Establishing a marine protected area in the Chagos Archipelago: socio-economic considerations

Report of workshop held 7 January 2010, Royal Holloway, University of London, UK

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1. Executive Summary

This workshop was convened to consider the socio-economic issues relevant to establishing a marine protected area (MPA) in the Chagos Archipelago. It followed on from a natural science workshop on the same theme held at Southampton in August 2009. Participants for the January meeting were invited on the basis of their involvement or interests in Chagos, including academics from a broad range of disciplines, Chagossians and their legal adviser, representatives of states in the region, the UK Foreign and Commonwealth Office (FCO), non-governmental organisations and the All Party Parliamentary Group on Chagos. Several invitees were unable to participate mostly due to snow and associated travel disruptions.

All participants agreed that establishing an MPA recognises the importance and value of the Chagos Archipelago and provides an important opportunity to promote wide recognition, and effective and long-term protection. A majority[1] further agreed that none of the three options identified in the FCO consultation were appropriate. Additional conclusions reached by most workshop participants were:

1. Every effort should be made to get the arrangements right first time, rather than having to start all over again if political circumstances change. In particular, the MPA should withstand future challenges that might arise through resettlement and/or a change in sovereignty.
2. That none of the three options identified in the FCO consultation are therefore appropriate, but that a fourth option would be preferred which would reflect the possibility of such changes by making provision for limited sustainable utilisation of natural resources through zoning or other means.
3. This option needs to be explicitly recognised by the UK government for further development at the international level.

Initial presentations gave a valuable grounding on the following:

- The Chagossian interest in preserving the natural environment of the Chagos, and their desire to be directly involved in discussions on its future
- The outstanding nature of Chagos from an ecological perspective
- The considerable threat posed by climate change and direct human impacts on coral reefs globally and in the Indian Ocean
- An overview of fisheries in Chagos and how they relate to the proposed MPA
- Ideas on how to fund the MPA initiative in Chagos
- A case study of community-managed MPAs
- Economic values of ecosystem goods and services of the Chagos
- Perspective of the All Party Parliamentary Group (APPG) on Chagos.

Topic areas lacking the unanimity of participants included the geographical coverage of a fully-protected MPA; the sequence of events towards MPA establishment; and the degree to which the MPA should contain provisions for resettlement and/or change of jurisdiction. Whilst all attendees agreed that there would necessarily be a need for accommodating such change into the management of an MPA should there be a change in current policy on resettlement, there was a difference in opinion as to how much this should be incorporated into a proposal or into legislation at this point in time. These differences meant that it was not possible for the meeting as a whole to endorse any of the three options proposed by the FCO.

Participants discussed the need for another option to add to those identified by the FCO, and many expressed the opinion that this would be preferable, but differences in opinions meant that it was not possible for the meeting as a whole to endorse this. A possible option, (proposed by those who favoured an Option 4) was to have an MPA that makes provision for well managed and sustainable utilisation of natural resources alongside conservation, perhaps with different “use” zones to be either established now or in response to a change in use or

jurisdiction. Such zoning is already being considered for Diego Garcia (through exclusion from wider MPA constraints), as noted on p 12 of the FCO consultation.

Given the desirability of a no-take MPA having international and regional recognition as well as cost-effective enforcement, many participants voiced the opinion that Chagossians and Mauritians should be closely involved in the MPA discussions and in the planning process, to a greater degree than apparent in the FCO consultation. The exclusion of these groups from any meaningful role to date may in the opinion of some participants, have already undermined the process, weakening potential support from other stakeholders. Unless these aspects are addressed, there was concern by a number of participants that future legal or political developments would jeopardise the long-term status of the MPA, or at least result in a significant decline in its effectiveness, delivering only a 'paper park'.

There was agreement that support for an MPA, on whatever scale, pre-supposes that adequate funding for management and enforcement would be made available. Thus it will be necessary to maintain, as a minimum, the current levels of patrolling that are currently undertaken in Chagos waters, as well as other management actions, environmental observations and research to ensure that the ecosystem integrity and quality of the MPA is maintained (and, preferably, enhanced).

There is need for more evidence-based studies to assess the possible impacts of Chagossian resettlement on the sustainability of the MPA. The multi-agency Living With Environmental Change (LWEC) programme could provide the necessary framework and support.

2. Background to FCO consultation

In early 2009, the Chagos Environment Network (comprised at that time of Chagos Conservation Trust, The Linnean Society of London, Pew Environment Group, The Royal Society, The Royal Society for the Protection of Birds, The Zoological Society of London, and Prof Charles Sheppard of Warwick University) recommended to the UK government the establishment of a marine protected area in the Chagos Archipelago, also known as the British Indian Ocean Territory (BIOT).

The envisaged area of the proposed MPA would correspond to the potential exclusive economic zone (EEZ) of the Chagos islands and surrounding waters, based on 200 nautical mile limits and currently managed by the BIOT administration as a Fisheries Conservation Management Zone and an Environmental (Preservation and Protection) Zone. This marine area, of at least 544,000 sq km includes mid-ocean ridges, trenches and abyssal plains as well as coral reefs, atolls and banks. If implemented as no-take throughout, this would be the largest fully protected marine reserve in the world.

Since the late 1960s Chagos has been exclusively set aside for defence purposes, with a US military base located on Diego Garcia, the largest island in the Archipelago. Prior to the development of the military base, Chagossians were evicted. They now live mostly in Mauritius, Britain and the Seychelles. Apart from Diego Garcia therefore, the Chagos Islands have been uninhabited for 37 years.

In August 2009, a workshop was held at the National Oceanography Centre Southampton to assess the conservation value of the Chagos/BIOT area[2]. The report arising from that meeting was highly supportive of strengthening marine protection from a natural science perspective, whilst recognising that wider stakeholder engagement would be necessary to address socio-economic considerations. This report is the result of a second workshop, held to address these socio-economic considerations.

In November 2009, the UK Foreign and Commonwealth Office (FCO) published a consultation to seek views from stakeholders and interested parties on "whether to establish a marine

protected area in the British Indian Ocean Territory"[3]. The consultation document identifies this proposed action as a remarkable opportunity for the UK, enabling the creation of one of the world's largest MPAs and potentially doubling the coverage of the world's oceans benefiting from full protection. The consultation document points out that Diego Garcia might have to be excluded from the MPA on account of the military base there.

The FCO is seeking views based on the following questions[3].

1. ***Do you believe we should create a marine protected area in the British Indian Ocean Territory?***

If yes, from consultations with scientific/environmental and fishery experts, there appear to us to be 3 broad options for a possible framework:

(i) Declare a full no-take marine reserve for the whole of the territorial waters and Environmental Preservation and Protection Zone (EPPZ)/Fisheries Conservation and Management Zone (FCMZ); or

(ii) Declare a no-take marine reserve for the whole of the territorial waters and EPPZ/FCMZ with exceptions for certain forms of pelagic fishery (e.g., tuna) in certain zones at certain times of the year.

(iii)Declare a no-take marine reserve for the vulnerable reef systems only.

2. ***Which do you consider the best way ahead? Can you identify other options?***

3. ***Do you have any views on the benefits listed at page 11? What importance do you attach to them?***

4. ***Finally, beyond marine protection, should other measures be taken to protect the environment in BIOT?***

All responses to this consultation are requested by the FCO by 12 February, 2010.

This consultation, and any subsequent legal and management interventions, could have a profound influence both on the natural environment of the Chagos Archipelago, and on present and future human uses. The Southampton meeting, although convened prior to this formal consultation process, clearly addressed the environmental issues of the declaration of such an MPA but was unable to give social-economic considerations the attention they deserved. The workshop held at Royal Holloway therefore sought precisely to address those aspects, with the intention of providing informed and expert advice which would benefit the consultation process but would also provide a valuable base for any future discussions on the legal and management framework of the Chagos Archipelago.

A number of weaknesses and inconsistencies in the FCO consultation document, were noted by several of the participants at the workshop, and are listed here:

- The FCO impact assessment uses estimates from global studies of economic benefits of coral reefs that report economic values of around $100,000 - $600,000 per km^2 per year. These values were derived from case studies with significant tourism and recreation sectors. Since approximately 60% of these economic benefits are associated with these sectors, they do not accurately reflect the economic value of the Chagos region which currently has very limited tourism and recreation activity. Whilst the Diego Garcia base does, to some degree, provide the latter for military personnel, it is difficult to see how these sectors could be expanded without a resident population in Chagos. Any increase in visitors to the archipelago would need to be restricted in order to prevent environmental damage therefore future tourism revenue is likely to be modest.

- The development benefits presented in the impact assessment are primarily from an environmental and UK perspective, with the consultation document stating that “the creation of a marine protected area would have no direct immediate impact on the Chagossian community”. A developmental context should arguably take much greater account of regional interests and cultural dimensions, particularly in view of current legal uncertainties.
- Annex C of the FCO consultation document implies that joint discussions between the UK and Mauritius governments on the establishment of an MPA are cordial and on-going. Recent public statements by the latter indicate otherwise, and the Mauritius High Commissioner withdrew from the workshop in late December, insisting that in the context of any proposed MPA the issue of sovereignty, resettlement and Mauritian fishing rights must be addressed.
- The consultation document does not indicate the goals and objectives of the proposed MPA.

3. Workshop aims and objectives

The principal aim of the workshop, held five months after the Southampton workshop which focused primarily on natural science issues, was to discuss socio-economic opportunities and obstacles in the context of a possible MPA in the Chagos Archipelago. It aimed to bring together experts from NERC-supported marine research centres, Universities, and NGOs who have practical experience of MPA development and management, as well as Chagos islanders, marine industry stakeholders and representatives of the UK and Mauritius Governments. Mauritian officials did not ultimately attend.

The specific objectives of this workshop were therefore to:

- examine the broader socio-economic considerations that the creation of an MPA could raise, including the consequences of a possible resettlement of the archipelago and the implications of a change in sovereignty;
- help develop responses to the FCO consultation, by:
    - identifying principles and criteria for a Chagos MPA;
    - considering the FCO options for potential endorsement, or proposing others;
    - discussing other collective or individual contributions to the consultation process.

The organisers emphasised at the workshop and in preparatory material that this workshop was not an appropriate forum for debating the rights and wrongs of contentious historical, political, legal or ethical issues, such as plight of the Chagossians and their disputed right to return; the sovereignty claim of Mauritius; and the US military activities at Diego Garcia. Nevertheless, such issues existed and were of concern to many stakeholders; they therefore could not be ignored as factors influencing MPA management arrangements.

4. Does Chagos need strong protection?

A substantial amount of environmental science has been undertaken in Chagos, notably over the last fifteen years by about 50 individuals from institutions from all over the world. There is agreement by natural scientists that the marine environment of the Chagos Archipelago is an exceptional place, comparable to being in a time machine - since Chagos reefs are in a condition close to that which existed elsewhere 50-100 years ago. This is a result of the absence of overfishing, pollution and minimal other human impacts. Diego Garcia is the single exception. The western half of the island has been transformed by construction of the US military base, with associated impacts on adjacent marine ecosystems from coastal engineering and anchoring of very large vessels. Nevertheless, stringent environmental

controls are in place, including pollution regulations and Strict Conservation Area status (Ramsar designation) for most of the island.

The condition of warm-water coral reefs around the world has been classified into four categories, depending on whether reefs: i) have effectively been lost; ii) are at critical stage; iii) are threatened; or iv) are at low threat level[4]. The reefs of Chagos make up just under 40% of the total reef area in the Indian Ocean that remains in the least disturbed, low threat category[4]. Others are spread over many different countries and jurisdictions, including parts of the Seychelles, Maldives and several remote islands currently under French jurisdiction. To find such a large area all within one jurisdiction is remarkably fortunate from a conservation perspective.

The scientific view that the reefs in Chagos need strong protection is based not only on studies of Chagos itself, but from knowledge and observation of the generally poor condition of reefs elsewhere in the Indian Ocean (from Madagascar to Kuwait, and from Sri Lanka westwards) and other oceans too. Additional aspects are covered in Table 2 and elsewhere in the report of the Southampton workshop.

5. Fisheries issues

5.1. Overview

Outside of Diego Garcia, fisheries in Chagos are currently managed by MRAG Ltd on behalf of the British Indian Ocean Territory Administration (BIOT). Although their contract does not cover management of the recreational fishery on Diego Garcia, they do process data relating to some fishing around this island, which is provided by the US-led Marine Welfare and Recreation group. MRAG's main activities include: i) operational management e.g. licensing, fee policy analysis; ii) science and management including fishery analysis and participating in the Indian Ocean Tuna Commission (IOTC); and iii) monitoring, control and surveillance activities.

The tuna fishery in Chagos is made up of both purse-seine and longline fisheries. Catches for the purse seine fishery, operated largely by European registered vessels, are highly variable ranging from about 95 to 35,000 tonnes annually. The fishery operates between November and March with a peak usually in December and January. The longline fishery, largely under East Asia flagged vessels is less variable and takes catches year-round; it targets the larger individual fish: yellowfin and bigeye tuna, swordfish, marlin and sailfish. The combined income to the BIOT administration from the tuna fisheries has typically been £700,000 and £1million since 1999.

A small licensed demersal fishery has operated out of Mauritius for a number of years. This is typically a mothership-dory venture (larger ships carrying a number of smaller vessels which operate line fishing on the banks) but in recent years two smaller vessels without dories have entered the fishery. Typically they operate in water depths of 30-75m and target snappers, groupers and emperors. The long distance and relatively short season has made this an increasingly unattractive venture and the number of licences issued has declined in recent years (full licence uptake, for six 80 day vessel licences, has not occurred in any year).

Fishing around Diego Garcia includes an offshore recreational fishery, which largely targets tuna and tuna-like species, in which catches are either released or must be taken for personal consumption. There is also some land or shallow-water based fishing in the reef and lagoon areas. Yachts passing through the northern atolls are also permitted to catch fish for personal consumption.

The number of illegal tuna fishing vessels in Chagos waters is probably low. By contrast there is a regularly occurring illegal fishery within the Territorial waters, targeting sharks and sea cucumbers (beche de mer). The FCO chartered BIOT Patrol Vessel, the Pacific Marlin, vessel is responsible for intercepting such fishing and makes a number of arrests most years.

Discussions in the plenary, the fisheries working group and during refreshments largely focussed on the two broad themes of the pelagic fisheries, and on the inshore, demersal or reef fisheries. The latter including the potential changes to the *status quo* fisheries and the potential for sustainable utilisation within a broader management framework for future scenarios. These are addressed separately below.

5.2. Pelagic fisheries

A number of participants had the opinion that there is relatively little ecological connection between the reef-based, shallow water ecosystems and the offshore pelagic fish species. The use of arguments based on reef-based, shallow water fisheries to press for a no-take MPA for the whole area distorts this strong distinction.

Although considerable discussions were held at the Southampton workshop regarding the relative costs and benefits of establishing different types of MPAs from a fisheries perspective[2], it was felt that there was some benefit in re-visiting these arguments, notably because two proposed participants (Charles Anderson, Fisheries Biologist based in Maldives, Chair of the IOTC Working Party on Ecosystems and Bycatch; Heather Koldewey, Zoological Society of London) had new information they wished to share. Unfortunately both were unable to attend due to the inclement weather, however their points were made available during the workshop discussions.

It was agreed that the closure of the entire Chagos Archipelago would not provide sufficient area to completely protect any of the highly migratory fish stocks of the Indian Ocean during their life cycle. Tuna, billfish and species caught as bycatch e.g., sharks are too wide-ranging to remain in these waters for sufficiently long to avoid risk of capture. The focus of debate then was on whether such closure would still provide some net positive benefit, or whether for any reasons, it might pose a high-risk strategy that would make no noticeable difference or even lead to greater losses than those which might occur through continued, well-managed fishing. These arguments are complex, and it was clear that resolution was not going to be achievable in the time frame of the meeting. Instead, it was felt important to present the arguments and limitations to knowledge to inform the FCO consultation (Table 1).

Table 1: Summary of fisheries based arguments for and against the establishment of a no-take MPA in Chagos

Issue	Arguments for well-managed fishery	Arguments for a no-take marine protected area
Chagos/BIOT EEZ area is too small to offer effective refuge for migratory pelagic species e.g. tuna.	Based on work on the value of MPAs to migratory species that explicitly accounts for a three month spawning migration and dispersal for the rest of the year, it is argued that effective protection of pelagic species e.g., tuna would require closure of 50% or more of their range[5]. A closure the size of the Chagos/BIOT EEZ is not sufficient to offer effective protection since tuna are highly mobile - they will still be caught elsewhere. There is high variability of catches in Chagos annually and although this is not fully understood, it is believed to be related to ENSO and El Niño events. The distribution of catches in Chagos waters does not suggest any relationship to its bathymetry and catches occur over the deep Chagos trench as well as shallower areas to the east of the archipelago[6]. The main concentration of sea mounts lies in the Western parts of the Indian Ocean, outside the FCMZ.	The Chagos/BIOT EEZ is not small. It accounts for perhaps 2% of the Indian Ocean tuna catch. Any place where tuna and other migratory fish are provided refuge will provide benefits proportional to the time spent in that refuge, modified by any variation in catchability whilst in that place compared to other areas. It has been argued, although evidence remains largely circumstantial, that Chagos may offer important areas for aggregations of tuna and other large pelagic species associated with seamounts, upwellings or areas of convergence. If this is the case, and Chagos is found to be disproportionately important for feeding or breeding, then the value offered to tuna protection would be further enhanced[7] The same arguments for closure of some parts of ranges are widely used in terrestrial conservation for the protection of migratory birds which are hunted extensively over large parts of their ranges. It is generally considered as wise management for terrestrial migratory species to

		provide refuges and indeed for many countries to forbid their hunting. A broader spatial context must also be borne in mind. At the present time other large areas in the Indian Ocean have reduced fishing e.g., 1) in Maldives the local fishery is restricted to 75 nm from the EEZ, while the numbers of foreign licensed vessels operating further offshore is restricted, with plans for further restrictions during 2010; 2) the closure of waters near Somalia because of the piracy risk, whilst having disastrous consequences in many ways has also created a large *de facto* no-take zone. Significant declines in the regional catch of skipjack tuna have been related to this effective closure.
Displaced fishing effort	The closure would displace the fishing effort to other areas – given the highly mobile nature of tuna, basin-wide fishing effort will determine the size of the catch and indeed of the equally mobile shark bycatch. An illustration of displaced effort has already been observed in relation to the piracy off Somalia: during 2009, tuna fishing fleets have remained fishing in the Mozambique Channel and have fished close to the Chagos FCMZ at times when they would otherwise have been in Somali waters. Such displaced vessels have been able to maintain typical catch rates indicating that the impact on regional stock would not change.	While some displacement is likely, the reduced fishing area may also deter some fishing, in which case even if per vessel catch rates remain, total take would be reduced. Somali piracy has already led to a number of European purse-seiners not entering the Indian Ocean (doubtless through a combination of risk avoidance and reduced fishing area). Reductions in basin-wide catch of some tuna species have already been reported or are predicted[8]. Fishermen displaced from the Chagos would be fishing in a less optimal place and would catch less tuna (if they could catch the same number there without having to pay for a BIOT licence, they would be doing it already).
Increased bycatch	Displaced fishing effort would be less well regulated and have a greater impact on bycatch (notably, BIOT regulations currently ban shark finning in Chagos and steel trace is not permitted for long-liners, both regulations reducing the potential for targeted or accidental shark capture). Thus species that are not so widely taken in Chagos may suffer disproportionate declines as effort shifts to adjacent waters. Bycatch levels observed in Chagos prior to the ban were comparable to those elsewhere in the Indian Ocean[9]. More stringent shark controls were introduced by the BIOT Administration in 2006 that go beyond the minimum required by IOTC. Unfortunately, due to funding constraints there has not been a tuna observer programme since the 2005/6 (Nov-Feb) season and so it has not been possible to verify the impacts of the legislation. However, logbook reporting has been seen to improve since the introduction of the legislation. Logbooks and shark bycatch are verified during inspections on board fishing vessels in the BIOT FCMZ. Early on (in 2006) one vessel was warned for failing to complete adequate records, another was arrested for finning and now the ban is believed to be effective with vessels complying with the legislation. Vessels entering the zone are required to bag and mark all fins taken outside BIOT and they must be declared in the entry and exit reports and in logbooks. The Sea Fisheries Protection Officer (SFPO) checks this on inspection.	Claims of lower bycatch in Chagos waters have not been substantiated. While bycatch and discards have been recorded to some extent by on-vessel fishery observers, these have only covered a very small proportion of the catch, and there has been no observer programme for the Chagos/BIOT pelagic fisheries since 2006. The bycatch from the Chagos/BIOT tuna fishery is considered by some to be significant, particularly for sharks and rays. The claimed benefits from current regulations may not be as great as it would appear (Charles Anderson, pers. comm.) as some or most longline fleets do not use steel trace anyway. MRAG Ltd suggest that Taiwanese fleets favour steel trace while Japanese do not. There has also been no perceptible decline in shark catches since the imposition of the steel trace and shark-finning ban. The lack of observer data and potential for under-reporting of bycatch in logbooks favours a precautionary approach.

Higher illegal, unregulated and unreported catches	Closure of the Chagos/BIOT EEZ could lead to an increase in illegal, unregulated and unreported (IUU) fishing activities as a result of perceived or real increases in target species in the MPA. The reduction of reporting of illegal fishing activities by license-paying vessels might reduce the effectiveness of policing efforts and to prevent that, fishery policing effort (and costs) may need to be increased. Declaration of an MPA in Chagos will do nothing to deter illegal fishing by Sri Lankan vessels.	It has been suggested that the actual degree of reporting of illegal fishing by other (licensed) vessels is currently very limited or non-existent. It was further agreed by all parties that patrolling would have to continue for the MPA to be worthwhile. Given that policing might even be simplified (*any* detected fishing would be illegal, vessel movements might be used to indicate fishing even when such vessels could not be identified; and any detatched gears could be confiscated); and that the costs of capture, including vessel seizure, loss of catch and a fine are so high, it might be assumed that with good surveillance IUU pelagic fishing would remain rare.
Continued fishing will enable allocation of favourable quotas by IOTC	There is some likelihood that management of the Indian Ocean tuna stocks may be moved to a quota based system in the near future and that quota levels would be linked to recent catch statistics. If there is no longer any catch the Chagos would not qualify for any quota. In this way a total, basin-wide, quota for the Indian Ocean would be set, largely uninfluenced by Chagos, leaving the MPA ineffectual at reducing total takes at the basin level. At the very least then, any decision to cut or reduce capture targets in the FCMZ should take place *after* quotas have been assigned as this would be the most effective way to reduce basin-wide fishing effort. Those responsible for fisheries administration would then be in a position to manage that quota either to generate revenue, improve tuna conservation or both.	If the case was made clear and explicit in IOTC, with a "without prejudice" claim to a future reasonable quota based on the last full years of catch, a perfectly robust argument would be made for obtaining a quota which could then be either sold or set aside for stock conservation. Other IOTC nations would likely be amenable to this given the benefits they will derive either now or in future from an MPA.
Continued influence at IOTC	It is important that UK maintains its influence in IOTC, and this may be diminished if the fisheries are discontinued in Chagos waters. BIOT already leads by example, for example in shark legislation.	Other IOTC members could benefit from reduced fishing effort or displaced effort (although see final "regional livelihoods" argument) raising their incomes from licenses, so they are likely to pay more attention to the UK, not less.
Legal status of no-take zones beyond territorial waters is questionable	Although countries can declare EEZ areas the UK has not. Its FCMZ may be broadly equivalent, however even with EEZ declarations there is an ongoing debate about the legality of excluding fishing completely (under UNCLOS nations may sustainably manage stocks, but total exclusion, it has been argued, does not equate with sustainable use)	There are numerous precedents from Australia, US and elsewhere of MPAs being declared in EEZ areas. The state of tuna stocks in the Indian Ocean is still poorly understood, however bigeye tuna are described as "fully exploited", with unsustainable catches in a number of recent years, and overfishing has been reported for yellowfin tuna over several recent years[8]. Such concerns would provide a suitable argument for the total closure of all fishing as a legitimate management response by any EEZ state.
Impacts on livelihoods across the region	If Chagos was closed to fishing, this, alongside the *de facto* Somali closure, could lead to an overall movement of fishing activity further east, with economic consequences for ports in Mauritius and Seychelles.	This argument also runs somewhat counter to arguments of effort displacement – if effort could be reduced across the entire western Indian Ocean in this way it would strengthen the case that an MPA would have an effective impact. If correct, however, and effort were to be displaced to the eastern Indian Ocean it might also make a strong argument for building a more sustainable fishery in the western regions. The "cost" of reduced use of western ports might be countered by the long-term gain of a sustainable fishery and a longer-term future for these ports, albeit with slightly reduced annual catch.

5.3. Nearshore fisheries

Unlike the arguments used for pelagic fisheries, there is a strong evidence-base for the ecological benefits of fisheries closures in coastal waters, as well as evidence that closures can bring local fisheries benefits if associated with other areas where fishing is still permitted[10-11].

While full closure of all reef-based, shallow water fisheries is conceptually a relatively simple task, it was widely accepted that it seemed likely that the three MPA options proposed by the FCO would make provisions or allow gaps in the designation for Diego Garcia. It was also likely that visiting yachts in the northern atolls would be allowed to continue, though further restrictions might well be applied. These are not clearly expressed in the FCO consultation document. Even less clear is whether the licensed Mauritius shallow-water fishery would be covered under new MPA legislation. As the principle shallow-water fishery operates outside of Diego Garcia, a clear understanding of this would be required in order to form clear recommendations.

Estimates of the levels of fishing that the reefs could sustain suggest that the current commercial fishery is operating well below maximum sustainable yields, and catch rates, an indicator of abundance, have remained high. It is worth noting however that the Chagos Conservation Management Plan[12] note that recreational fisheries in Diego Garcia in 2001 were considerably higher than the commercial fishery and were above the limits for sustainable fishing suggested by some studies. It was noted that caution should be taken in looking at the catch-rate statistics from the Mauritian mothership-dory fishery as this typically involves heavy fishing for short periods, with vessels moving on as soon as stock show signs of depletion. In this way catch rates can appear to be maintained. It was also pointed out that natural attrition of the Mauritian mothership dory fleet had occurred and in recent years only one vessel had intermittently fished. In place of the mothership ventures two smaller vessels that do not fish with dories have now entered the fishery. In reality it seems likely that Chagos, lying in a low-nutrient oceanic zone, probably has relatively low rates of productivity per unit area compared to many continental shelf reef systems. The Nazareth and Saya de Malha Banks which run between Mauritius and Seychelles may have many similarities to the Chagos, but these have been overfished and are now no longer fished to the same extent due to the gradual decline in the fleet.

There are a number of existing closed marine areas in Chagos and a zoned MPA approach was first proposed in 1996[13] and subsequently by Sheppard and Spalding[12]. Current closed areas include protection of a spawning aggregation at Peros Banhos, and in lagoons where no fishing is allowed. Additionally, the existing strict nature reserves, established largely for terrestrial habitats also are related to certain lagoons and reefs in the territorial waters. However, due to a standing agreement between the BIOT Authorities and the Mauritius Government these no-take areas were not applied to the licensed Mauritian inshore fishing vessels at the time.

It was suggested in the working group that the proposals for an MPA which excluded all fishing might face considerable challenges from the historical fishing rights and current management arrangements with Mauritius. Clearly exclusion of this fishery from any no-take regulation would undermine the entire justification for a claim that the site was no-take. However, all present recognised the extremely difficult political challenges. All agreed that should Chagossians be allowed to return then they too would have to be allowed to undertake some fishing activities. Some suggested that a zoned use approach was appropriate in order to accommodate the potential for return of the Chagossians and Mauritian historical fishing rights.

The greatest problem facing inshore fisheries within the territorial waters is illegal fishing by vessels from Sri Lanka. Such current illegal fisheries are in no-one's interests. They appear to have taken a considerable toll on both beche-de-mer and reef shark stocks[14-17]. Any MPA designation will critically require continued or indeed enhanced patrolling to prevent such activities and some concern was expressed that the FCO consultation document gives no mention of funding.

5.4. Chagossian and Mauritius interests

Those present at the fisheries group discussion felt that the respective interests of Chagossians and Mauritians, through resettlement and sovereignty respectively, included an ability to utilise and manage the fisheries.

For the pelagic fishery it was clear that present management costs are not covered by the income obtained from licensing, and further that the current methods, being high investment, foreign-owned operations would also offer little in terms of direct income or employment.

The scenario of tuna fisheries in the Maldives was briefly discussed. Here the tuna fishery is nationally operated using a relatively low impact pole-and-line fishery, with some 1200-1300 vessels operating from the atolls of the Maldives. This fishery is currently being certified for its sustainability. There is also a handline fishery comprised of between 200-250 vessels that target yellowfin tuna[8]. While there would be challenges in applying the same model in the Chagos, where there is no infrastructure or skills base, it may offer valuable lessons and offer potential future employment opportunities for returning Chagossians. It was also noted that pole and line fisheries require access to baitfish and this would pose new environmental problems; in coastal areas bait collection can damage reefs. Handline fisheries will take shark bycatch in the same way as longline fisheries, and they must be supported by significant shore based infrastructure.

All, including those pressing for immediate designation of a strict MPA, agreed that either Chagossian resettlement and/or a change in sovereignty would inevitably lead to the need for changes in the management regime in reef or nearshore fisheries. During the plenary, attendees were informed of several examples of successful MPAs which were established with strong community support and which incorporated the need for strict closed areas, but also allowed for continued sustainable use. Debate must then focus on whether it makes more sense to make provision for changes in advance of MPA declaration or to hope that such changes can be made *post hoc*.

6. Economic issues

The economic issues raised at the workshop fell into three broad categories: the economics of the fisheries, the total economic value of goods and services and the potential sources of livelihoods of locals should resettlement take place.

There was a clear division of views on the importance of the economic value of the pelagic fishery to the British government in terms of licence fee revenues (MRAG) versus the economic value lost due to damage caused by the fishery (CEN).

A recent study estimating the value of the ecosystem goods and services of the Chagos Archipelago conducted for the Pew Charitable Trust was presented to participants[18]. The Chagos appears to have a wide range of identifiable economic benefits. These include direct use values (such as fisheries, tourism and scientific research); indirect use values (such as shoreline protection and support for SWIO fisheries); and non-use values (such as bequest and existence values) (Figure 1). Few of them are associated directly with a market and so very difficult to place an accurate figure on. Only the current market value of fisheries and tourism can really be estimated with any degree of certainty. However, environmental valuation methods are available to estimate the scale of the more intangible benefits. Although the study was not able to quantify an exact value of some of the economic benefits of the goods and services, their relative magnitude and potential importance are clear. They are likely to provide diffuse benefits across the region and beyond. The distribution of the benefits of the ecosystem goods and services of the Chagos is typical of a protected area. The most tangible use benefits are those that are accrued locally. Benefits increase in their scale, intangibility and difficulty in valuation as one moves away from the site. The abundant biological benefits of the Chagos are potentially matched by considerable economic benefits on a global scale.

Given that many economic values are very difficult to quantify with any degree of certainty, it was put to workshop participants that an important question to try to address is not what the exact values are but how these values may change under the different management options recommended by the FCO consultation document (and any other option deemed appropriate). In other words "how is the establishment of a Chagos MPA going to affect the economic value of the region?" Using the economic values estimated from the study for Pew as a starting point, workshop participants were asked to consider how the options provided in the FCO consultation document would impact on each of the economic values identified.

For example did the working group participants expect a change in tourism benefits as a result of implementing Option 1 (full no take 200nm)? If so would that change be positive, negative, significant or moderate? Participants were also asked to consider possible fourth or even fifth options which made some allowance for resettlement. A blank table was given to the participants to try to fill and then discuss (Annex IV). Economics working group participants were asked to fill with appropriate number of dots to reflect scale of value. For example the FCO Option 3 was considered by most present to be the equivalent of status quo and so had the same dots as the current estimates of the Pew report[18]. Tourism was considered by most to remain unchanged in terms of relative scale of other benefits but may increase under Option 1 (no-take) and Option 4 (limited resettlement) scenarios. It was also suggested that arrows or a + / - system would be more informative. The results of the exercise were not finalised at the workshop. A subsequent survey will be sent to participants to gauge expert opinion on potential changes to economic value. This survey will be based on a scale of -2 to +2.

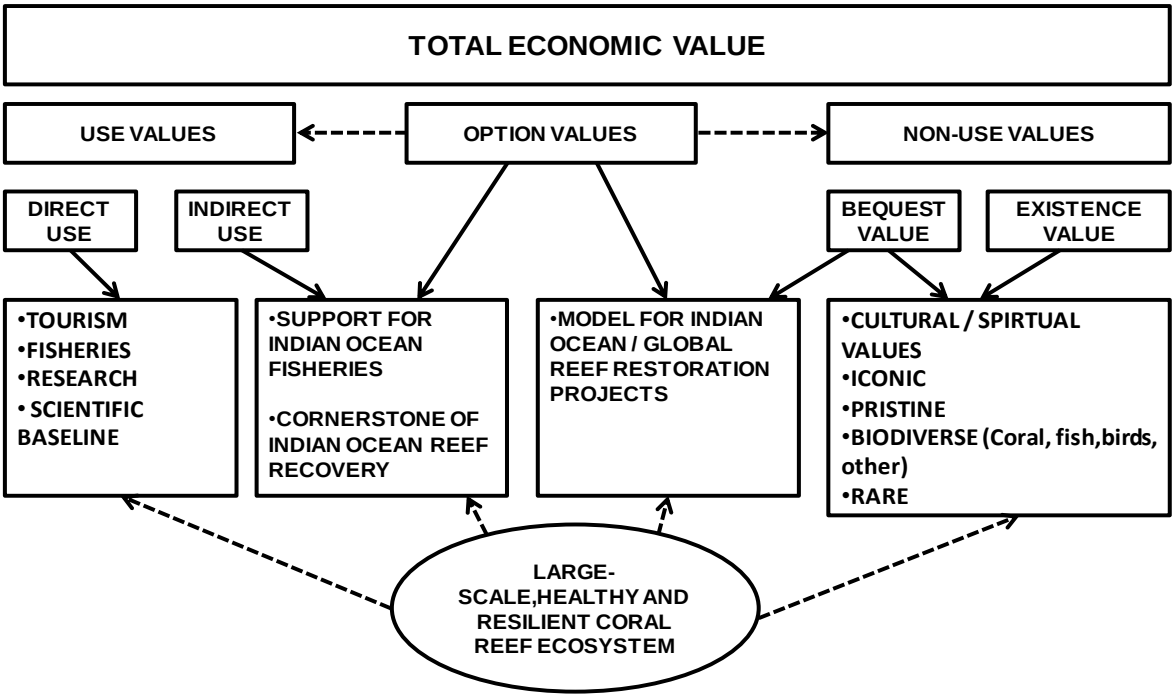

Figure 1: Components of total economic value that were used to value the goods and services provided by Chagos ecosystems[18]

Other issues raised in the working group included how the costs of running the MPA should be quantified and who would pay for each of the options. These issues are yet to be resolved but must be included in any viability study of MPA establishment.

In further discussions it was pointed out that the Pew analysis was based on the current situation and so does not take account of the costs or benefits of potential Chagossian

resettlement nor the possible transfer of sovereignty of all or part of the archipelago (probably excluding Diego Garcia) to Mauritius. Furthermore, the economics of the Diego Garcia base needs to be considered. Should resettlement occur, the potential for employment of Chagossians at the US base needs to be explored. Renegotiation of the current agreement between the British and US governments when the current arrangement expires in a few years' time could include the introduction of a lease fee to provide social benefits/income to any resettled Chagossians and support MPA activities. Crucially, there is now a need to undertake a new, independent and objective study of possible resettlement that would examine the sustainability, costs and benefits of resettlement, maintenance of the community and eventual evacuation and resettlement should sea-level rise make this necessary, as well as of appropriate livelihood activities.

Many participants were of the opinion that there is a need for another option to add to those identified by the FCO. In particular, there is a need to have a well-protected MPA that also makes provision for Chagossians to resettle some of the islands. This would need to take into account their subsistence fishing, the possibility of well-managed and relatively small-scale commercial fishing activity, land-based livelihoods, low-level sustainable tourism, and their involvement in scientific research (including environmental monitoring) and fisheries protection.

7. Social issues

This workshop differed from the one held in Southampton in that it had participation from Chagossian representatives, hence giving them an opportunity to put forward their points of view. Unfortunately Mauritius had withdrawn on the basis that they had agreed with the UK government that the MPA would be put on hold and would only be discussed in bilateral talks between Mauritius and the UK.

Chagossian representatives at the workshop indicated that they would only support an MPA initiative if they were involved throughout the discussions and their right of return is safeguarded. Some Chagossians would want to return to their original home but at different times – some right away while others later. The Chagossians pointed out that they would be able to monitor illegal fishing and therefore their presence is required. Given that establishing a no-take MPA will require enforcement, most participants were of the opinion that Chagossians and Mauritius should be directly included in the MPA discussions and planning. Otherwise, if sovereignty changes or there is resettlement, then the MPA might be short-lived, or at least with reduced effectiveness as a 'paper park'.

The Chair of the Chagos Islands (BIOT) All Party Parliamentary Group (APPG) explained the Group's perspective regarding the establishment of a marine protected area in Chagos. The APPG, comprises MPs and Peers from all major political parties. The purpose of the Group is to help bring about a resolution of the issues concerning the future of the Chagos Islands and of the Chagossian people. It supports the idea of an MPA and believes that the Islanders should be allowed to return. The number of Chagossians wishing to return is small, hence there should not be a conflict with marine conservation. It was argued by them that Chagossians resident on the islands would be best placed to protect the marine environment and that human rights and justice should not conflict with conservation.

The workshop provided an opportunity to discuss resettlement implications. Whilst the MPA proposal is about environmental protection in the first instance, it is crucial that the conservation debate is not used in a way that detracts from the Chagossians' own concerns. No-one should wish to see human rights trampled upon, and therefore the way forward should be to achieve environmental protection in partnership with the Chagossian people and without prejudicing basic human rights. Concerns were also raised in the group that any no-take zone or MPA (particularly Option 1) could potentially compromise the opportunity for future resource use if this were a decision of the returning Chagossian peoples. A conclusion of the group was that

the recommendation for the consultation should be for an MPA that kept future development options open.

For over two decades, the idea that biodiversity can be conserved without considering stakeholder's interests, needs and aspirations, has been recognised as untenable. There are numerous examples of unsuccessful protected areas ('paper parks') where conflict with those who use or have rights to a location has prevented successful protection of the biodiversity[19-20]. In the first planning stages of a protected area, stakeholders must be engaged and allowed to take part in the planning and decision-making, so that their interests in the site can be clearly defined and understood, and a platform established for negotiation[21].

There is need for more evidence-based studies to assess the impacts of potential Chagossian resettlement on the sustainability of the MPA. The multi-agency framework Living With Environmental Change (LWEC www.lwec.org.uk) could be used, since this involves the Research Councils working in partnership with a range of government departments to achieve interdisciplinary, cost-effective and equitable solutions to environmental issues related to global change.

8. Dealing with climate change in coral reefs

Relevant impacts of climate change on marine systems and adjacent islands include increases in sea surface temperature, sea level rise and ocean acidification. Rising sea surface temperature causes coral bleaching where the close association between corals and the algae contained within coral tissues breaks down. When such exposure is prolonged the corals die. For instance, in 1998 high sea surface temperatures caused widespread coral bleaching that killed over 80% of corals in the Chagos Archipelago[22]. Reefs can, however, recover from such bleaching events. Given that global temperatures are predicted to rise, it is expected that coral bleaching will become more frequent, with less time for recovery[23-24]. This will have negative impacts on fish communities through the alteration of the reefs physical structure[25-26].

Sea level rise will likely have a limited direct impact on marine life, but considerably more on the islands. This is because all the Chagos islands are low-lying and many have a slight internal depression, making their central areas even lower-lying than their coasts. It is not yet clear whether sea level is rising around the Chagos Archipelago. Some studies e.g., Church *et al.*[27] showed little change in Chagos from a 52 year record while Ragoonaden[28] showed increases that were twice the global average. A rise in sea level will influence the atolls through the salinisation of groundwater, increased erosion in certain areas, and eventually through inundation of the lowest-lying areas.

Acidification of the oceans occurs as increased concentrations of CO_2 become dissolved in the water forming a mild carbonic acid thereby lowering the concentrations of key minerals required by corals and other "calcifying" organisms for growth. At the present time this is largely regarded as a future threat, but there is concern that before levels become inimical to coral growth there will be reduction in rates of growth, exacerbating the problems associated with coral bleaching[24,29].

The threats posed by climate change on reefs are considerable. However, management interventions can improve the prospects for the reefs. Literature shows that healthy reefs not only recover faster from coral bleaching impacts, but that they are less susceptible to other threats such as disease[30-31]. Effective management that reduces human impacts, including fishing and pollution, is critical to this improved health and rapid recovery. Managers therefore need to protect reefs from threats such as boat and diver damage, pollution, sedimentation, and unsustainable fishing to ensure resilience in reefs.

A growing number of examples from around the world are showing how networks of marine protected areas or zoning systems can be developed to build climate change resilience into

management frameworks for coral reefs. These include representation and replication of all reef habitats within strictly protected areas; the inclusion of critical areas such as spawning grounds or refugia for rare species; considerations of connectivity in the design of MPA networks to ensure that "upstream" reefs are protected and can thus help in recovery downstream; and establishing a system of effective management[32].

A clear message from successful coral reef management elsewhere in the world is that all stakeholders (with direct or indirect interests in the reefs) need to be involved in decision making. Such coral reef users include traditional fishers, dive operators, and other user groups; they should be assisted to understand the principles of coral resistance and resilience to bleaching and should be involved right from the initial stages in MPA selection, design and management. This will help to ensure clear understanding of the concept of reef survivability, strong grassroots support for conservation at the site, and effective partnership in management where appropriate.

Whilst direct human impacts, other than by illegal fishers, are currently not a significant impact in Chagos outside Diego Garcia, prudent and future-proof planning needs to take such considerations into account. Well-planned management may allow future changes in use of the coral reefs of the Chagos without incurring undue damage or indeed risking potential food and livelihood securities. At the same time it must be recognised that the long-term future for all atoll islands and their associated reefs remains bleak unless concerted global efforts to reduce greenhouse gas emissions come to fruition in the coming years.

9. MPA examples

Many MPAs were mentioned during the presentations and in the working groups as good examples of the approaches that have been used to establish and/or manage MPAs. The discussions also noted that that there are also many examples around the world where MPAs have not realised the anticipated benefits and have been little more than 'paper parks'. However, given their relevance in setting context for the discussions, a number of the positive examples are briefly discussed below.

9.1. Blue Ventures, Madagascar

The presentation by Fran Humber described how Blue Ventures Conservation has led community-based efforts to establish a network of small-scale MPAs in Andavadoaka, southwest Madagascar. Strategies for sustainable resource use are essential for the region, as stresses from coral bleaching events have coincided with a dramatic increase in fishing activities in recent years. Coastal population growth has been rapid, exacerbated by high levels of migration towards coastal zones. Artisanal fishing is the way of life for members of the indigenous Vezo communities, and is the primary economic activity for 71% of villagers.

The Velondriake MPA network evolved from the establishment of a successful temporary octopus no-take-zone (NTZ) by the village of Andavadoaka in November 2004. By October 2006, 22 neighbouring villages had established temporary octopus and mangrove NTZs. Presently, the network encompasses 25 villages and 6,500 people are effectively husbanding their natural resources, developing alternative livelihoods and tackling the social challenges they face.

Velondriake's success was first recognised in 2005, when Blue Ventures won the SEED Award (UNEP, UNDP, IUCN), in recognition of the establishment of the first community run Marine Protected Area in Madagascar. Velondriake is also a winner of the UNDP Equator Prize for biodiversity conservation and its President, Roger Samba, was awarded the WWF J. Paul Getty Award for conservation leadership.

Velondriake (meaning "to live with the sea" in Malagasy) is based on a common vision that the community wanted to achieve. The network is managed by a legitimate and democratic

community-based organisation, and it operates according to a social contract, with rules and regulations defined and agreed upon by the community, which are founded on a tradition of local law. Traditional village meetings, which embody a tradition of open dialogue and consensus building, are held before taking any management decisions. These frequent meetings, and other regular feedback to villages, ensure a constant dialogue between the committee and villagers and sustain the essential village-level consensus as a basis for action.

The network is supported by a programme of capacity building, which takes a number of forms. The committee and community members tackle problems and carry out tasks with the hands-on support and guidance of experts. Formal training workshops are also organised, and educational outreach has a central role. Teams of villagers are also involved in ecological monitoring of the MPAs, using straightforward methods to assess the state of fisheries and key habitats.

It is also recognised by network managers that the problems of biodiversity conservation and poverty alleviation are inextricably linked, and conservation cannot be considered without addressing the social and economic needs of communities. Future development of the project will aim to stimulate and diversify the local economy through the development of alternative sustainable livelihoods, and Blue Ventures has already helped the Velondriake management to establish the basis for sea cucumber and seaweed aquaculture and ecotourism.

An important lesson learned from the Velondriake network is that governance developed via traditional social codes can lead to high compliance and awareness, and to a system of iterative, adaptive management, that can be rapidly replicated, but this does not remove the need for reinforcement of community actions by legislation.

9.2. Great Barrier Reef Marine Park, Australia

The Great Barrier Reef Marine Park is widely recognised as the world's largest tract of protected coral reefs and often used in discussions of both management challenges and of successes. Particular challenges facing the park have included ex situ threats from terrestrial land uses, and fishing. The former have been ameliorated or at least contained through widespread involvement of stakeholders. With regard to overfishing the park was re-zoned in 2004 with about one-third of the total area designated as no-take fishing area. These management interventions have improved the effectiveness of the park as a conservation and fisheries management tool.

9.3. Agatti Conservation Reserve, Lakshadweep, India

Agatti Conservation Reserve lies in the Lakshadweep Islands, part of the same geological and ecological system as the Chagos. It is a community led marine reserve that was established in January 2008. 80% of the local population of 16,000 people were consulted prior to designation. The reserve was designed to follow "resilience principles" to try and improve the chances of reef survival or recovery in the face of climate change.

9.4. Aldabra Marine Protected Area, Seychelles

This MPA was mentioned by some attendees as a model for a Chagos MPA. It was one of the original locations for a proposed US military base, but was protected following a powerful campaign led largely by the UK scientific community. Unlike Chagos however, it was never inhabited. Since designation it has had a very small resident staff who run the protected area, undertake some scientific monitoring and some interpretation for cruise-vessel tourists.

10. Plenary discussion

10.1. Which option to choose from the FCO consultation document?

In the final plenary session we revisited the FCO consultation options to determine whether we had any consensus or majority opinion.

The consultation issued by FCO has three options:
1. *Declare a full no-take marine reserve for the whole of the territorial waters and Environmental Preservation and Protection Zone (EPPZ) / Fisheries Conservation and Management Zone (FCMZ)*
This option is the recommendation of organizations in the Chagos Environment Network (CEN) and others. Both environmental science and preliminary economic analyses strongly indicate that the Indian Ocean needs a protected area like Chagos, providing regional and global benefits. This option, in some peoples view, fails to take account of human rights factors and other political contexts that cannot be ignored if a viable and sustainable solution to marine protection for the Chagos islands is to be found. A major challenge faced by fully protected marine reserves wherever they are established is the ability to secure funds to meet high management and enforcement costs required for successful implementation. No proposals have been made as to how management costs are going to be met, especially since there will no longer be income from licences to undertake the current level of management. Further, a full no-take reserve means that existing small-scale fishing will be stopped e.g. yachts and Diego Garcia personnel. This could very quickly lead to conflict.

2. *Declare a no-take marine reserve for the whole of the territorial waters and EPPZ/FCMZ with exceptions for certain forms of pelagic fishery (e.g. tuna) in certain zones at certain times of the year*
This option represents a zoned use approach. An integrated zoned MPA regime was recognised by many participants to offer the best potential to addresses all the environmental, social, economic and policy/governance concerns faced in Chagos. MRAG are the current providers of fishery management advice to FCO/BIOT Administration and within a wider zoned use framework support this option with respect to keeping the whole of the pelagic fishery open from 12 nm from any point of land to the limits of the FCMZ. By allowing licensed commercial fishing for offshore tuna to continue, this option would generate revenue which might partially support MPA management and surveillance, and in the longer term would keep the BIOT Administration's management options open in respect of either generating a conservation benefit or generating revenue or both from any Indian Ocean Tuna Commission quota allocation system that may be introduced.

Option 2 would also protect the more vulnerable reef ecosystems that would benefit from no-take protection. MRAG and others noted, however, that it fails to take account of Mauritian historical inshore fishing rights, that have to date been recognised by the UK and regulated, but with free licenses. In order to respect those rights and/or any potential return to the islands by Chagossians, zoned use of the reefs would also need to be permitted within the MPA (i.e. a fourth option).

3. *Declare a no-take marine reserve for the vulnerable reef systems only.*
This option represents a more restricted zoned use than Option 2 and would only apply to the vulnerable reef systems (that would need to be defined). Chagos already has several strictly protected areas, notably around islands supporting high bird populations. These islands have recovered well from previous massive exploitation of birds and turtles. Current levels of exploitation within the reef systems are, however low, and they are reported to be in near pristine condition. This option would ensure their future protection.

There remains some question as to whether any of the three FCO options described would take into account the historically agreed and ongoing rights of Mauritian vessels to exploit the inshore and offshore fisheries. Clearly considerable political challenges remain, but any designation which excludes this fishery, under any option and particularly in relation to Option 3, would greatly undermine claims that the reefs were managed as "no-take". Since offshore fishing would continue under conservation-based regulation as at present, this option is effectively the status quo.

10.2. Way forward
All participants agreed that establishing an MPA recognises the importance and value of the Chagos Archipelago and provides an important opportunity to promote wide recognition, and effective and long-term protection. The process of establishing one, however, should be done in a manner such that the MPA will withstand future challenges that might arise through resettlement or sovereignty changes.

Topic areas where it was not possible to reach a clear consensus in the time available for the workshop included:

- Geographical coverage of a fully-protected MPA. Some participants e.g., members of CEN wanted the whole area to be no-take (Option 1) while others considered that zoned use was most appropriate in order to address the social and economic concerns (Option 2 and a zoned Option 3 framework, representing a fourth option).
- Sequence of events towards its establishment. Some participants felt that the MPA should be established as soon as possible, while others considered that additional discussions and fact-finding were necessary, including the need for further impact assessment analyses (to be more comprehensive – and independent – than provided in the FCO consultation).
- Whether there should be resettlement or no resettlement. All delegates recognised that if some Chagossians resettle then local fishing rights (if only at subsistence level) would probably need to be allowed. Some felt that without prior training this could lead to over-exploitation or degradation of the reefs, e.g. through use of destructive fishing gear. Other participants, including the Chagossian representatives, were of the opinion that it would still be possible to regulate the fishing effectively under resettlement. The matter of the right of islanders to return is being considered by the ECtHR, but the question of resettlement remains a political decision.

Since resolution of political issues (sovereignty and resettlement) may take some time, a few participants suggested that the MPA discussions should not be held back by these factors. Instead participants should reach a firm view as to whether the MPA is the right way forward to protect Chagos reefs or not, in the context not only of the Western Indian Ocean at large but also its global value.

The unresolved issues outlined above meant that the workshop was unable to collectively endorse any of the three options given in the FCO consultation document. Instead, many of those present wished to consider a fourth MPA option that would allow for the possibility of resettlement and ‘getting it right first time’.

Concerns were raised that the discussions between UK/FCO and Mauritius on a range of issues had apparently stalled, and that MPA-related campaigning by groups such as CEN was regarded by Mauritius as prejudicial to their sovereignty claims. Nevertheless, a somewhat similar dispute between France and Mauritius has recently been pragmatically resolved, regarding the island of Tromelin. Thus those two governments agreed in December 2009 that there should be a joint management committee for Tromelin, responsible for protection of the environment, joint exploitation of marine resources, weather observations, and archaeological studies. Such arrangements could provide a suitable model for Chagos/BIOT.

Acknowledgements

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Annex I. Workshop programme

Morning Session

- Opening Statements
  Prof David Simon (Royal Holloway, Workshop Chairman)
  Mr Roch Evenor (Secretary, UK Chagos Support Association)
- Climate Change and Frameworks for Sustainable Management
  (Dr Mark Spalding, University of Cambridge)
- Can the Principles of the Defra Marine Aggregate Levy Sustainability Fund help the Chagos Initiative?
  (Prof Paul Leonard, Environmental Consultant)
- An Overview of Current Fishery Operations in the Chagos Archipelago
  (Dr Chris Mees, MRAG)
- The Current Status of Chagos and the Regional Benefits of Strong Protection
  (Prof Charles Sheppard, University of Warwick)
- Community Management of MPAs: A case study from Southwestern Madagascar
  (Miss Fran Humber, Blue Ventures Conservation)
- Concluding Plenary Statement
  Mr Jeremy Corbyn, MP (Chairman, Chagos Islands (BIOT) All Party Parliamentary Group)

Afternoon Session

- Socio-economic Issues of the Chagos Fishery (Dr Chris Mees, MRAG)
- An Economic Value of the Chagos Archipelago (Ms Pippa Gravestock, University of York)
- Working group discussions
  Fisheries (Chair: Dr Mark Spalding)
  Economics Chair: Dr Lynda Rodwell)
  Social Issues (Chair: Prof David Simon)
- Final Plenary Session
  Combining working group outcomes to discuss Chagos MPA management scenarios

Outline of working groups

Social Issues

This group focussed on human-related issues concerning the MPA, in particular

a) impacts and implications of existing human activity: the US base on Diego Garcia; fisheries; visiting yachts
b) possible employment and/or resettlement of Chagossians
c) enhanced scientific research and monitoring (both land-based and marine, including fisheries)
d) socio-culturally, environmentally and economically sustainable tourism and associated infrastructure
e) implications of global environmental/climate change

Economics

The aim of this working group was to focus on the economic costs and benefits of a Chagos MPA on different scales – local, regional and global. The main focus of discussions was on the current and potential future benefits of the Chagos archipelago according to scale and how these may (or may not) change under different future management scenarios. Broad issues covered included:

i) An overview of economic values of Chagos marine resources;
ii) Economics of the fisheries and;
iii) Economics of alternative livelihoods.

However, due to time constraints not all of these were explored in depth in the working group session.

Fisheries

Fisheries in Chagos currently comprise: licensed commercial fisheries (offshore for tuna; and a reef-associated fishery prosecuted by vessels from Mauritius); recreational fisheries (around the military base and by yachts in the northern atolls); and illegal fisheries (mostly vessels operating out of Sri Lanka, for shark and in the past sea cucumbers). A marine protected area is likely to increase the regulation of some or all of these fisheries through partial restriction or complete closure.

The fishery working group focussed on potential management regimes considering both the offshore and near-shore fisheries as well as management implications for the illegal fisheries. The objective was to undertake a broad scoping exercise of fishery management options - including spatial, gear and temporal restrictions, changes to the fishery (e.g. to tuna pole-and-line), and MSC certification - as well as record the reactions to these from the various interest groups.

Annex II. Workshop participants

Dr Robert Arthur	MRAG Ltd
Ms Lottie Cantle	Goldsmiths, University of London
Dr Sean Carey	Cronem, Roehampton University
Mr Jeremy Corbyn, MP	Chairman, Chagos Islands APPG
Mrs Bernadette Dugasse	Chagossian Social Committee in the UK
Mr Bashir Ebrahim-Khan	Chagos Refugees Group, Mauritius
Mr Roch Evenor	UK Chagos Support Association
Mr Alistair Gammell, OBE	Pew Environment Group
Mr Richard Gifford	Clifford Chance LLP
Ms Pippa Gravestock	University of York
Mrs Taffeta Gray	IUCN
Mrs Tara Hooper	Marine Education Trust & PML
Miss Fran Humber	Blue Ventures Conservation
Mr Adrian Jackson	Independent Observer
Dr Laura Jeffery	University of Edinburgh
Prof Paul Leonard	Environmental Consultant
Dr Stephen Mangi	Plymouth Marine Laboratory
Mr William Marsden, CMG	Chagos Conservation Trust
Lt Cdr Vince McCaughey	Ministry of Defence
Prof Laurence Mee	Scottish Association for Marine Science
Dr Chris Mees	MRAG Ltd
Mr John Pearce	MRAG Ltd
Miss Catherine Quick	UK Overseas Territories Conservation Forum
Miss Laura Richardson	University of Wales, Bangor
Dr Lynda Rodwell	University of Plymouth
Prof Charles Sheppard	University of Warwick
Prof David Simon, AcSS	Royal Holloway, University of London
Mr David Snoxell	Marine Education Trust
Dr Mark Spalding	University of Cambridge
Dr Ruth Temple	The Linnean Society of London
Ms Sue Wells	Independent Observer
Dr Phillip Williamson	NERC & University of East Anglia

The following had planned to attend, but were unable to do so (mostly due to the extreme weather and associated travel disruptions):

Mr Stephen Akester	MacAlister Elliott & Partners
Mr Andrew Allen	Foreign and Commonwealth Office
Dr Chas Anderson	Marine Biologist
Dr Matthew Bunce	University of East Anglia
Mr Jock Campbell	IMM Ltd
Dr John Howell	Overseas Development Institute
Mrs Paula Howell	Vorster du Plessis Attorneys
Dr Heather Koldewey	Zoological Society of London
Ms Ceri Margerison	The British Ecological Society
Dr Francesca Marubini	Joint Nature Conservation Committee
Miss Bucy McDonald	Independent Observer
Dr Lindsay Parson	National Oceanography Centre, Southampton
Prof Nicholas Polunin	University of Newcastle
Mr Jean Philippe Ramdas	The Diego Garcian Society
Dr Paul Shaw	Royal Holloway University of London
Dr David Smith	University of Essex
Miss Michelle Taylor	Imperial College London & ZSL
Dr John Turner	University of Wales, Bangor
Mr Olivier Tyack	IUCN
Dr Allen Vincatassin	The Diego Garcian Society

Mr Abhimanu Kundasamy, High Commissioner of the Mauritius High Commission, withdrew from the workshop.

Annex III. Notes and References

1. No vote was taken. It was however the view of the overall Chair of workshop and the chairs of the three discussion groups that conclusions (1) –(3) in the Executive Summary were shared by the majority of those present. When this report was reviewed by participants, objections to the use of the term 'majority' were received from only four participants, all of whom are individually or institutionally members of the Chagos Environment Network, which is running a lobbying campaign in favour of the full no-take option in the FCO consultation.
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Annex IV. Approach used by participants in the Economics working group to discuss the potential changes to economic value of Chagos under each of the FCO options and a proposed Option 4

Benefit (Economic)	**Potential value on relative scale**	**Scenarios of MPA establishment**				
	Current situation estimates of scale of benefits[22]	Option 1 (FCO) No-take	Option 2 (FCO) Certain fishing allowed	Option 3 (FCO) Vulnerable reefs protected only	Option 4 Resettlement up to 1000 people (opt 2 + fishing zone)	Option 5 ??
Tourism	•	• ⇑	• ⇔	• ⇔	• ⇑	
Fisheries	••			•• ⇔		
Shoreline protection	•			• ⇔		
Scientific value	••			•• ⇔		
Support for South West Indian Ocean fisheries	•••			••• ⇔		
Cornerstone of Western Indian Ocean reef recovery	•••			••• ⇔		
Other non-use benefits	••••			•••• ⇔		

Annex V. Statement from David Bellamy to workshop participants

"I am delighted that, following the launch last March of the proposal by the Chagos Environment Network to create a Marine Protected Area for the Chagos Archipelago, a workshop to consider the socio-economic issues is taking place at Royal Holloway on 7 January 2010. I commend the organisers for having taken this initiative. It is gratifying to note that all interested parties have been invited, especially the Chagos Islanders. It has long been my contention that the preservation of this unique Archipelago requires everyone to work together – Chagossians, the British and Mauritian Governments, scientists, environmentalists and conservationists across a wide spectrum of disciplines. The issues are complex and challenging but with good will and cooperation on all sides we can help to bring about a secure future for the Chagos Islands that protects the environment and bio-diversity as well as the interests of the Chagossian people. Carefully managed, limited resettlement should be compatible with conservation, and indeed could enhance the overall protection of the Islands. The challenge to us all is to make this possible. We are fortunate that the Islanders are committed to the environmental protection of their homeland. I hope that the workshop will agree recommendations that will result in the preservation of the Chagos Archipelago for all mankind, not least the people who once lived there.
With best wishes for a productive workshop".

Annex VI. Statement from Roch Evenor, Secretary, UK Chagos Support Association

"Chair, Ladies and gentlemen

We were illegally exiled from the Chagos Archipelago – but we are not here to discuss the exiled issues this is for the court to decide. On the agenda today is the BIOT MPA for us to deliberate on. Our "Right of Return" is paramount not only now but in the near and distant future. We the Chagossians, from the Seychelles, Mauritius and across the world join together to say in a loud and clear voice "we will support the MPA and the CEN project only if we are physically involved in it all the way and our "Right of Return" to the Chagos Archipelago are not compromised either by law or any other outside groups. We believe we can co-exist with the project like Dr. Bellamy suggested – Chagos archipelago could be something great if we all put our heads together and collaborate without taking our sight on our "Right of Return", let me repeat "Our fundamental right to return to Chagos should be safeguarded at all time either by the British Government and/or the Mauritian Government if/when the islands are returned to them.

Some people are saying that not all Chagossians want to return to Chagos – but after talking to most of the Chagossians that I know I haven't heard any say they do not want to return – though some of them do not want to return straight away but they said they would like to return in the future. This includes the second and third generations Chagossians.

My worry (and that of some Chagossians) is if the Prime Minister, who is championing the fight against the Global Warming, does go ahead and declare the Chagos Archipelago a conservation zone despite our objection (by enacting an Order in Council). Former USA President George Bush did go ahead in designating the Marianas Trench Marine National Monument in 2008 despite opposition from the inhabitants. The PEW Environment Group, part of the CEN, is a big organisation with financial might which was behind the lobbying of President Bush to set aside the Marianas Trench Marine Park. It was designated as a National Park as a way to boost President Bush's record on environment who had been criticised on doing enough on global warming.

With the Chagossians living on Chagos we will be able to help and assist MPA and CEN to meet most of their objectives. Our presence on Chagos will be a deterrent factor for other illegal fishermen who are fishing the sea-cucumbers and sharks and used the islands to dry them. Though we should have the right to fish within the 12 miles EEZ for our consumption should be safeguarded and beyond specific areas beyond the zone we should be able to sell fishing licenses to organisations to carry out commercial fishing. We should use the Great Barriers Reef in Australia as a model without repeating their mistakes".