continue to fight for is not only recognition of the wrong that was done but for their future – a future in which these islanders can be enabled to live in security and dignity, with the opportunities for self-advancement that other communities take for granted.

The natural presumption is that the Ilois should enjoy such a future in their own homeland. If only things were that simple! As I pointed out in last year's debate, that solution may be unrealistic, especially if it means re-creating a dependence on copra and salt fish. Indeed it would be absurd to revert to an economy whose viability was already questionable in the 1960s and to a society requiring only the manual skills of a people dependent upon a single employer for such basic supplies and social services as their isolation allowed. Rather, a fresh start requires a fresh look at how, using today's technologies, the Ilois can unlock the potential of this garland of islands and reefs to the long-term benefit of themselves and the world.

We must all hope that the current feasibility studies will be thorough in scope and positive in outcome. Yet this is no time for rose-tinted spectacles, whether to look at the pre-expulsion past or the post-court case future. It is one thing to imagine an economy based on advanced forms of fishery, mariculture and tourism, quite another to ensure that these activities generate a surplus for the Ilois inhabitants themselves. It is no good their going back just to become the labour force for external profit takers. It is no good going back in too small numbers to create a viable society or in numbers too great for these tiny islands to support. It is no good going back without help in developing the skills needed to build and operate a revived but authentic Chagossian society. Nor is it any good returning, unless the archipelago's ecology can withstand the activities which make it economically viable. Lastly, all concerned need to be sure that the risks associated with climatic change have been properly weighed.

I make these points not to pour cold water on the aspirations of a people too long denied their birth right. I do so because I am only too well aware of the vulnerability of the Chagos reef system. Nearly four years ago, following the publication of the World Conservation Monitoring Centre's report *Reefs at Risk*, I used the Adjournment debate I won by ballot to draw to the British Government's notice the responsibilities it bears as one of the world's largest coral reef nations. In reply, the Minister commented "We must understand that, for poor coastal communities, degradation of reefs leads to loss of food security, destabilisation of the community structure and, often, migration to the urban centres, which creates increasing problems". The Chagos, which account for a large part of Britain's reefs, have of course no urban centres to migrate to and, largely for that reason, are probably the world's most pristine. It would be a poor reward for thirty years of waiting to condemn the Ilois to the inevitable degradation of the habitat on which their sustainable existence depended.

How then to give substance to the islanders' hard-won right of access to their own homeland without the environmental consequences from which they would suffer first and most? I have no instant solution and I will be surprised if the present feasibility studies come up with one. What they can provide is the starting point for a more informed discussion, involving the Ilois themselves, on the way ahead. I hope that chance will at last be taken.

Tam Dalyell

Tam Dalyell, a Labour Member of Parliament since 1962, is now its most senior Member (Father of the House). Famous for his persistence and independence of mind, he has involved himself in issues pertaining to the Chagos since the 1960s.

THE CHAGOS: A WORLD HERITAGE BANK

Without doubt some of the most rewarding days of my life as a research ecologist were spent on the Chagos Bank charting unexplored reefs in the company of members of Joint Services expeditions and fellow scientists and students. The results of those exciting months were inadequately put in the public domain in a book entitled *Half of Paradise*, a BBC documentary *An Island Called Danger* and in several reports and scientific papers. They were heady days during which Jacques Yves Cousteau was opening the eyes of the world to the myriad wonders of Earth's own Inner Space, and Greenpeace was cutting its campaigning teeth on the problems of Atomic Power and Whaling.

I was one of those who naively thought that common sense would soon prevail over the mounting problems of over-fishing, pollution and eutrophication. I also thought that integrated coast zone management and closed circuit fish farming would pave the way to sustainable use of the resources of five sevenths of this ill-named planet.

Sadly, this was not to be and the last twenty decades of destruction have taken an ever-increasing toll on the biodiversity and hence the balance of all marine ecosystems. Forest destruction, including the all-important mangroves, which we now know act as the kidneys of the land, has carried on apace choking the hermatypic, or reef-building, corals with silt. Chemical farming has added to the annual load of phosphates and nitrates enriching the oligotrophic waters in which the reefs evolved to play their crucially important role - as giant solar-powered wave calming structures protecting vulnerable coastlines and hence the homes of many millions of people. Overfishing is now so rife that commercial catches in all of the so-called fish boxes of the world are in a state of collapse. In consequence, local artisanal fisher-folk have had to turn to dynamite and cyanide fishing in order to feed their families.

In the same way, uncontrolled development of marine-based tourism has wreaked a complex of havoc around the coral seas. So much so that 40% of the reefs and sea grass beds are already almost beyond repair and another 30% are severely stressed. In the same way most of the major estuaries of the world have already been badly damaged by wrong forms of development or are under immediate threat by plans for barrages or marinas.

Even back in the mid-seventies the reefs of the Chagos Bank were not in pristine state. Replacement of the native vegetation by coconut plantations must have taken its toll on the balance of the atolls, as must fishing both for the consumption of the workforce and for export, however limited. Fortunately the coconut industry collapsed before the widespread use of pesticides and herbicides exacerbated the damage to the Islands. All except Diego Garcia were left to their own devices and to the mercy of the Yachties, a few of whom deserved to be keel-hauled. Much worse, the vast majority of the Islands were populated by large populations of feral rats, which precluded the presence of all but the most adventive nesting birds. In contrast the smaller islands that had not been colonised by rodents were overflowing with birds, each nesting in due season.

Of all the animals in the world, rats are species I don't get along with too well; it was for that reason that I called my book Half of Paradise. As explained in the text, it was my hope that one day a team from New Zealand, where they have developed the process of feral eradication to a fine art, would relieve Chagos of their unwanted guests. My dream was that regeneration of the original forest with the help of a little bit of arbori-

culture would then allow the birds to return in as much force as they were on the nearby islands. Making the Chagos Bank a paradise for avifauna could lead to a nature reserve of world class.

Returning to the Islands in the late nineties, a new team of young scientists found that, despite the presence of the rats, a more natural vegetation was replacing the coconuts. What is more, despite increased exploitation of the reefs by visiting fishers from far away Sri Lanka, including a dramatic drop in shark numbers, the reefs were still in very good shape. Then catastrophe: that Little Rascal, El Niño, breathed his warming presence across the length and breadth of the Bank and the reefs went into decline.

It had long been my opinion that reefs, like human beings, have an inbuilt "immunogenic" system. In the case of mammals this is a complex biochemistry, in the case of reefs a complex biodiversity, many organisms each playing a role in the life processes of the reef. As long as the system is intact the reef can, as it were, shrug off the effects of a bad storm or a slight rise in water temperature, but the more that biodiversity is impugned the more the health of the whole system is put in jeopardy. Overfishing, especially at the top end of the food chain, which plays an important role in the balance of the food web, puts the whole reef out of kilter.

Be that as it may, the announcement that the people who had lived on the Islands of the Chagos Bank before the Military took over Diego Garcia had been given permission to return to their "homelands" set alarm bells ringing. What of the future for the dreams of an Island Paradise? Well, looking on the bright side, once there are people back on the Bank there is the possibility of getting rid of the rats, selectively felling the oldest of the palm trees and replanting the original forest from what still remains of the local stock. With people back on the bank, the yachties and the rogue fishers can be monitored and tamed.

The burning question is: how is the new generation of locals going to make a living? Either they will have to be paid from conservation funds - not a very sustainable outlook - or they will have to make a living out of properly run tourism based on the biodiversity of those reefs and forests. With sustainable fishing of the atoll and modern methods of permaculture, enough food could be grown for a limited number of locals and visitors alike. Composting toilets could solve many problems and add humus to the horticultural mix. Ample power could be supplied from solar and wave power, the latter already being successfully employed in similar places. The challenge is enormous but surely this is the way to go. In my opinion the first step is to make The Chagos Bank a World Heritage Site and then a role model of atoll rehabilitation showing that paradise can be regained and make a sustainable living.

David Bellamy

Professor David Bellamy, FLS, a botanist by specialisation, is well known as a tireless environmental campaigner and broadcaster. He is President of the Conservation Foundation, 1 Kensington Gore, London, SW 7 2 AR. E-mail: conservef@gn.apc.org

ISLAND PROFILES, CORAL DEATH, EROSION AND SEA LEVEL RISE IN CHAGOS

There are three main barriers to erosion of Chagos islands: the shallow seaward reefs, the algal crests and the reef flats which attenuate waves. Four years after most corals died in Chagos, mortality remains very high in shallow water, where many reef surfaces have 'dropped' over 1 m due to loss of dense thickets of the coral *Acropora*. Erosion is substantial, but juvenile corals are abundant, so a 'race' exists between erosion and new growth. The outcome is unknown at present, though sea surface temperature (SST) is rising at about .25°C per decade, and more episodes of coral mortality are likely. The condition of the algal crests has not been investigated. Regarding the reef flats, sea level rise is predicted to be 0.25 cm y^{-1}, and accelerating. Deeper water over reef flats will reduce their effectiveness in attenuating waves.

Reduction in effectiveness of any of the three barriers will transfer wave energy to island shores. Most islands have a raised perimeter surrounding a central depression which dips to, or even below, sea level. Consequences could include erosion or breaching of island rims, and impairment of fresh water lenses.

Following the massive coral mortality in the Indian Ocean in 1998 there is concern about what consequences might affect the reefs and island shorelines. All three major functions of coral reefs, namely maintenance of diversity, productivity and coastal protection, are at risk. New coral growth has been observed but it is uncertain what proportion of the abundant juveniles will survive to reach maturity on the unstable substrates. As in much of the Indian Ocean, many of the corals killed in Chagos were hundreds of years old, and it was clear that whether or not the cause was cyclical, natural, or even an isolated occurrence, an event of this magnitude has not occurred for several centuries or even millennia.

In the Chagos, sea surface temperature is rising at about 0.25 °C per decade or more. Sea level (Figure 1) is predicted to rise by 0.2 – 0.5 cm per year, values which closely agree with measured sea level rise in the nearby Maldives. This equates to a 5 cm rise by 2020, and possibly a 20 cm rise by 2040. Predictions show an acceleration as time passes.

Recently published articles (cited at the end) deal with effects of coral death, reef erosion, temperature trends and possible coral recovery. This article discusses possible consequences of sea level rise over the reef flats, profiles of the islands, and island erosion.

Survey transect levels across several islands of the Great Chagos Bank and Egmont atoll were measured using traditional methods in the 1970s, from seaward to lagoon shores, on Joint Services Expeditions. These data are redrawn here. The accuracy of each level is not questioned, though their absolute elevations above a sea level datum was not fixed as accurately as would now be desirable. However, discussions with some of those initially involved has meant that the levels redrawn here can be used to help assess possible island erosion and inundation.

Figure 2 shows redrawn profiles of all islands surveyed, adjusted where appropriate to mean high water level at the time of survey (Spring tidal range here is approximately 1 m). Remarkably, most islands show elevated rims surrounding a depression which reaches to near sea level or even below it.

The central depressions of these islands are sometimes marked and are clearly obvious even on thickly vegetated islands. The northern atoll islands were not levelled, but many also have clear interior depressions. Central depressions are probably formed by solution by mildly acidic rain acting on the limestone rock, and the dips may extend over most of an island. On some (e.g. North Brother) the effect is almost of a thin shell surrounding a fertile and vegetated centre, while on others (e.g. the similarly sized Sea Cow) the depression is small and the entire

island is well elevated. The largest islands measured were on Egmont atoll and Eagle Island, both previously inhabited when copra was valuable. During and after heavy rain, freshwater 'lakes' may form in the interior of several islands, which seep gradually away over hours or days through the porous rock - the high porosity is confirmed by the fact that wells show tidally connected rises and falls in their fresh water level.

Two consequences may be predicted if wave energy reaching island shores increases because of reef erosion or sea level rise: the first is breaching of the island's raised rims. If this happens, flooding of parts of the interiors would be expected. One islet in Diego Garcia already illustrates the effect of a breached rim (though it is not necessarily assumed that this is because of current sea level rise). Two sites in western Peros Banhos atoll appear to see this process taken further: in Ile Monpatre and Ile Diamant, tidal channels split each island along their long axes, i.e. parallel with the atoll rim, leaving separate 'seaward-side' islets. The rim of north Ile du Coin (Peros Banhos) has also eroded back noticeably since this writer lived on it for several months in the late 1970s.

The second consequence concerns fresh water lenses even where rim breaching does not occur. Rainfall maintains these lenses, whose upper surface may be already very close to ground surface level. A rise in sea level to heights more closely aligned with island surfaces and rims could affect this balance in several islands. Rainfall on these islands is between 2,500 and 4,000 mm y^{-1}, the highest of any Indian Ocean archipelago. What will happen to rainfall is currently unclear from climate change models, though increases in extremes appear to be likely even where average values do not greatly change.

In summary, the 1998 coral mortality has reduced the first of the wave barriers, and sea level rise is reducing the effectiveness of the third, so that wave energy dissipation is moving from reef areas to the island shorelines, with possible consequences to erosion and to fresh water lenses. The 'dish' profiles of many of the islands would exacerbate any problems of breaching and flooding.

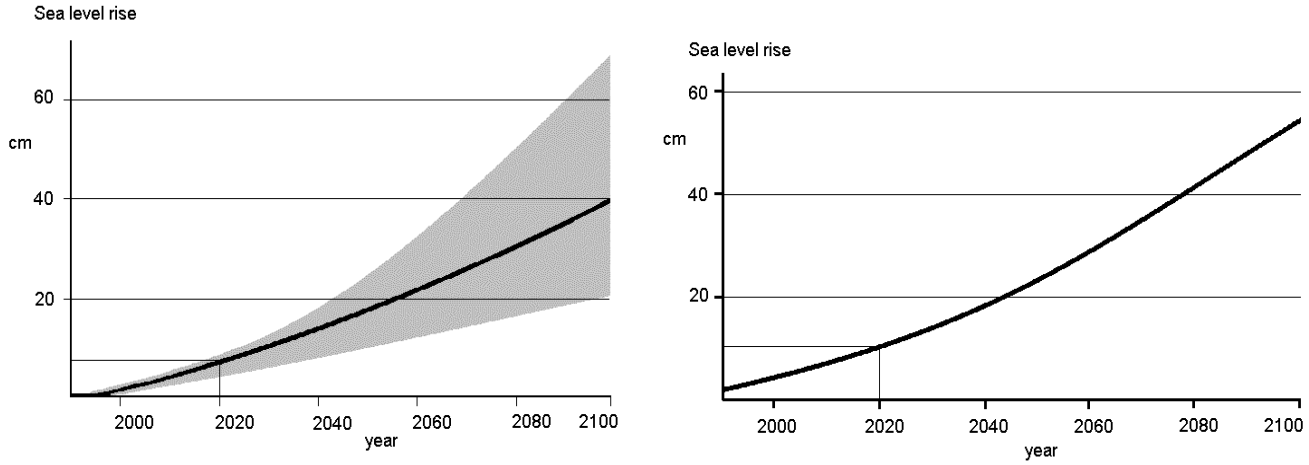

Figure 1: Sea level rise predictions (redrawn from IPCC 2001). Grey zone in the left figure indicates a spread of ranges depending on the parameters input into the model

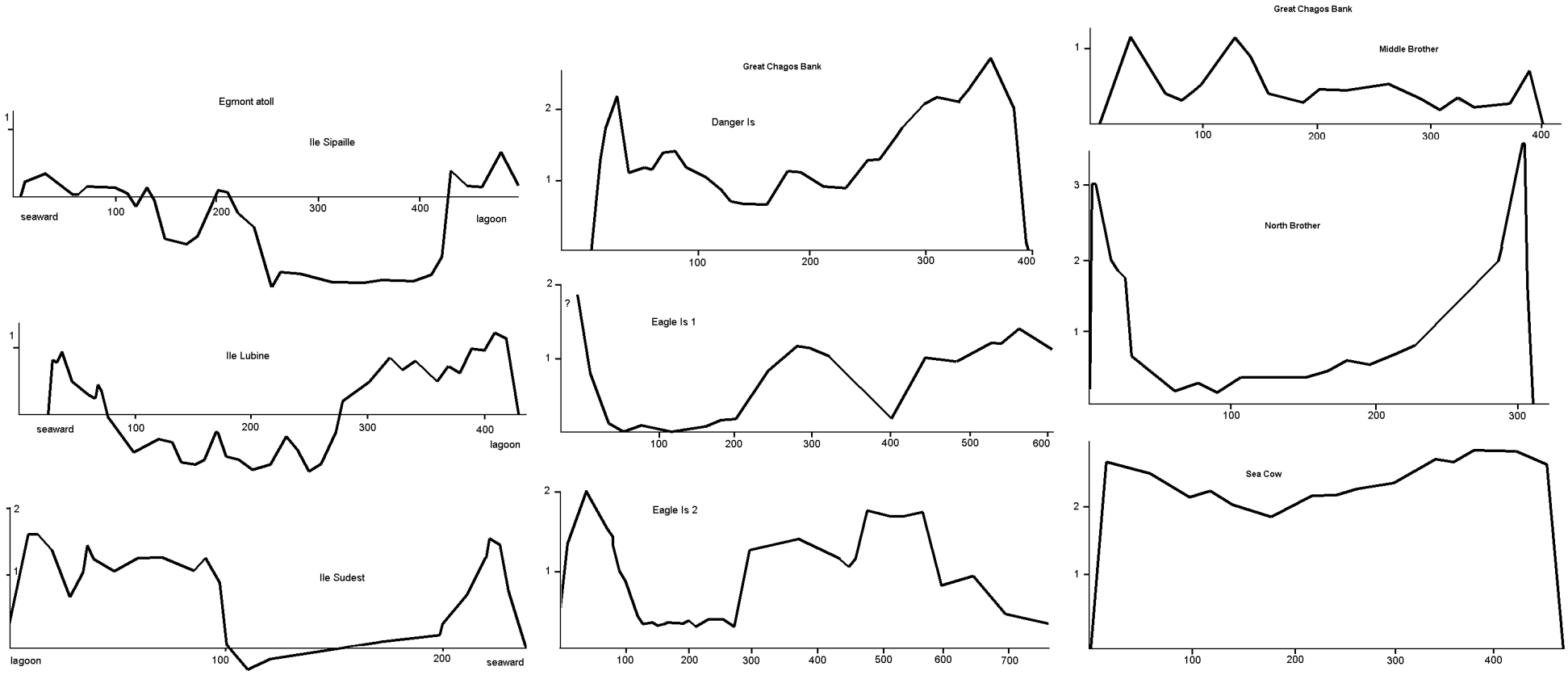

Figure 2 (left): Profiles of islands of Egmont atoll drawn for survey transects carried out in 1972/3. Redrawn from unpublished charts loaned by M. Hirons. **(Centre and right)**: Profiles of islands of the Great Chagos Bank drawn from survey transects carried out in 1975. (Source: Report of Danger Island Joint Services Expedition, 1975). Numbers are all metres, horizontal lines are approximate mean high tide levels at time of survey. No other island profiles of Chagos islands are known at this time

What of the future? The critical sea temperature value for killing corals was 29.9°C in Chagos (this varies regionally). Extrapolation of existing data suggests that even the mean April sea temperature (the warmest month) will reach this critical value in about 2020. Periodic fluctuations above this 'lethal index' would be expected repeatedly well before then. Thus recovery of the first barrier, that on shallow seaward reefs, may well be set back repeatedly.

Continual erosion of the huge quantity of dead corals will create much sand and rubble. Sand can augment rather than reduce the beaches. However, sand 'dunes' are nowhere nearly as effective a breakwater as coral rock and, underwater, chutes of scoured substrate indicate that much of this newly created rubble is already being carried into deeper water rather than being deposited on shore.

The question may be asked: cannot corals on reef flats grow upwards at rates as fast as sea level rises, thus maintaining at least the reef flat barrier? However, reef growth and coral colony growth are not the same thing, though they are commonly confused. Reef growth in atolls has long been known to be much slower than coral colony growth (or predicted sea level rise). Formation of durable reef substrate such as that of which a reef flat is made, as contrasted with simple extension of coral colonies, is a complex and poorly understood issue. In the Chagos archipelago there are as many 'drowned' reefs and atolls which have failed to reach present sea level as there are islanded atolls, even though the last several thousand years showed no marked sea level change. We can, unfortunately, have little hope that reefs will keep up with a sea level rise of the magnitude currently being predicted, especially if recurrent warm episodes kill recovering corals. This means there will be an increasing height of water above the reef flats, with corresponding reduction in their ability to attenuate wave energy.

The effects of mortality, its possible recurrence, and sea level rise will clearly compound each other. It is suggested that, given the upward trend in temperature and sea level, there will be both erosion of elevated rims of islands and repeated episodes of coral mortality. Time frames are not known, though the IPCC curves and tables suggest that some Chagos islands would not be able to support much terrestrial life by 2020 or 2040. (It may be noted that abandonment of some inhabited islands in the tropical Indo-Pacific is already occurring.) To end on a positive note, however, the ecological value of Chagos lies mainly in its sublittoral reefs, and it may be that survival of at least deeper parts of these reefs will continue far into the future.

Acknowledgements I gratefully acknowledge many expediton companions who (with myself) cut numerous transects across these islands, in the 1970s. At the time we had no idea why we were doing such arduous work when we could have been diving, but in good Services tradition relied on the wisdom of our expedition leaders. Now we can see their prescience and foresight!

More detailed information may be found in:

Sheppard, C.R.C., Spalding, M., Bradshaw, C., Wilson, S. 2002. Erosion *vs.* recovery of coral reefs after 1998 El Niño: Chagos reefs, Indian Ocean. *Ambio* 31: 40-48.

Sheppard, C.R.C. 2002. Island elevations, reef condition and sea level rise in atolls of Chagos, British Indian Ocean Territory. Cordio, in press.

Sheppard, C.R.C. Rayner, N.A. 2002. Utility of the Hadley Centre sea-Ice and Sea Surface Temperature data set (HadISST1) in two widely contrasting coral reef areas. *Marine Pollution Bulletin*, in press.

Sheppard, C.R.C. and Seaward, M.R.D. (eds.) 1999. *Ecology of the Chagos Archipelago*. Occasional publications of the Linnean Society of London. Vol 2. Pp 350.

Charles Sheppard

Dr Charles Sheppard has organised several research visits involving many scientists to the northern and central Chagos atolls, over the last quarter of a century. His address is Dept Biological Sciences, University of Warwick, Coventry, CV4 7AL, UK. csheppard@bio.warwick.ac.uk

‘ONE OF THE MOST WONDERFUL PHAENOMENA OF THIS GLOBE’

This is how the hydrographer James Horsburgh described Diego Garcia when he was wrecked there in 1786. He was describing the atoll itself, but were he alive today he could equally well apply the same words both to island and Ilois. It is the future well-being of both with which we are concerned.

Let me briefly state my interest. I began my studies of coral reefs and islands – the main interest of my life – in the western Caribbean in 1959. In 1964 I took a small party to Addu Atoll in the southern Maldives to work on reef and island ecology. We stayed at the RAF station on the island of Gan, which had been used by the military since World War II: the island itself was a scene of devastation in contrast to other islands where the Maldivians continued their traditional way of life. It was on Gan that I learned for the first time that studies were underway on the suitability for use as military airfields of a number of western Indian Ocean islands. – Desroches, Farquhar and Aldabra in Seychelles, and Diego Garcia in the Chagos Archipelago, part of Mauritius.

Realising from the example of Gan what military development can do to vulnerable island ecosystems and being aware that there had been virtually no scientific work on any of these islands since the first decade of the century, I decided to approach the Royal Society with the suggestion that if such development seemed likely then an independent assessment of the ecological importance of the islands should be made before it began. As a result the Royal Society arranged for me to be attached to a Ministry of Defence planning group on Aldabra in 1966, and to an American Department of Defence and Royal Naval party on Diego Garcia in 1967. I concluded that with its huge population of giant tortoises, diverse and indeed unique land birds, and large populations of seabirds Aldabra was one of the most ecologically important atolls in the world, and must not be ‘developed’ by the military. The Society accepted my report completely and made the case to the British Government in the most emphatic terms: when the details became public knowledge there was a general outcry against the defence proposals.

In the case of Diego Garcia, where I was asked to report on the terrestrial environments most likely to be disturbed by development, I had to say that it was simply a coconut plantation. The plants were those common to Indo-Pacific atolls, with many weedy species, and the birds and other land animals few in number of species and in population size. There could be no compelling reason on ecological grounds to argue against development, which indeed began almost immediately. It needs to be recorded that there was no suggestion at the time that any other atoll in the Chagos would be affected, nor was there any discussion of the consequences for the islanders until their summary eviction at the beginning of the 1970s. Aldabra was saved, Diego Garcia was lost. That loss has distressed me ever since: had the Ministry of Defence been more straightforward in revealing the probable consequences of the proposed developments then my terms of reference would have been wider, the field studies more extensive, and perhaps the recommendations quite different. But the base was built and the atoll changed irreversibly – for ever.

That is now more than thirty years ago – a very long time in anyone’s life. A time not insignificant in the life of islands too. Before the military development began the

settled islands were as they had been described by Robert Scott in his evocative book *Limuria* in 1961. They had remained, essentially uncharted, as coconut plantations operated by the Ilois initially for oil and later for copra, for over a century.

That world has gone for ever, and not simply because of the military development of Diego Garcia. Life on such islands has been transformed throughout the tropical seas since the trauma of the dispossession of the Ilois. The older of them will remember with nostalgia their former lives. But since they were compelled to leave their homes the price of copra has collapsed, and such tiny and remote plantations could no longer viably support an island economy. The market for salt fish is trivial and in practice restricted to Mauritius and Seychelles. The pirogue and the skills to work it have both disappeared. The outboard-powered aluminium boat requires quite different expertise – and is vastly more expensive (both are bought rather than built from local timber on the beach).

The world has simply left the old island life behind. It is not only in Chagos that islands have been abandoned. In Seychelles former plantation islands such as Cosmoledo and Astove have had to be abandoned in spite of massive government subsidies in maintaining sea connections. Mauritius has acute problems in maintaining Agalega and Cargados Carajos. Once deserted – as is true also of Chagos – these islands are at the mercy of anyone who chooses to go there. Foreign commercial fishermen, unauthorised tourist vessels, the endless stream of yachts – and who cannot even be monitored, much less controlled.

People change too. After a generation spent in Mauritius the older Illois must be less familiar that they were with their former means of making a living – and enjoying it – in such environments. The younger men and women will scarcely know what skills were needed. But in their exile they will all have seen how modern life requires such things as television, telephone, CD players, microwaves, washing machines – all the trappings of modern life available to the successful in the high islands but which the copra plantations will never be able to support. One can only sympathise deeply with the desire of the Ilois to reconstruct their lives by returning to a world that they still remember with nostalgia, but it would be tragic if it were not realised that it is a world lost for ever.

The island world has changed in other respects too. Maldives is foremost, together with Tuvalu and Kiribati in the Pacific, in warning of the effects of global warming on future sea-level rise and subsequent beach erosion and increasing groundwater salinity. In the longer term the death of corals through thermal stress not only completely transforms shallow marine ecosystems but removes the source of the sediments of which islands are composed. I have seen in Indonesia that dead reefs means disappearing islands.

It cannot, I think, be disputed that the only realistic option for economic viability in islands like the Chagos (apart from externally-managed marine fisheries) is ecotourism. This has been the strategy on several atolls in the Maldives, and on Desroches and Bird in Seychelles. But this requires substantial capital and a considerable infrastructure – airfields, shipping, hotels, marketing and professional expertise, for example. And the very isolation that makes the Chagos so important ecologically militates against any easy development of specialist tourism. Crucially, too, ecotourism requires a relatively small number of skilled personnel rather than the employment of a large local population. And since the capital to develop and operate such facilities is almost inevitably from the outside that is where the revenues and profits (if any) go too.

If the islanders do go back, which they have every right to do, the establishment of viable populations will require major investment by BIOT, for administration, security, maintenance of public order, customs and immigration, public health and transportation – in short the creation of an active administration in the Chagos rather than in London, which cannot possibly be supported by local revenue. It is hard to believe that any institution outside BIOT would undertake such financial responsibility.

My fear is that, after the misery of the last thirty years, islanders returning to the Chagos with such high hopes for their future will instead find disillusion, grief, and ultimately anger and despair.

What can be done? I think there are two connected strategies to consider. One is what might be termed 'the Aldabra solution'. Aldabra is the largest island in Seychelles; it is also the most remote, and of enormous ecological importance. It truly is a World Heritage and indeed bears that title. Chagos has the clear potential to be so recognised too. There is an absolute imperative to manage and conserve such places for all future time.

When the military plans for Aldabra were abandoned in 1967 (on economic not scientific grounds – ignoring the Royal Society's arguments the decision had already been made to build the base though the government denied it) the Royal Society built a research station there and assumed the lease of the atoll. Thus began a research programme that has made Aldabra one of the best known atolls in the world. When Seychelles became independent it was detached from BIOT and returned to the new republic. The Station and the lease were transferred to a new charitable body called the Seychelles Islands Foundation. This has worked closely with the Islands Development Corporation, a government body responsible for the management of the Seychelles outer islands.

With a total Aldabra staff of about twenty managing a land area of some 70 square miles enclosing a lagoon of about the same size, and overseen by trustees with International as well as Seychellois representation and the President as Patron, SIF meets the normal administrative needs of island management without the direct involvement of the central government. Cruise ships call briefly and up to 45,000 people in a single year have visited the Research Station – for a fee. The greater part of the atoll is out-of-bounds and managed as a strict nature reserve for conservation and research. Linked with SIF's other World Heritage site on Praslin, Aldabra is essentially self-supporting apart from major capital costs, which in practice are met by the international community. In the eyes of the world the protection and management of Aldabra through a continuous scientific and conservation presence is seen as one of the greatest achievements of the Republic of Seychelles.

Such a permanent presence in the Chagos islands would make it possible for the Ilois to visit their homeland, to renew their memories, and to tend the remaining evidence of their former lives. The 'Aldabra solution' could not of course support any substantial local population. But this leads to the second part of the strategy I am suggesting: that the Ilois need the resources to develop a truly secure future for themselves in a wider world. This can only come through education, training, and investment of the development of skills to support a richer and more rewarding life that would ever be possible in isolated communities on Peros Banhos, Salomon or Egmont. The Ilois would still be citizens of Chagos and could go there whenever they wished. They would be shielded

from the stress of both environmental and economic uncertainty and indeed possible disasters in the future if they tried to make a living on the islands themselves.

And the Chagos would rightly remain 'one of the wonderful phaenomena of this globe'. I urge that in the developing discussions on the future of the islands and the islanders the Aldabra solution takes high priority. Perhaps it is not too early to begin to think of a substantial trust fund for the future administered by a Chagos Foundation. It would have wide international support.

David Stoddart

Professor David Stoddart O.B.E. of the Department of Geography, University of California at Berkeley, was the founder and first president of the International Society for Reef Studies.