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Editorial

Marine protected areas and pelagic fishing: The case of the Chagos Archipelago

Most marine protected areas are only partially protected in that they commonly permit fishing, a primary ecosystem-distorting activity. Many indeed are no more than 'paper parks'. The creation of no-take MPAs lags well behind several national declarations of intent and certainly lags behind need. A letter calling for more of these no-take zones has been signed by 250 of the world's leading scientists (<http://www.globaloceanlegacy.org/>).

Although the poor situation in the oceans is slowly changing, it is not without opposition from the pelagic fishing industry. A two day workshop was held earlier this year in connection with pelagic fisheries and the creation of the Chagos Marine Protected Area. This half a million square kilometres sits in the middle of the Indian Ocean where, amongst other things, pelagic fisheries will be prohibited from late 2010. It is a roughly circular zone about 450 nautical miles in diameter. Detailed aspects of this are in this issue [Koldewey et al. \(2010\)](#). Chagos has a marvellously rich set of coral reefs, which was the motive driving the MPA creation by the UK government in the first place, but it is also a region where tuna fisheries once operated. The Chagos MPA will double the no-take pelagic area in the oceans, but how significant is this, both in quantitative terms and in terms of the change in attitude towards the pelagic fishing industry by placing such restrictions upon it?

The case for protection has long been clear for marine species with low mobility, such as reef sharks and coral reef fishes that would clearly benefit from zero fishing mortality throughout their home range throughout their annual cycle. But the most contentious question occupied the most time – that of closure also to tuna fisheries. The workshop was not very important for any formal conclusion which, apart from those unanimous and inevitable calls for more research etc., was irreconcilably divided between the tuna fishers that were present and environmental scientists. But it was illuminating for views gleaned during informal conversations between sessions. Those of us who have advocated no-take MPAs were castigated by the industry on several issues. Firstly, we were lectured, the area is too small to make any difference to the oceanic tuna fishery (so we should not bother to make it a no-take zone). Others said the area was so big it will adversely affect the tuna industry (so we should not make it a no-take zone). The tone of the language used privately was sometimes arrogant and aggressive, reflecting perhaps the presumed ownership that fisheries have exerted over the oceans. This ownership has been largely unchallenged until recently, but now some governments are beginning to designate large MPAs and, finally, to apply no-take status to pelagic fisheries.

Chagos is thus a test case in this sense. Some fisheries proponents claimed that the data are so poor for Indian Ocean tuna that there was no science to back up a closure. So, of course, it shouldn't be closed. Another claimed the data from this part of the Ocean

were so good that we must not stop collecting more. And so on. This kind of industry-favouring prevarication and obfuscation will be familiar to any non-fisheries scientist following fisheries debates over the last two decades. I think that the resolution of the 'so poor' vs 'so good' divide is that tuna data are in fact pretty good in the Chagos area compared with other areas of that Ocean at least, but that in scientific terms are still very feeble indeed. Thus both are correct. The data are scarcely fit for any useful purpose, despite years of fishing during which useful data could and should have been collected; they certainly are too poor to easily be used to determine whether or not a closure will have any effect on tuna conservation or catches. Some in the tuna industry (the words being put to me in the wings of the meeting) hope it might be re-opened again soon – three years being a stated goal, when no proof could be found to show a significant change. Of course, it was said, one way to gain the desired data would be to continue the fishery for scientific reasons: 'scientific fishing' perhaps, like 'scientific whaling'.

So let us look first at some key aspects of tuna industry, and what it is doing to the ocean.

1. Total catch

Of the total Indian Ocean tuna catch, Chagos provides, apparently, only 2% by some measures (4 or even 6% by others). We learned that the annual capture in the Indian Ocean is 30–40% of the standing stock. To a population biologist that is a terrifying high level, but the fishing industry lives with such figures regularly it seems, playing dangerously with the capital in the way recently seen by gambling bankers. But, as with the recent banking crisis, greatest chances are taken when it is not their own capital they are playing with, and we can see the dismal results of both industries around the world. Even that 30–40% figure is dubious: the Indian Ocean Tuna Commission itself has recently commissioned a report that highlights many inadequacies of data and performance ([Anon, 2009](#)). Even aside from the under reporting, an independent assessment of the population trends (derived from the fisheries stock assessments) of the two main tuna fisheries in the Indian Ocean show that both the yellowfin and bluefin tuna have declined to the point where they have breached the conservationist benchmarks of concern and would qualify for listing by the IUCN Red List as being Vulnerable (see [Juan-Jorda et al., 2010](#)). In the much better investigated Atlantic tuna fishery, it was determined that under reporting was probably a factor of 2.5 ([Sloan, 2006](#)). Multiply, if you will, the 30–40% admitted capture by some unknown multiplier! Such under reporting is not limited to the Atlantic: we might remember Japan's admission of under reporting its southern Bluefin tuna catch also, after it was

caught out (<http://www.abc.net.au/news/newsitems/200610/s1765413.htm>). It requires a flight of fancy to imagine that tuna fishers are better behaved in the more anarchic Indian Ocean. The inshore artisanal element, for example, is another large unknown, and the ocean suffers from pervasive illegal and unregulated fishing.

2. Migratory catch

The argument was made that a tuna stock is presumed to be a migratory species. What is not caught in the Chagos MPA could, if it migrates, be caught elsewhere in the Indian Ocean, so what is the point of protecting one part only? Numbers supporting or quantifying this assertion were not produced or discussed in any meaningful way, however. Of course some are migratory, possibly the majority, but the key question in relation to the value of a large pelagic protected zone is: what proportion? This is important, especially given the comments made by some to me that if the no-take status of Chagos is maintained, then their ships would simply line up along the border and catch the fish as they emerge. In other words, why make things difficult for the tuna fishery? However, *Sibert and Hampton (2003)* model this situation in Pacific archipelagos and find that “the median lifetime displacement of skipjack ranges from 420 to 470 nautical miles. The lifetime displacement of yellowfin is about 20% less”. So, there is very likely to be a large resident tuna population, a source, or reservoir perhaps, in the archipelago. Nobody has much idea for that ocean. *Sibert and Hampton (2003)* go on to comment on the assumption that these tuna are high migratory: “The term, ‘highly migratory’ appears to have no operational definition in relation to the natural history of tunas. Rather, it is a legal term defined only in the context of the Law of the Sea.” Further: “. . . the results also suggest that Pacific Island countries can implement effective domestic management policies to promote conservation and sustainable utilization of tuna stocks within their EEZs”.

If this applies at all to Indian Ocean archipelagos too then there is great benefit to be gained from the large no-take region in Chagos for this important pelagic group also.

3. Bycatch and wasted catch

The quantity of bycatch in the Indian Ocean tuna fishery is also unclear. It is barely known for the iconic turtles and seabirds, and largely unknown for most other groups. It is known that sharks are greatly desired and valued, for example, and that lines can be, and are, set to preferentially target high value items such as shark fins for Asian markets. The FAO report that shark numbers in the Indian Ocean are currently at about 10% of their stocks of not long ago, and over half of the world’s oceanic pelagic sharks have declined to the point where they are considered threatened by the World Conservation Union. But quirky rules and poor monitoring also actually permit gross under reporting of bycatch. Lancetfish can and have been caught as frequently as the targeted tuna. But their flesh is apparently soft and undesirable, so they are jerked off the lines before they are landed on the deck. Whether, with their jaws torn off, they can survive seems unlikely, but because they don’t touch the deck they are not recordable as bycatch. In this way, thousands of tons of carnivore are removed annually from the ocean system. One fisheries expert did assure me that in the Chagos context this only happened for the one year when the observation was reported.

An important element in the general ecology which is almost always overlooked, is the supply of bait for longliners. Some details on the Atlantic fishery are revealing, where apparently 500 million squid are taken annually, largely for the supply of bait (*Sloan, 2006*). The Falklands and other southern Atlantic islands were

developed for their squid fishery several years ago. You may be familiar with those satellite images of light at night, in which you will see that the Falklands squid fishery lights up almost as strongly as London or New York. The squid fishery is apparently in decline now, not surprisingly perhaps. However, to the fishing industry there is room for doubt: at one conference recently a fisheries expert admitted this decline but blamed. . . climate change! As one scientific colleague put it: “It is difficult enough to get people to care about fish – what hope for squid!”. Another wasteful problem comes from the observation (*Sloan, 2006*) that by the end of a successful hunting trip, the bottom third of the tuna in some ships’ holds may be too squashed from the weight of fish above to be of much value. Some presumably can be used for tinned cat food, but the rest is used as fertiliser for fields of crops. To an ecologist, the energetics implied by inputting a top carnivore into the base of a new food chain is astonishingly wasteful. Too much of this sort of profligacy could be the difference between collapse of a species or its survival, and between continuing revenue and benefit or its loss. It is only possible because wild pelagic fish capture is more akin to clear-fell logging than to harvesting.

4. What can be done?

Depressingly, probably little on a global scale will be done in time regarding management of multi-national fisheries over a multitude of EEZs. The literature on excesses of the blue water fishing fleet is huge, yet nothing much has happened. If proof is needed, just look at past decades of history and the trends of fishing intensity and fish stocks (*Roberts, 2007*). This applies even in the generally much more regulated European Union and its North Sea fishing industry. *Wakefield (2009)* recently reviewed this from a legal perspective and concluded that the situation is long past being supportable, and even the EU itself recently concluded that it has, in fact, messed up on a truly massive scale. The fact is that we know the key facts, and have done so for many years, but facts are not enough. It is difficult to find examples where industrial fishing has succeeded without collapsing the stocks. Traditionally the fleets have just moved on: deeper, further offshore, but there are fewer and fewer places left. As has been pointed out for the whaling industry, from a company perspective it pays not to fish sustainably, but rather to maximise a return now, liquidate the asset and invest the earnings elsewhere, rather than to save some for later. In an analysis of 27 Scombrid stocks over half a century (mostly Atlantic and Pacific but with the only two Indian Ocean stocks for which there was sufficient data) *Juan-Jorda et al. (2010)* commented: “Threat status has increased over time with 20 out of 27 stocks having declined at a sufficient rate to qualify as treated according to IUCN A1 criteria”. These authors also say with regard to the Atlantic stocks “This is equivalent to a 69% decline in spawning stock biomass, 10% decline in the mean age of adults and 9% decline in the mean body size of the catches. . .” Despite this, some piecemeal activities are occasionally proposed and even implemented, such as a meaningful level of observers on ship, not always with the enthusiasm of the fishers.

5. The way ahead

The only sure way to protect a widely distributed fished stock is to close off access to a large proportion of the spatial distribution of the stock. More simply, the way ahead is with simply governed, no-take protected areas, and the Chagos example is one of several new initiatives (*Nelson and Bradner, 2010*). Given that most of the oceans are a free-for-all and suffer the ‘tragedy of the commons’, profligate over-exploitation and waste probably will not change in time in most places unless such ‘common’ access is restricted.

Perhaps this can only change in areas that fall under a simple, single, determined and responsible jurisdiction. Where there is complex jurisdiction, such as in EU waters, where it now takes four barrels of fuel to catch one barrel of fish (Brander, 2008), it probably cannot change. Mostly, countries lack politicians courageous or influential enough to try and do something where there are multiple interests. Lobbying by special interests is clearly powerful of course: in Britain, when several years ago a junior Minister opened a marine science conference by saying that he supported no-take MPAs around Britain, only two weeks passed before he was on the main morning news back-tracking, saying that perhaps MPAs were a bit excessive after all! In very fortunate contrast, a later senior Minister (the UK Foreign Secretary, no less) then declared the Chagos MPA no-take zone, this being possible because of its status as a UK Overseas Territory. Its jurisdiction is simple (compared to the EU at least) which made the move possible. Perhaps the solution can come only from such relatively simple jurisdictions, and the larger they are, the more hope there is for overall sustainability. The diameter of the Chagos no-take MPA is roughly the size of the median range of some tuna species, so even though that MPA was declared because of its reefs, its benefit for pelagic species will also be critical. As *The Economist* stated in August 2010 (p. 67, based on Beare et al. (2010)) “...there is much to learn about fisheries biology. But one lesson is clear. Laying off, even just for six years, has as big an effect on migratory fish as it does on sedentary ones.”

This is what led to the tuna industry concern, even indignation, described above – a rule being established in the free-for-all. This was not just a shock (but was it really? see Worm et al., 2009) but is a warning of possible regulation elsewhere too. Given the recent call for many more such areas as noted earlier, no Minister responsible for such areas in any ocean need be embarrassed any longer for taking the correct and necessary action.

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