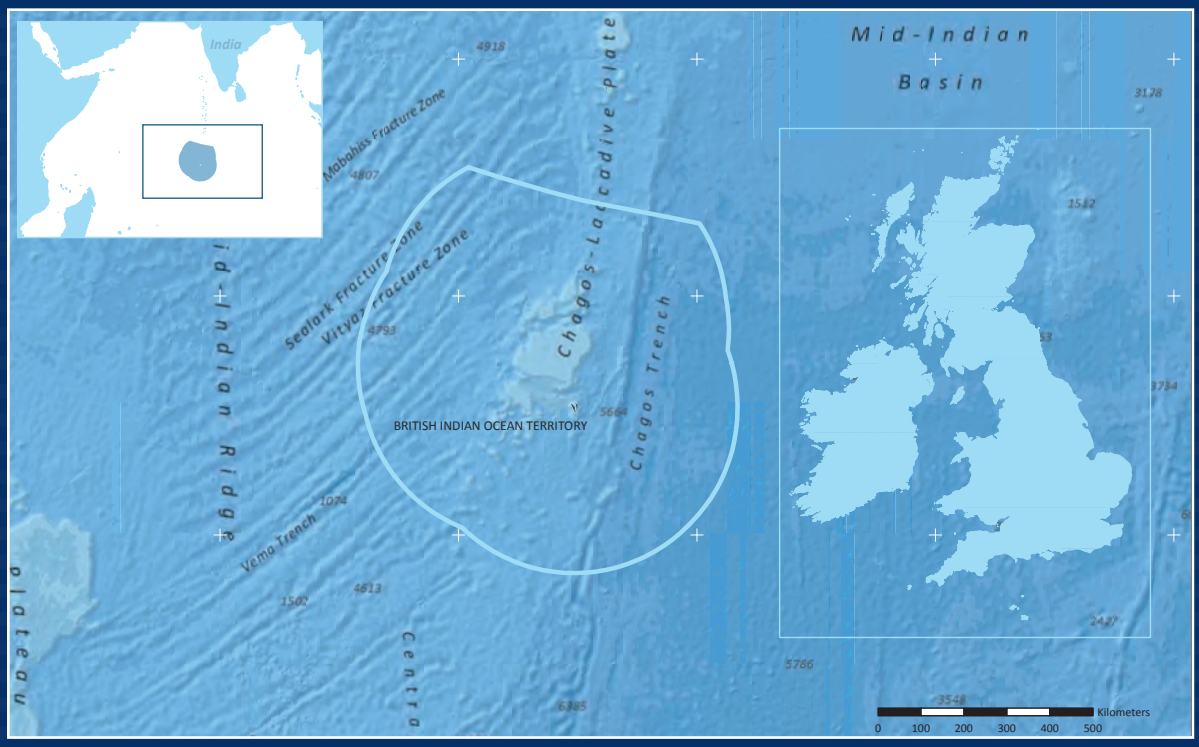
Managing Marine Protected Areas

a case study examining the Chagos Archipelago



Chagos Archipelago MPA with British Isles for relative size comparison

Scale 1:10 000 000 at A4 Datum: World Mercator 5°S (Indian Ocean) and 55°N (UK).
Data Sources: Esri Ocean Basemap (Sources: GEBCO, NOAA, National Geographic, DeLorme and Esri)
(NOT TO BE USED FOR NAVIGATION) and Esri ArcGIS Data Country Outlines; VLIZ (2012) Maritime Boundaries Geodatabase, v6.1.
Available online at http://www.viz.be/vmdcdata/marbound. Consulted on 2012-01-06.

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Foreword

The Chagos Archipelago, which forms the British Indian Ocean Territory, has a very special marine environment. It is remarkably rich in biodiversity and has world status ecologically. Because of where it is – in the middle of the Indian Ocean – and its history the Chagos Archipelago has enjoyed relatively little anthropogenic disturbance. The whole marine area was declared a marine protected area (MPA) in April 2010, making it the biggest MPA in the world. The present Coalition Government has since confirmed the UK's commitment to protecting the highly valued marine habitats and species in and around the Chagos Archipelago. The North Sea Marine Cluster commissioned this report and the underpinning research to help inform consideration of how that goal can best be achieved.

Just about every MPA can give rise to complications and disagreement. It would be an understatement to say that Chagos is no exception. There is, for example, considerable controversy over the compulsory relocation of the former islanders by the UK Government in the 1960s. In debate, this issue frequently becomes entangled with the pros and cons of declaring the marine protected area itself. Our report takes as the starting point the decision to declare the marine protected area and takes no position on the merits or otherwise of the decision. It is not that we are insensitive to associated issues. It is that we believe that the report can add most value by focussing on the practicalities of MPA implementation.

Similarly, we are aware of sensitivities over cost and whether protecting an environmental MPA costs more or less than fisheries management. We do not see this as a helpful or meaningful comparison. It is not our chosen prism. Instead, It is more productive to relate costs to the stated goals and ambitions for the MPA. In reality, this will probably be an iterative process. The MPA objectives and the delivery mechanisms need to take into account the resources that can be made available, but equally adequate resources will need to be found to secure the stated goals. We believe that it is important to be clear from the outset about objectives and what success will look like, and to be realistic about costs. We would not expect this to be a comfortable process, but we caution against fudging. Tempting as it may be in the short term, the end result is invariably disappointment and criticism.

With the foregoing in mind, the report's conclusion that declaration of the MPA will carry additional cost consequences is unlikely to be welcome. The Bertarelli Foundation's donation of £3.5 million over the next five years and the efforts of the Blue Marine Foundation to facilitate this are to be applauded. It is likely that similar and further innovative thinking will be required to ensure that in ten year's time the Chagos MPA will be heralded world-wide as an example of a well managed and highly effective MPA. The report offers some suggestions and ideas.

Success will depend not just on the money spent – from whatever source. It will depend critically on how effectively and efficiently the money is used and how well the resources are deployed. It is the central theme of this report. Declaring a MPA is just the start. The really difficult part is making it happen in the way intended. Fortunately, there is plenty of expertise that can be tapped into across all sectors. It has already been demonstrated that there is room for a collaborative approach. The report is offered in this spirit.

Professor Peter Liss **Rodney Anderson**

North Sea Marine Cluster

The North Sea Marine Cluster (NSMC) was created in 2009 by an association between the University of East Anglia in Norwich and the Gardline Group based in Great Yarmouth, and combines academic excellence with hands on worldwide marine experience. The NSMC commissioned two research reports in 2010 looking at the practical implementation of marine protected areas (MPAs) in Europe and more widely to see what lessons might be drawn from this and applied to UK waters. The NSMC followed this up in 2011 with a well attended and well received cross sectoral conference in London entitled "Marine protected areas : aspiration or reality". 110 delegates representing 80 organisations discussed what needed to be done to ensure that MPAs were not just 'paper parks'.

It was recognised that we could be on the brink of the greatest positive set of changes in the way that the UK's seas were managed, but that the planned rapid and huge expansion of conservation MPAs around our coast could fail to deliver if insufficient attention was paid to the practicalities of implementation. Past experience, in the UK and elsewhere, suggested that there was an urgent need to consider how these sites were going be monitored and managed.

It was as a result of this earlier research and conference that the NSMC concluded that similar considerations needed to be applied in the case of the then recently announced Chagos Archipelago Marine Protected Area. The Cluster commissioned further research and this report is the product. The aim is to assist those currently considering the future management of the MPA and to draw attention to the risks and opportunities from the perspective of practical and sustainable marine management.

Acknowledgement

A number of colleagues from Government, business, academia and civil society with an interest in the Chagos MPA provided helpful comments and suggestions on earlier versions of this report. We are grateful to those colleagues and stress that any error or omissions are the responsibility of the North Sea Marine Cluster.

Executive Summary

The Chagos Archipelago and its surrounding seas are unique and biologically very special. The area is also vast and remote, sitting in the middle of the Indian Ocean. The main Island, Diego Garcia, is used by the USA as a military base and 46 years ago people then living on the islands were compulsorily relocated. There is an outstanding dispute between the UK Government and the Mauritian Government over sovereignty and a group of Chagossian Islanders is seeking through the European Court of Human Rights the right to return. For many years the Archipelago has been subject to various individual environmental protections and in 2010 the whole area was declared a MPA.

The stakes are high. The Chagos Archipelago is one of the most important marine habitats in the world. The MPA is the largest in the world. Its distance from other occupied land and low levels of anthropogenic activity have helped protect it.

Future funding will be a key issue. Costs can be expected to rise and UK Government funds will be in short supply. The Blue Marine Foundation has facilitated a donation of £3.5m by the Swiss based Bertarelli Foundation over the next five years to help meet the cost of enforcement. Whilst obviously a welcome demonstration of philanthropic concern and practical assistance, the UK Government will need to explore further and longer term funding options. Like other parts of the Globe the Chagos Archipelago is not immune from the effects of climate change, but the main immediate threat is from illegal commercial fishing. It has been declared a no-take zone on the instruction of the UK Government.

To ensure that this can be brought into effect, the objectives of the MPA can be secured and a sustainable funding package can be found, this report concludes that a number of measures are required. We recommend:

- That (a) there should be clarity from the outset about the conservation objectives; (b) a MPA management plan should be drawn up for the area; and (c) a risk based approach should be adopted towards management of the MPA. To assist this process an assessment tool, such as the guidebook published by the IUCN on evaluating marine protected area management effectiveness[1], suitably adapted could be employed to ensure that the appropriate actions are taken at the outset.
- That consideration should be given to developing a marine plan for the Chagos Archipelago which would examine and draw together the economic, social and environmental factors affecting the MPA.
- That consideration should be given to establishing an advisory group, perhaps centred around the existing cross-departmental official-level group with responsibility for overseeing delivery of the UK Government's objectives for the conservation and sustainable use of biodiversity in the Overseas Territories.
- That steps should be taken to ensure that the future surveillance regime and the patrol vessels employed as part of that are tailored to the task. A MPA management plan would assist considerably here. We believe that ideally there should be two vessels available on the basis of what is known now: a powerful vessel that large offshore fishing vessels could not easily outrun and which could offer modern research facilities; and a second smaller vessel capable of operating effectively and flexibly inshore, but also with the capacity to extend its reach to the offshore area. This smaller vessel could also offer research facilities and should be capable of undertaking such other tasks as may be required.

[1] *Pomeroy, R.S. , Parks, J. E. , and Watson, L. M. , (2004) How is Your MPA Doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness. ICUN*

- That when commissioning the patrol vessel(s) there should be due regard to the actual number of active operational days made available and how these will be divided between the different tasks (recognising that the FCO wants the vessel(s) to be capable of undertaking more than MPA protection).
- That, as part of the arrangements to protect the MPA, there should be aerial surveillance to help spot illegal activity or the threat of illegal fishing. Aerial surveillance can be an effective deterrent as well as a means of detecting illegal activity.
- That, to help meet the cost of protecting the MPA and undertaking further scientific research and monitoring, consideration should be given to new ways of finding additional resources. Among these might be scientific bodies nationally and internationally subscribing towards the cost of maintaining the MPA, if they want access to the area for research purposes or access to data relating to the area.
- That consideration be given to asking those that exploit the Indian Ocean for commercial gain to contribute, for example, members of the Indian Ocean Tuna Commission (IOTC). They may stand to gain a bottom line benefit from an effectively run MPA.
- That consideration should be given to eco-tourism making a financial contribution. It should be possible to achieve that without causing security difficulties. For example, access to waters near the outer islands (i.e. well away from Diego Garcia) for could be granted to cruise ships with licences issued for diving and/or small vessel access to enable visitors to observe the exceptional quality of the local marine environment.
- That other market mechanisms should be explored as a means of attracting funds. Given that one of the principal benefits of the MPA will be its contribution to better understanding and monitoring the impacts of climate change, it would seem worthwhile exploring whether resources might be available through a carbon trading or other market type mechanisms. In the longer term these might include, for example, international biodiversity offsets.
- That the UK Government should regard the Chagos Archipelago as a priority in its stated policy of promoting safeguards for biodiversity and it should apply the strategic approach set out in Defra's "United Kingdom Overseas Territories Biodiversity Strategy". The Government's commitments include consideration being given to a new UK Government funding stream, continuing to help Overseas Territories to participate in the full range of available funding sources and .exploring possibilities for helping the Overseas Territories access the large international funds on biodiversity, climate change and natural heritage.
- That, in recognition of the importance of a healthy marine environment in mitigating climate change and the role of MPAs in this respect, consideration should be given to accessing the very large sums of money the UK Government is contributing to international climate change finance.
- That the existing or a new wider cross-departmental group should explore innovative ways of collectively addressing the challenges faced in respect of the Chagos MPA. If Government departments work together, and draw on external expertise in the scientific, civil society and commercial sectors, there will be a better chance that effective solutions can be found.

Introduction

This paper draws on a research report on the Chagos Archipelago Marine Protected Area (MPA) prepared by Daria Nazarova[2], on behalf of the North Sea Marine Cluster. It includes a summary of Daria's findings and from these and other documentation draws conclusions and makes recommendations about the future management of the MPA. Considerable thanks go to all who have assisted in the preparation of the research report which, with this paper, will hopefully make a helpful contribution to ensuring the conservation and protection of a very special area of ocean.

Background

The Chagos Archipelago – which makes up the British Indian Ocean Territory (BIOT) - is one of the fourteen UK overseas territories. The BIOT is a group of seven widely spread atolls comprising of about 55 tropical islands which sit in an exclusive economic zone of about 544,000 sq km of ocean (about the same size as France). The islands themselves are small. They have a land area of only 60 sq km and 698km of coastline. Diego Garcia is the largest and most southerly island, covering 44 sq km. It is used as a military base by the US and is the only inhabited island.

The BIOT is in the middle of the Indian Ocean and lies about 1,770 km east of Mahé (Seychelles) and about 500 km south of the Maldives. It is administered by a Commissioner based in the Foreign and Commonwealth Office (FCO) in London.

Until 1965 the Chagos Islands that now make up the BIOT were administered as a dependency of Mauritius, prior to Mauritius gaining independence in 1968. In 1965 they were detached to become part of the British Indian Ocean Territory. Subsequently about 1000 people living on the islands were compulsorily relocated. In 1966, the UK entered into an agreement with the US that permits the US to use any island of the BIOT for defence purposes for 50 years (through to December 2016). There is the option of a 20 year optional extension if both parties agree by December 2014. The only island currently used under the agreement is Diego Garcia.

There are presently two issues of dispute involving the UK Government over the Chagos Islands. One of these concerns sovereignty. Since the 1980s successive Mauritian Governments have asserted a claim to the islands, arguing that they were detached illegally. The UK Government does not accept this, but has undertaken to hand the Islands over to Mauritius when they are no longer required for defence purposes. The other issue of dispute is over the right of Chagossian Islanders to return to the Islands. A group of Islanders have taken their case to the European Court of Human Rights and a ruling is awaited. The issue is one that attracts intense debate and it inevitably becomes entangled with any discussion about the MPA. The FCO has stated that declaration of the MPA is without prejudice to the outcome of the pending proceedings before the European Court of Human Rights. However, among those that support the Chagossian's case against the UK Government it is argued that the declaration of the MPA creates a further barrier because, as a no take zone, it closes the opportunity of the Islanders deriving any economic return from commercial fishing[3].

[2] *Daria Nazarova worked as a Researcher for the North Sea Marine Cluster during 2011, specifically to investigate the Chagos Archipelagos and the issues surrounding the environmental objectives of the marine protected area.*

[3] *David Snoxell, 2011*

The Chagos Archipelago is one of the most important marine habitats in the world

The BIOT waters and reef systems are widely recognised as being among the richest on the planet in terms of biodiversity and ecological significance. There are at least 220 coral species and over 1000 species of fish[4]. The BIOT contains about half of all the reefs of the Indian Ocean which remain in good condition[5]. The BIOT is also home to the world's largest living coral atoll – the Great Chagos Bank. The Chagos Islands waters also harbour an endemic coral Ctenella chagius and reef fish found nowhere else in the world[6].

In addition, the Chagos Archipelago serves as a refuge and breeding site for whales, sharks, dolphins, marine turtles, rare crabs, birds and other marine life. Seventeen species of seabird breed on the islands. BirdLife International have established 10 Important Bird Areas (IBAs) in Chagos, with two others sites suggested for IBA status[7].

The Islands provide an undisturbed nursery for hawksbill (Eretmochelys imbricata) and green turtles (Chelonia mydas), which are accorded 'critically endangered' and 'endangered' status on the International Union for Conservation of Nature's Red List of Threatened Species[8]. It is estimated that there are some 300-700 hawksbills and 400-800 green turtles nesting annually in the Chagos Islands[9]. The turtles were heavily exploited during the previous two centuries but now they and their habitats are protected by the BIOT Administration[10].

The remoteness and the low level of anthropogenic activities around the Chagos Islands – with the exception of the military base on Diego Garcia – has resulted in a rare example of relatively unmodified and unperturbed ecosystem functions and species assemblages. While climate change and ocean acidification affects all reefs, those in Chagos Archipelago have been shown to be relatively resilient to ocean warming. The coastal waters of Diego Garcia in the Chagos Archipelago have been assessed as being among the cleanest in the world, with the data available capable of serving as a global reference baseline[11].

The deep oceanic waters within the Chagos 200 mile Environment Preservation and Protection Zone (EPPZ)/ Fisheries Conservation and Management Zone (FCMZ) include some exceptional diversity of deepwater habitat types (e.g., plate separation, fracture zones, sea-floor spreading, sea-mounts and mid-ocean ridges, deep trenches to approximately 6,000 metres (approximately 4 miles), and abyssal plains).

The British Indian Ocean Territory MPA is the largest in the world and is of global significance

In April 2010, David Miliband, the then Foreign Secretary, announced the creation of the MPA in the BIOT. The MPA covers the entire EEZ around the territorial waters of the Chagos Archipelago. The only geographical exception is an area immediately surrounding Diego Garcia extending 3 nm from the shore. The Foreign Office stated that declaring the MPA had the effect of doubling the global coverage of the world's oceans under protection[12]. The benefits identified by the FCO included:

- Providing climate change science with a "control" against which to measure changes in the marine environment elsewhere. Unlike most other places on the globe the BIOT is not confounded by man's direct impacts and pollution and so the effects of climate change can be better understood. Its location also fills the large gap in global coverage for automated measurements of various important atmospheric and ocean parameters.
- Providing a scientific benchmark and a natural laboratory which will contribute to understanding the processes that influence climate change and how to manage the threats it poses.

[4] *Chagos Conservation Network Consultation Response 2009, 3*
[5] *FCO Consultation Report 2009, 9*
[6] *Chagos Conservation Network Consultation Response 2009, 4).*
[7] *FCO Consultation Report 2009, 9*
[8] *Chagos Conservation Network Response 2009, 3*
[9] *Greenpeace Consultation Response 2010, 5*
[10] *Chagos Conservation Management plan 2003, 46.*
[11] *Sheppard et al, 2009, 16*
[12] *It actually doubled the total area of environmental no take zones world-wide, rather than the total coverage of the world's oceans under protection; which is still very impressive.*

- Offering great scope for research in all fields of marine science, biodiversity and many aspects of climate change, which are core research issues for UK science.
- Providing an unpolluted reference site, and one which is almost entirely unaffected by man's direct impacts.
- Acting as a source site, or reserve, for many species heavily exploited in most other areas of the Indian Ocean, especially those down current (which is the Western Ocean and African coast).
- Acting as an "environmental insurance policy" with the size of the MPA ensuring integrity in the way that smaller reserves cannot.
- Addressing shortcoming in the global network of properly protected marine reserves (most being too small, damaged or far apart to function effectively).
- Increasing the chances of managing degradation of the marine environment in other locations of the Indian Ocean.

A further role for MPAs is to export 'surplus' (juveniles, larvae, seeds and spores) and reproductive output to the neighbouring areas. It has been said that the BIOT area is exceptionally well placed to serve as such a stepping-stone, though the research findings so far have been limited in this respect[13].

The MPA builds on existing environmental protections

As observed in the report on the results of the FCO's consultation exercise on the MPA proposal, the area has already been declared an Environmental (Preservation and Protection) Zone with legislation in place to protect these natural resources. These include strict controls over fishing, pollution (air, land and water), damage to the environment, and the killing, harming or collecting of animals. Some of the most important land and sea areas have already been set aside for additional protection. Most of the lagoon areas and a large part of the land area of Diego Garcia are protected as Restricted Areas, four Special Conservation Areas and a Nature Reserve. Strict Nature Reserves cover the land and surrounding reefs and waters of the islands of the Great Chagos Bank and a large part of Peros Banhos Atoll.

The report explains that the BIOT is also subject to further levels of internationally binding legal protection. This includes the designation of part of Diego Garcia as a Wetland of International Importance under the Ramsar Convention; the Whaling Convention (including an Indian Ocean Whale Sanctuary); the Law of the Sea Convention (with provisions to protect fish stocks); the Indian Ocean Tuna Commission (IOTC); CITES (regulating trade in wildlife, including corals); and the Bonn Convention (with provisions to protect marine turtles and cetaceans).

Until the MPA was declared and the area became a no take zone there were licensed commercial and recreational fisheries in the BIOT

A 200 nm Fishery Management Conservation Zone (FCMZ) together with a fisheries management regime was introduced in October 1991. Commercial fishing within this zone was allowed under licence. Pelagic fishing was permitted beyond 12 nautical miles of land. Inshore fishing for demersal species was permitted from 1 April to 31 October each year, but only by hook and line, and not within lagoons. Fishing effort was further controlled for both pelagic and demersal species by limiting the number of licences.

In the early 1990s, The BIOT Administration appointed consultants - MRAG to assist with fishery management within the 200nm FCMZ. This included, preparing a fisheries management strategy, issuing fishing licences on behalf of the BIOT Administration, and undertaking fisheries monitoring and enforcement[14]. The pelagic fishing within the BIOT occurred over the deep Chagos trench to the east of the archipelago,

[13] *Sheppard et al, 2009, 16*

[13] *Marine conservation in the British Indian Ocean Territory 2009, 10*

and the shallower waters to the west of the archipelago[15].

The longline fishery in the BIOT was mainly pursued by Taiwanese and Japanese registered vessels targeting the large pelagic species: yellowfin tuna, bigeye tuna, swordfish, striped marlin, and Indo-Pacific sailfish[16]. The catches were highly variable across different years and during each year. Data supplied by MRAG shows August to January being the busiest months[17].

The licensed purse-seine fishery in the BIOT mainly targeted yellowfin and skipjack tuna and was seasonal, taking place between November to February[18]. These vessels were mostly from France and Spain, but included vessels from Japan and Thailand.

There were two smaller BIOT fisheries: i) low-level recreational fishing activity in Diego Garcia and from visiting yachts; and ii) inshore fishing by Mauritian vessels based on historical rights. Some Mauritian owned but not Mauritian flagged vessels fished in 2008 and 2009. Overall, the inshore fisheries total catch was considered to be within sustainable limits (though there had been some concerns expressed because the fishery targeted predatory species at the higher trophic levels, e.g. groupers, and the fish retained were often at the maximum recorded total length for that species)[19].

Following the establishment of the MPA on 1 April 2010, the BIOT Administration has not issued any more commercial fishing licences and the last of the licences expired on 31 October 2010. Recreational fishing around Diego Garcia continues to be permitted under the UK-US agreement but is limited to within 3 miles of Diego Garcia's shoreline.

The consequences of climate change, including rising sea temperatures and sea levels, impact on the Chagos Archipelago

Coral reefs are highly vulnerable to climate change. Reef corals have restricted thermal tolerance and when the sea level temperature rises above a certain threshold bleaching events occur[20]. In 1998 high sea surface temperatures (SST) caused widespread coral bleaching which affected island archipelagos with mortality of over 90% to considerable depths in the Maldives, Seychelles and Chagos[21]. However, the Chagos Archipelago coral has recovered rapidly since 1998 despite additional warming events in 2003 and 2005[22]. Marine reserves in other parts of the world have not shown the same results as the Chagos recovery patterns. This is said to be due to the lack of multiple anthropogenic stresses to which most other reef systems are subject[23].

The average sea level is predicted to rise by 0.2 – 0.5 cm per year globally. In Diego Garcia it has averaged 0.54 cm annually since 1986, which is similar to the Maldives[24]. The rise in sea level will not directly affect marine life in the Chagos archipelago, but it will impact on the islands. It is expected that the reef flats will become less effective in attenuating waves leading to erosion of island shores. Because a lot of the islands are concave, once the outer rim is breached there will be extensive flooding.

Whilst the Chagos Archipelago is not immune from the affects of climate change, as a MPA with its protection against direct anthropogenic pressures, the resident habitats and species are probably better placed to adapt. The MPA also offers a unique reference site to better understand climate change impacts.

[15] *MRAG Consultation Response 2010, 23*
[16] *Koldeway et al. 2010, 4*
[17] *MRAG Consultation Response 2010, 26*
[18] *MRAG Consultation Response 2010, 25*
[19] *S. Harding, pers. obs.*
[20] *Marine conservation in the British Indian Ocean Territory, 2009, 12*
[21] *Sheppard et al., 2002*
[22] *Graham et al. 2008, 4*
[23] *Graham et al. 2008,7*
[24] *Chagos Conservation Management Plan 2003, 41*

After climate change, the major risk to the MPA is from illegal fishing

Fishing is not the only potential threat to the BIOT marine environment, but it is without doubt the main one after climate change. Litter is also a problem. All of the BIOT atolls suffer from shore line debris. Apart from being unsightly, on some beaches breeding turtles are adversely affected by the litter present.

Although this can be problem, the impact is localised, whereas illegal fishing can have widespread detrimental effects affecting many species and habitats with the impacts extending far beyond the MPA itself. The BIOT sits in the western Indian Ocean, which has been judged as remaining a region with some of the most exploited, poorly understood and badly enforced and managed coastal and pelagic fisheries in the world[25].

One of the main risks in the offshore area is likely to be vessels in transit through the MPA, using the opportunity to catch tuna and other large and commercially valuable pelagic species (as the MPA sits astride the main transit route for tuna fishing boats travelling from East and North East Africa to Thailand and back). Other vessels may choose to slip over the MPA boundary from the adjoining international waters and fish illegally for a short time before returning to external waters. Much will depend upon the willingness of owners and skippers of fishing vessels to observe the no take rules and whether they perceive that the consequences of illegal activities outweigh the financial rewards.

A total of 32 unlicensed offshore fishing vessels were detected and inspected between 2002 and 2010[26]. It should be borne in mind that fisheries protection by the patrol vessel made up only 62% of its contracted days. Although it is to be expected that vessel patrols were targeted and risk based, there remains the strong possibility that more illegal fishing occurred than was identified and reported. Even in heavily patrolled and monitored waters, such as those around the UK, it is difficult to observe and prevent all illegal fishing activity, especially at sea.

MRAG pointed out that, prior to the no take zone, licensed fishing vessels were able to tip off the authorities and to act as a deterrent themselves. The same point was made by respondents with tuna fishing interests when responding to the FCO's MPA consultation document. On the other hand, Rosemary Stevenson, the Consultation Facilitator, reported that most respondents commenting on enforcement took a different view. They believed that if no fishing was allowed it would be easier to identify illegal vessels. Interestingly, many made the distinction between identification and enforcement and acknowledged that illegal fishing was likely to increase. Whichever view is accepted, it is probable that, unless robust and effective counter measures are put in place, the offshore area could see an increase in illegal fishing.

Bycatch could be a further problem if illegal fishing does take place in the offshore area of the MPA and could have a serious impact on non-target species. When targeting tuna, other species such as sharks and rays are commonly caught as bycatch.

More generally, shark numbers have also been depleted despite safeguards in place before the MPA was declared because they are hunted illegally as a target species. This is a long standing problem. Shark numbers have dramatically declined throughout the Indian Ocean despite fishing regulations to aim at preventing this. The sharp decline of the shark numbers was noticed before fisheries protection measures were in place but the numbers are still declining overall. Landings of species especially vulnerable to population decline from fishing activity, such as sharks and rays, have been steadily rising in both the eastern and western Indian Ocean since the 1950s[27].The frequencies of some species have changed: research has showed silvertip sharks increased in abundance between 1996 and 2006, but blacktip and whitetip reef sharks were rarely seen during a 2006 study[28].

Declaring an activity to be illegal does not necessarily put a stop to it. Prior to the MPA being in place, between 2002 and 2009,

[25] *Koldewey et al. 2010*
[26] *(MRAG Consultation Response 2010, 50*
[27] *Camhi et al., 2009; FAO, 2009*
[28] *Sheppard et al. 2009, 19*

fifty Sri Lankan registered vessels were reported as fishing illegally in the BIOT[29]. As with the offshore area, the incidence of illegal fishing might well have been higher. These vessels are hard to detect. They are usually small, around 10m in length, and employ a combination of surface driftnets and longlines[30]. In seas greater than 2-3m, the vessels are visible only within 4 to 6nm. In addition, their wooden and fibreglass hulls emit only faint radar signatures so close quarter (visual) surveillance is necessary to spot them. Inshore areas offer plenty of refuge for small unlicensed boats, in dangerous shallow banks and reefs.

The inshore illegal fishing by Sri Lankan registered vessels has traditionally been seen as the biggest problem in the BIOT. The area acts as a convenient post for vessels transiting between Sri Lanka and the fishing grounds of the Saya de Malha and Nazareth Banks, located to the southwest of the MPA. When inspected, Sri Lankan vessels usually claim that they are either transiting or on the way back to Sri Lanka after fishing[31].

Fishing vessels that are in transit through the MPA do not have to report to the BIOT, though they are encouraged to do so. Dependent upon the surveillance facilities available, this lack of any formal requirement could mean that it is more difficult to detect illegal fishing than would otherwise be the case. The BIOT Administration would not be in a position to require vessels to report since there is no internationally recognised legal obligation on them to do so.

Sea cucumbers (holothurians) have been one of the biggest poaching targets in the BIOT and remain a potential target. They are commercially valuable as well as performing an important ecological role. A study in 2006 revealed a marked decline in sea cucumbers over the previous four years. There appears to be a strong relationship between fishing activity by Sri Lankan vessels and the illegal harvesting of the holothurians[32].

To provide a base for their illegal activities fishermen have in the past set up camps on the outer islands, from which they could harvest sea cucumbers or support fishing operations[33].

The camps that were discovered had scuba diving equipment, communications equipment, skiffs and provisions sufficient for prolonged periods ashore. Sri Lankan registered vessels helped service the camps. The boats dropped people off in the camps or pick them up in transit to and from the Saya de Mahla Bank[34].

Monitoring and enforcement in the marine protected area will be a serious challenge

The economic and social incentives for fishermen to fish illegally in the MPA are strong – both inshore and offshore. The vast remote area dotted with islands, adjoining an established international pelagic fishery, presents a prime opportunity for poaching. There are two main types of fishing that make up the threat: sophisticated and highly technical vessels fishing for large pelagic species (mainly tuna) in the Western Indian Ocean and basic small Sri Lankan registered vessels mainly after sharks and inshore demersal species. Detection of illegal fishing in both cases is difficult. The size of the area to be policed, the ability of vessels – especially small vessels – to remain undetected by radar, the opportunity to operate from island bases and legitimate reasons to be transiting the area without requiring consent all add to the challenge.

Effective enforcement relies upon good intelligence and data, the capacity and ability to catch offenders and penalties that will deter. The BIOT is administered from London. At present, there is only one patrol vessel – the BPV Pacific Marlin. This is a Singaporean flagged vessel, owned and operated by Swire Pacific Offshore. It is capable of a MCR of about 12.5 knots (which means in practice that it will do a maximum of about 11 knots). Having visually identified on the horizon a vessel suspected of illegal fishing it would take the Pacific Marlin at least an hour to reach that spot, if the suspect vessel remained stationary. It is, of course, highly unlikely that any vessel engaged in illegal activity would wait for the patrol vessel to catch up with them. Large modern

[29] *IOTC, 2010*
[30] *MRAG Consultation Response 2010, 48*
[31] *MRAG Consultation Response 2010, 48*
[32] *Sheppard et al. 2009, 19*
[33] *MRAG Consultation Response 2010, 49*
[34] *MRAG Consultation Response 2010, 49*

fishing vessels are well capable of outrunning the Pacific Marlin. The much smaller and slower Sri Lankan fishing vessels may find themselves outpaced, but MRAG have pointed to the difficulty of finding such vessels in the first place.

Having independent observers aboard fishing vessels can discourage illegal activities and ensure that there are sound data on which to base fisheries management. Prior to declaration of the MPA, MRAG placed observers on offshore purse seine and longline vessels licensed to fish in the BIOT FCMZ[35]. However, tuna observer programmes vary every year, due to constraints on funding in the BIOT[36]. Between 1995 and 2008, the maximum observer coverage in a year for longline fishing was 3.21% of fishing days and the average (mean) across the full period was 1.24% of fishing days. For the purse-seine fishery the percentage coverage varied from 34% in the year 2000–01 to 0% in 1997-98, 2002-05 and 2007-08. Across the whole period the average (mean) was 5.56%[37]. The observer programme was, therefore, patchy and at a low level. Data are available from logbooks, but these can be notoriously inaccurate and, on their own, are of little value for the purpose of monitoring and enforcement.

Following the declaration of the MPA there are no licensed fishing vessels and, therefore, no observers on board such vessels as part of the MPA management regime. The Indian Ocean Tuna Commission (IOTC) does have minimum observer coverage levels which may prove of some assistance in discouraging illegal activity in the MPA. However, the IOTC's own report in 2009 reviewing its performance drew attention to the low levels of compliance with IOTC measures and obligations[38].

There is also the problem of what to do with offenders when they are caught. The remoteness of the BIOT and the security sensitivities of the only occupied island - Diego Garcia - being a military base mean that there are practical difficulties not experienced in other MPAs. Issuing warnings avoids complications, but does little to discourage illegal fishing. It becomes a cat and mouse game with no real penalty for the offender, assuming he can be caught with proof of illegal activity.

Two years after the Fishery Conservation and Management Zone was introduced, the first arrest of an illegal unlicensed offshore longline fishing vessel resulted in a fine of over £1 million[39]. Since then two smaller longliners have been arrested for fishing without a licence and one other vessel was arrested but managed to escape.

There is then the question of whether the penalties will prove a sufficient deterrent. The average yearly income from licences was between £700,000 and £1,000,000 a year. It follows that the returns from illegal fishing in the offshore area – with no licence fee to pay – could be considerable. The risks and penalties would need to outweigh the rewards of illegal fishing if they are to act as a significant disincentive.

Since 2002 there have been 28 arrests and 22 written warnings where vessels have been detected or suspected of illegal activity in the inshore area. Warnings were issued where there were minor technical infringements or where it was suspected that a vessel had been fishing illegally bit this could not be proved. Where stronger action was taken and fines were imposed they proved to be of little deterrence. In the case of substantial fines, vessels owners were prepared to abandon their vessels and simply dodge payment. If the fines were of a lower amount this was written off as a business risk and the illegal activity continued[40].

The current patrol vessel is used for a variety of tasks

The Pacific Marlin is used for various tasks, including: fisheries patrols, tasks for the BIOT Administration and British Operational Patrols[41]. MRAG commented in their response to the MPA consultation exercise that this meant that the Pacific Marlin was frequently not engaged on fisheries protection duties. By way of example, MRAG pointed out that over one 7 month

[35] *MRAG website*
[36] *Koldeway et al. 2010, 4*
[37] *Mees et al 2009*
[38] *Report of the IOTC Performance Review Panel: January 2009. Indian Ocean Tuna Commission. (2009).*
[39] *MRAG Consultation Response 2010, 50*
[40] *MRAG Consultation Response 2010, 51*
[41] *MRAG Consultation Response 2010, 46*

period only 13% of the Pacific Marlin's operational tasking was taken up by offshore fisheries patrols in the outer sector. This was because of the amount of time spent in port on Diego Garcia and on visits in support of the ship's multi-tasking role[42]. Pacific Marlin is suited to inshore work; for example it can safely navigate through the Great Chagos Bank because of its shallow draft. However, MRAG have suggested that ideally there should be a dedicated offshore vessel as well as an inshore vessel.

It is not clear from the information gathered for this study how the tasking priorities were determined and the balance of time spent on different tasks. It would also be helpful to have data showing the amount of time the Pacific Marlin was at sea on station in a year, how much time was spent off station due to fuelling, maintenance, picking up supplies, changing crew and so on. Also relevant would be how these periods off station were accommodated within a risk based approach to the fisheries protection task.

There will be extra costs arising from declaration of the MPA and the area becoming a no take zone

The FCO's MPA Consultation paper stated that the fisheries surveillance gross costs had been roughly £1.7 million per year. In response, MRAG argued that the actual cost of fisheries protection was closer to £1m, because the Pacific Marlin spent much of its time on non-fisheries activity. In recent years the revenue from fishing licences had been between £700,000 and £1 million[43]. It follows that there will be drop in income now that the area is a no take zone.

In a deal negotiated by the Blue Marine Foundation with the FCO, the Swiss based Bertarelli Foundation agreed to donate £3.5 million over the next five years to help offset the loss of fisheries licence fee revenue. These funds are to be spent specifically on the protection of the reserve.

The Secretary of State for Foreign and Commonwealth Affairs announced on 11 March 2011 that an extra £1 million would go to the British Indian Ocean Territory (BIOT) Administration to strengthen the Territory's reserves to help bridge the gap. The extra funding is intended to contribute to rising costs of operating the BIOT patrol vessel, to enabling the Administration to support new measures to help Chagossians visit the territory for humanitarian purposes and to undertake environmental work in the territory.

Furthermore, the UK's Biodiversity Strategy for Overseas Territories[44] noted that several hundred potential funding sources had been previously identified for biodiversity conservation in the Overseas Territories, including Government streams, international funds, multilateral institutions, EU regional frameworks, non-governmental organisations, private trusts and foundations. Further work was being undertaken by the Joint Nature Conservation Committee (JNCC) to help identify how these funds and others might best be accessed.

On the face it there would seem cause for reasonable optimism about funding, particularly given the potential for innovative new financing approaches. However, the costs are potentially high and stand to increase. The sums so far identified appear to equate roughly to historic expenditure levels. The question arises whether these sums together will be sufficient to protect the MPA and meet the cost of further research, monitoring and other BIOT related activities. Much will depend on what the funds are intended to cover and the levels of activity proposed. A large number of respondents to the MPA consultation wanted monitoring and enforcement in the MPA stepped up and believed that this would be necessary to secure the purpose of the MPA.

But, even if the level of monitoring and enforcement remained unchanged costs will rise – probably substantially. Inflation can be expected to eat into the resources available, especially rising fuel costs. This will be a problem for all regulatory authorities involved in marine environmental protection across the world,

[42] MRAG Consultation Report 2010, 45-46
[43] FCO Consultation Report 2009
[44] Defra, The United Kingdom Overseas Territories Biodiversity Strategy, 2009

but is likely to have a disproportionate impact in the case of the Chagos Archipelago MPA because of its vast area and location.

The stakes are high, but the UK Government is firmly committed to protecting biodiversity

The fact that over a quarter of a million people worldwide responded to the FCO's MPA consultation is a measure of the level of domestic and international interest. The Government can expect close attention to be paid to what they do next, having confirmed the MPA. Since then the Government has set out its policy goals on nature conservation, in its White Paper The Natural Choice: securing the value of nature. One of the commitments in the White Paper is that the Government will play a leading role in promoting safeguards for biodiversity. The future of the Chagos Archipelago will no doubt be seen as a test case by many of the respondents to the consultation exercise.

Defra as the lead Department, along with the Foreign and Commonwealth Office, the Department for International Development and the JNCC, published in 2009 a strategy for the conservation and sustainable use of biodiversity in the UK overseas territories. In the strategy it is stated "additional support from the UK Government is needed to help reduce the rate of biodiversity loss in the Overseas Territories, which will contribute to meeting obligations under the Convention on Biological Diversity and other Multilateral Environmental Agreements." The strategy goes on to explain that "several reports from parliamentary select committees, the National Audit Office and non-governmental organisations have stressed the importance of the UK Government's role in conserving biodiversity in the Overseas Territories. These reports have recommended that if the UK Government is to discharge its responsibilities effectively a more joined-up approach across Whitehall is needed, in which all relevant departments play distinct but complementary roles. The reports also stress the requirement for enhanced financial support for biodiversity conservation in the Territories".

Returning to the Natural Environment White Paper, the Government has recognised that there is a gap in the international process for dealing with the conservation of high seas biodiversity. There is the commitment to work with partners in the UK and around the world to establish a new global mechanism to regulate the conservation of marine biodiversity in the high seas. It is intended that such an agreement should set up a clear means of designating High Seas Marine Protected Areas, building on the work undertaken in Regional Seas Agreements. Such statements invite the UK to lead by example and demonstrate that, in the case of MPAs under its control and especially those adjoining the high seas, it takes its responsibilities seriously.

So, it can be said that expectations about the Government's intentions towards managing the Chagos Archipelago MPA will be high, fuelled by its own undertakings and commitments.

Conclusions

Effective enforcement demands clarity of objectives set within an agreed management plan.

The FCO's MPA consultation facilitator reported that a significant number of respondents highlighted the need for effective enforcement, to prevent illegal fishing in the zone, and ensure the MPA was not just a 'paper park' without practical impact. The great majority of respondents of all types believed that cost should not be an issue to stand in the way of taking action. However, the reality is that the management and protection of marine protected areas always involves weighing up the potential risks to the conservation objectives and striking a balance between addressing those risks and the resources available to do the job. In all MPAs there should be two prime strands to managing the site: surveillance and enforcement to protect the site; and scientific

monitoring and research to assess whether the objectives are being secured. There may also be other important elements such as research to develop a better understanding of the biology and ecology of the area or, as in the case of the Chagos MPA, using the site as a control against which to measure changes in the marine environment elsewhere.

The starting point for marine protection is clarity about the conservation objectives. It is essential to know what the MPA is intended to achieve, so that the risks can be assessed and progress monitored. The OSPAR guidelines[45] for the management of MPAs recommend that management plans are prepared for each site. These start with the conservation objectives. The same approach is applied to European marine protected areas under the Habitats Directive[46]. Inevitably there are uncertainties and unknowns in the marine environment and this will certainly be true of the BIOT MPA. Ideally there should be comprehensive baseline data, but these are rarely available (the work to develop a network of MPAs in UK waters illustrates the problem) and the data available about the Chagos Archipelago will be patchy. Nevertheless, it should still be possible to frame the conservation objectives in a form that takes into account these difficulties.

A risk based approach helps ensure resources are directed where and how they can do the most good

The UK commonly uses a risk based approach to managing MPAs to ensure that risks are prioritised according to potential impact and likelihood and take into account the conservation objectives. This approach recognises resources constraints, enables available resources to be targeted to best effect and is tailored to the needs of individual sites. Accordingly, to ensure that the BIOT MPA can be effectively managed we recommend that (a) the BIOT Administration should be clear from the outset about the conservation objectives; (b) a MPA management plan should be drawn up for the area; and (c) a risk based approach should be adopted towards management of the MPA.

It is always helpful to consider at the outset how success will be measured and evaluated. There are various published guidelines on evaluating the effectiveness of the management of marine protected areas. Each area is unique and has its own challenges and circumstances. But, with suitable adaption, a guide such as that published by the IUCN[47] could provide a useful tool for considering whether the appropriate management framework is in place to enable the Chagos MPA to be judged successful in years to come.

Marine planning provides a framework for evidence based decision making, which could assist the future spatial management of the Chagos Archipelago MPA

There are a number of important issues that are often linked to the BIOT MPA including Chagossians seeking the right to return to the BIOT, with their case before the European Court of Human Rights, differences of view between different groups of Chagossians about whether there should be a MPA in the first place, Diego Garcia being a major and strategic US military base and the Mauritian Government claiming sovereignty over the Islands. This creates a set of difficult challenges through which to navigate the successful implementation of the MPA. To add to the mix there is considerable public interest in all these aspects and strong pressure from active conservation NGOs for the MPA to be effectively managed and protected. Marine planning might offer a basis for a broader management regime that recognises these issues and sensitivities, with a MPA management plan forming part of the process. Marine planning is a relatively new concept which is in the course of being developed and rolled out in the UK and elsewhere. Whilst it is not a means of resolving legal disputes, it is a mechanism that: helps establish priorities, brings together different parties and can enable a wide range of views to be accommodated. It can also be used as a framework to enable

[45] *Guidelines for the management of marine protected areas in the OSPAR maritime area.*

[46] *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*

[47] *Pomeroy, R.S. , Parks, J. E. , and Watson, L. M. , (2004) How is Your MPA Doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness. ICUN*

a flexible response to future challenges and pressures. The planning process is capable of recognising different positions among interest groups and offers a route for finding common ground. With this in mind, the FCO and BIOT may want to consider developing a marine plan for the Chagos MPA, which brings into account the economic, social and environmental considerations. The planning mechanism would need to be tailored to needs of the BIOT. It would not be appropriate to assume that the models employed in the UK or elsewhere were necessarily appropriate. Practicality would suggest that the priority would be to put in place the MPA management plan and to build a broader marine plan around this.

The MPA will be successful only if there is effective implementation

No plan of any kind works unless it is accompanied by effective implementation. Without this it remains just paper and fine words. Successful implementation of the BIOT MPA requires a level of resources necessary to achieve the desired objectives. There also has to be the appropriate expertise, capability and capacity among the management team. This does not necessarily all have to be in-house, but it does need to be available and properly directed and able to draw in the strengths and capabilities from a range of stakeholders, across different sectors. The Government White Paper "Open Public Services"[48] seems of relevance here. The White Paper discusses opening public services to additional providers with the aim of improving services and reducing costs.

Those responsible for ensuring that the MPA is well managed, face a new and, as yet, largely untried task.

The management contract with MRAG was extended, but this related to the previous management regime. The declaration of the MPA took matters in a new direction and to a different level. Fortunately, within central government circles and among NGOs and the private sector there is considerable expertise on which to draw. The UK Government has its own agency responsible for managing MPAs around the English coastline – the Marine Management Organisation. The Joint Nature Conservation Committee is a statutory advisor to the UK Government and holds considerable international experience of nature conservation. The Blue Marine Foundation has demonstrated how a NGO can help marshal and facilitate resources and the Chagos Environment Network has a wealth of knowledge and expertise. Within the private sector, there are companies with a strong marine applied science base coupled with direct experience of operating research and protection vessels internationally. An option open to the FCO and the BIOT Administration would be to call upon these and other organisations to advise on future management arrangements. An advisory group could be established, perhaps centred around the existing cross-departmental official-level group with responsibility for overseeing delivery of the UK Government's objectives for the conservation and sustainable use of biodiversity in the Overseas Territories. The focus would need to be on management and implementation rather than concept and theory; making sure that things happen to plan. It would be particularly important to be able to draw on practical and direct experience of operating vessels, applied research, and monitoring and surveillance.

It will be important that patrol vessels are capable of doing what is asked of them

The current patrol vessel, the Pacific Marlin, does not have the capability to meet all enforcement needs. It was possibly adequate as a combination of patrol vessel and a means of transporting officials, visitors and other personnel, whilst the main concerns were catching and deterring Sri Lankan registered illegal fishing boats, inspecting licensed offshore fishing vessels and providing supplementary services for the BIOT Administration and visitors. A more appropriate patrol vessel with the required speed and duration at sea is likely to be required in future so that large offshore fishing vessels

[48] *http://www.cabinetoffice.gov.uk/resource-library/open-public-services-white-paper*

cannot easily outrun and that could offer modern research facilities. Ideally there should be a second smaller vessel capable of operating effectively and flexibly inshore, but also with the capacity to extend its reach to the offshore area if necessary (An example, would be the type of patrol vessel operated by the North Eastern Inshore Fisheries Conservation Authority). Both vessels should have facilities for marine science and would need to be able to meet any other demands and requirements of the BIOT Administration. It is possible and often cost effective for vessels to multi-task, and also have the flexibility to respond to future tasks (for example training activities) – clarity of objectives and an open discussion with potential providers will help identify the fullest range of options. When commissioning the patrol vessels the BIOT Administration will want to have regard to the actual number of active operational days and how these are divided between the different tasks. MRAG have pointed to the amount of down time in the past.

Aerial surveillance is a valuable tool

With such a large area to keep under surveillance, it is not possible even with two vessels more suited to the job to guard adequately against illegal fishing. Whilst there may be obvious sensitivities with the US base at Diego Garcia, aerial surveillance to spot illegal activity or the threat of illegal fishing is necessary if the MPA is to be properly protected. Aerial surveillance is a strong feature of marine and fisheries protection and it is not possible to co-ordinate deterrence, interdiction and arrests without a facility to cover large areas of ocean and thereby identify suspect vessels and priorities for physical investigation. In their response to the FCO's MPA consultation, MRAG drew attention to the existing difficulty of spotting small boats fishing illegally inshore among the 55 islands and have argued that with the removal of licensed fishing more effort will be need to keep the offshore area under surveillance. Others disagree on the grounds that to ban all fishing makes it easier to spot illegal activity. But, whichever argument is accepted, to be able to take action it is necessary to be able to prove that illegal fishing has occurred, which usually means catching offenders in the act. As those responsible for marine protection know only too well, suspicion or belief that a vessel has been acting illegally is insufficient to do anything other than issuing an informal warning. This is particularly so where the crew can claim that the vessel was doing no more than transiting the area; a claim which is easily to hand in the BIOT FCMZ. Aerial surveillance coupled with efficient patrol vessels would be a valuable and effective tool to counter this. However, it would introduce a further cost for which budget provision would need to be found.

Marine research is expensive and yet funds will need to be found

The funds made available for protecting the MPA will need to cover both the cost of guarding against illegal fishing and enforcement action, and the cost of monitoring the environmental effects of safeguarding the area. Marine research and monitoring is expensive and can be very expensive. The UK Marine Science Strategy[49] comments that "the difficult and extensive nature of the marine environment means that research tends to be very expensive" whilst observing that "resources and expertise are limited". The Strategy also states that it is a feature of marine science that sustained observations are essential for much of marine science because net changes in the marine environment generally only become apparent over extensive time scales of decades or longer, due to the large natural variability. It is difficult to tell from the information so far sourced about the Chagos Archipelago MPA how much is being budgeted for scientific monitoring and research. But, it is reasonable to assume that resources will be tight, particularly in the current economic climate. One way of supplementing the existing level of provision would be to recognise the global and regional value of the MPA. Among the stated reasons for establishing the MPA were to provide a "control" for climate change science, to provide the opportunity for automated measurements of important atmospheric and ocean parameters, to offer opportunities for exploring core research issues and to provide an important "reference" site. It would

[49] *The UK Marine Science Strategy, 2010*

not seem unreasonable that those that stand to gain from all these environmental "uses" of the BIOT should contribute towards the cost. This could involve, for example, scientific bodies nationally and internationally subscribing towards the cost of maintaining the MPA, if they want access to the area for research purposes or access to data relating to the area.

Those that exploit the Indian Ocean for commercial gain could also be asked to contribute

There are differences of view about the extent to which the MPA will be able to act as a source site for species heavily exploited elsewhere in the Indian Ocean, but there is an expectation that the MPA could increase the chances of managing degradation of the marine environment in other locations of the Indian Ocean. There is a potential bottom line benefit to those who profit from commercial exploitation of the Indian Ocean. This suggests a case could be made for seeking contributions from members of the Indian Ocean Tuna Commission (IOTC). The Commission is an intergovernmental organisation established under Article XIV of the FAO constitution. It is mandated to manage tuna and tuna-like species in the Indian Ocean and adjacent seas. The objective of the IOTC is "to promote cooperation among its members with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks" covered by the agreement and "encouraging sustainable development of fisheries based on such stocks"[50]. The value of the fish being harvested is large. The FAO reported in 2009 that one million tons of oceanic tuna and tuna-like species, with a processed value of £2–3 billion, are harvested each year from the western Indian Ocean. A very small proportion of this would help considerably in protecting the MPA and in doing so assist the IOTC to meet its conservation objectives. The IOTC would need to be persuaded that, while the declaration of the no take zone might have an adverse short term economic impact among fishermen in the region, there will be longer term offsetting benefits, which could be secured only through effective management and enforcement.

Eco tourism could make a financial contribution in the longer term.

Another source of potential funding discussed among the responses to the MPA consultation document was high end eco tourism. Access to the area near the outer islands (i.e. well away from Diego Garcia) could, for example, be granted to cruise ships with licences issued for diving and/or small vessel access to enable visitors to observe the exceptional quality of the local marine environment. For this unique privilege visitors could be expected to pay say $150 each. However, there could be a counter view that tourism of this kind is incompatible with the highly protected status of the MPA.

Market mechanisms should be explored as a means of attracting funds

Given that one of the principal benefits of the MPA is thought to be its contribution to better understanding and monitoring the impacts of climate change, it would seem worth exploring whether resources might be available through a carbon trading or other market type mechanism. Charting Progress 2 notes that the oceans play an important role in mitigating climate change, taking up and storing about a quarter of anthropogenic CO2 emissions through a combination of biological processes, solubility, and circulation patterns. Increasingly, the importance of ecosystem services are being recognised – see the UK Government's 2011 White Paper: "The Natural Choice: securing the value of nature"[51]. The establishment of the Chagos Archipelago MPA and more importantly protecting it would seem to be full square with Government policy in this respect. The White Paper states "we now have a carbon market which rewards people for reducing emissions, there may be opportunities to establish other markets which help manage natural resources or services. Trading those resources could reward those who protect or improve them". The Chagos Archipelago MPA would seem an excellent opportunity for the Government to put those words into action. Biodiversity offsetting is an emerging internationally

[50] *IOTC website, 2011*

[51] *http://www.defra.gov.uk/environment/natural/whitepaper/*

as a recognised mechanism for protecting and enhancing biodiversity. It is still at a relatively early stage of development, but in the longer term may present opportunities for applying market mechanisms internationally which could perhaps benefit the BIOT MPA.

The Chagos MPA should be able to attract UK, EC and International funds available to protect biodiversity

The Government is on record as stating that it will take the lead in promoting safeguards for biodiversity (in its Natural Environment White Paper). Investment in tackling climate change is seen as part of this. Very large sums of money are being made available by the UK Government, which has announced that it will contribute £2.9 billion of international climate change finance between 2011 and 2015. Part of this will be going to conserve and protect territorial environments such as peat bogs, woodlands and forests because of their beneficial impact on carbon as well as their contribution to biodiversity. If the same thinking was applied to the marine environment the Chagos Archipelago would be a good place to start. Accessing monies available for use internationally to protect the MPA would enable the UK Government to demonstrate its commitment to biodiversity on a broad canvas.

The preparatory ground ought to be well covered. Among the strategic priorities agreed in 2009 for the UK Government's support for biodiversity conservation in the Overseas Territories were: developing tools to value ecosystem services to inform sustainable development policies and practices; and developing ecosystem-based initiatives for the conservation and sustainable use of the marine environment.

The Strategy set out a number of actions that officials were going to undertake. These included:

- Considering a new UK Government funding stream that would support a wide range of environmental activities (including biodiversity projects) within the Overseas Territories.
- Exploring possibilities for helping the Overseas Territories access the large international funds on biodiversity, climate change and natural heritage. It was said that this would require significant political expenditure, but could potentially secure significant additional funds for work in the Overseas Territories.
- continuing to help Overseas Territories to participate in the full range of available funding sources, especially those that have the potential to support major biodiversity projects (such as EU funds and certain charitable trusts) by maintaining an up-to-date database of funding mechanisms, providing guidance/ training, and supporting the preparation of funding.

All would seem applicable to the BIOT and the MPA.

Some lateral thinking may also be required

The Chagos MPA stands to benefit from Government Departments working together and applying innovative thinking. An example might be finding ways in which to discourage Sri Lankan fishermen risking their lives to fish illegally in the BIOT waters. The reasons that they do so are because of their socio- economic circumstances. Protecting the MPA should be seen, therefore, as more than a straightforward marine protection activity. Through the combined efforts of DfID, FCO and Defra it might be possible to use available resources and mechanisms to help create alternative opportunities for the fishermen involved. All regulation relies upon the acceptance and cooperation of the regulated; command and control is rarely effective. This suggests that there ought to be room for dialogue and persuasion as well enforcement and penalties. The UK has played a leading role within the EC and internationally in tackling illegal, unreported and unregulated (IUU) fishing. That capacity and expertise could be tapped to help protect the MPA. There may be instruments available though such channels to influence behaviours among fishermen (offshore and inshore) who may be tempted to breach the MPA no take rule.

The existing cross-departmental official-level group could look at the various possibilities and advise the BIOT Administration. Agencies such as the Marine Management Organisation have considerable practical experience of surveillance, monitoring and enforcement on which the BIOT Administration and the official level group could draw.

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NOTES

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