

UK Overseas Territories and Crown Dependencies: 2011 Biodiversity snapshot.

British Indian Ocean Territory: Appendices.

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This section includes a series of appendices that provide additional information relating to that provided in the British Indian Ocean Territory chapter of the publication: UK Overseas Territories and Crown Dependencies: 2011 Biodiversity snapshot.

All information relating to the British Indian Ocean Territory is available at <http://jncc.defra.gov.uk/page-5747>

The entire publication is available for download at <http://jncc.defra.gov.uk/page-5759>

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APPENDIX 1: NATIONAL LEGISLATION

A. Current local legislation protecting the environment

1. Protection and Preservation of Wild Life Ordinance, 1970

An ordinance to provide for the protection and preservation of wild life (last amended in 2008).

a. Green Turtles Protection Regulations, Statutory Instrument of 1968

Prohibition to harpoon, kill, destroy or take possession of turtles or to purchase or sell turtles and turtle products.

b. The Restriction of Exportation of Giant Land Tortoises Regulations 1968

Prohibits the exportation of Giant Land Tortoises without a licence

c. Strict Nature Reserve Regulations 1998 – Statutory Instrument No. 4 of 1998

Declaration of Strict Nature reserves in the Great Chagos Bank and in the Peros Banhos Atoll

d. The Wild Life Protection Regulations 2003 – Statutory Instrument No. 2 of 2003 (amended in 2008)

Protection of flora and fauna

2. Marine Pollution: The Environment Protection (Overseas Territories) Order 1988 – (amended in 1999)

Deals with deposits at sea

3. Ozone Layer Protection Ordinance, 1994

An Ordinance to give effect in the law of the Territory to certain international agreements for the protection of the ozone layer and, for that purpose, to control the manufacture, importation and exportation of certain substances and produce.

4. Diego Garcia Conservation (Restricted Area) Ordinance, 1994

An Ordinance to promote the conservation of the natural resources and historical heritage of the Territory by authorising the restriction of access to certain areas in and adjacent to Diego Garcia and the regulation of activities within those areas

5. Prevention of Oil Pollution Ordinance, 1994

An ordinance to prevent the pollution of the waters of the British Indian Ocean Territory by the discharge or escape of oil

6. Trade in Endangered Species (Control) Ordinance, 2007 (amended in 2008)

An Ordinance to regulate the trade in endangered species

7. Fisheries (Conservation and Management Ordinance) 2007

An Ordinance to consolidate, with amendments, existing provisions relating to the regulation, conservation and management of the fishing waters of the British Indian Ocean Territory.

B. Other current local legislation having some provisions which contribute to the protection of the environment.

1. The Waters (Regulation of Activities) Ordinance, 1997

An Ordinance which prohibits the use without a licence of underwater swimming or diving equipment and any unlicensed exploration or survey of the waters or seabed.

2. The Visitors and Visiting Vessels Ordinance 2006

An Ordinance which requires all visitors and visiting vessels to obtain a permit and to abide by conditions which limit their environmental impact on the Territory.

3. The Prohibited Imports and Exports Order 2009

An Order made under the Imports and Exports (Control) Ordinance 2009 which includes the prohibition of importing into the Territory any fill material which contains plant or animal material not originating in the Territory and also prohibits the exportation without written permission of any wildlife (including seashells, corals, eggs etc.) whether alive or dead.

C. PROCLAMATIONS

1. Proclamation No.1 of 2003 – Establishment of Environment (Protection and Preservation) Zone in the Territory.

2. Proclamation No. 1 of 2010 – Establishment of the Marine Protected Area in the Territory

APPENDIX 2: RESEARCH PRIORITIES: Work needed in Chagos

The following is a list of priority topics compiled from views from a large range of scientists who have visited Chagos or who are actively engaged in its conservation, compiled by Prof. Charles Sheppard.

General database and ecological mapping

- The foundation to successful conservation and management is knowing what you've got and where it is. This task is made all the easier by the recent launch of Worldview-2, a satellite with metre-resolution and spectral bands pooled into the short wavelength water-penetrating spectrum. Therefore, construct a first rate web-based GIS for the BIOT. First step would be a high-resolution satellite-based mapping audit.
- Gradually an elegant GIS-stack for the entire MPA would be constructed, eventually building to a web-based resource that would be updated with each scientific visit. This would not only include map polygons, but also bathymetry, currents, temperature, permanent reef-sites, in situ loggers, video, photos, - the works. This is also a great way to get the science to the public. This might even be tendered through Google Earth. Its initial ground-truth for the mapping would be provided by all the previous surveys that have geo-information, including the GIS funded by BIOT in 2006-7.
- Multibeam and ROV surveys to map seabed structure of atolls, especially Great Chagos Bank.

Benthic condition, habitat survival (given climate change) and reef resilience

- Continue the now long time-series of coral reef monitoring, with increasing emphasis on the nature of coral recovery in Chagos, in particular the structure and composition of recovering communities and populations contributing to this coral cover.
- Analysis of taxonomic composition and size frequency distribution of Chagos coral communities to address the change (if any) in kinds of coral communities, providing new insight into reef resilience and the structure of Chagos reefs relative to other areas of the Indian Ocean.
- Assess the contribution of major factors that contribute to ecological resilience of reefs in determining bleaching susceptibility and recovery potential of different reefs within the Chagos archipelago and of Chagos as a whole.
- Coral growth rates in Chagos (specifically separating carbonate accretion from linear extension of colonies). This would serve as a baseline for assessing effects of ocean acidification on corals independent of other more direct anthropogenic impacts. Importantly, there is a call to study both large *Porties* (which provide long-term records of local growth) as well as other fast growing corals.
- Assessment of juvenile corals – the next generation. Recruit monitoring: which species are taking over?

- A study of coral vs. algal recruitment, bleaching susceptibility and recovery rates) to assess resilience of essentially unfished reefs. An important, understudied group here is the macroalgae – why do they not take over dead patches in Chagos?
- Video survey transects for establishing a monitoring archive.
- Continue with the series of temperature sensors both in lagoon and seaward reefs
- Periodic monitoring of marine invasive species introductions, focusing on primary points of introduction but also including remote/pristine areas.
- Continued work towards a comprehensive species inventory.

Reef fish research

- Fish monitoring of both diversity and biomass in different reef types within Chagos. This will put Chagos fish assemblages in context with others in the Indian and Pacific oceans.
- Assessment of age structures of key fishery species. Are the maximum and size and age values of (normally) exploited fish different in Chagos compared to locations where they are targeted. This will likely form a new baseline for maximum age of many species.
- Assessment of growth rates of key fish groups. Again, a pristine environment, such as Chagos, will form a new baseline for understanding the growth rates and maximum sizes of reef fish.
- Predator-prey and behavioural patterns of reef fish in pristine environments. Most assessments to date have been in exploited areas, or comparing small marine protected areas to fished areas. Chagos will provide an assessment of how fish communities should be structured in the absence of humans.
- Urchin, algae and fish predation experiments (i.e. assays, tethering, clear bag experiments). Chagos offers the opportunity to assess how key reef processes operate in unexploited systems.

Connectivity of Chagos with other areas of Indian Ocean

- Using DNA techniques, continue work to identify the levels of connectivity among Chagos and other Indian Ocean locations (such as Seychelles), and assess if they are just genetically significant, or also of ecological relevance (i.e. replenishing denuded stocks).
- Assess the degree of reliance of Chagos reefs on external seed stock (e.g. Maldives, Indonesia, W Australia).
- Assess the role of Chagos reefs as a stepping stone, convergence point and source zone for major biogeographic regions in the western Indian Ocean, particularly between the eastern Indian Ocean, the northern Mozambique channel and the northern Indian Ocean
- Using DNA techniques as well as detailed mapping of currents, identification of the degree of connectivity within Chagos for different taxa, to assess degree of inter-connectedness and interdependence of atolls

Sea level changes, island erosion and historical changes

- Gain a better picture of how sea level has varied here over the last few thousand years and during the 20th Century, and most importantly how the islands have responded to past changes in sea level. This will heighten our understanding of the nature of sea-level change in the future and how the islands will respond to these changes.
- Establish detailed island morphological monitoring across the archipelago, undertaken with mapping and RTK GPS and tied back to sea level records, and complemented with chronostratigraphic records of island development and change.
- Identify 'high value' and highly vulnerable islands for the most immediate attention. Put in place proper monitoring transects which can be a platform for future investigations.
- Monitoring of key environmental parameters (SST, SSS, pH, $\delta^{18}\text{O}$ and Sr/Ca of seawater, $\delta^{13}\text{C}$ DIC). This database provides a basis for quantitative reconstructions of climate and environmental change at Chagos over the past centuries to millennia.
- The collection and analysis of fossil corals is required in order to expand the Chagos chronology back in time. The fossil data will provide a baseline of natural climate variability at Chagos.

Fishing effects

- Sharks: Direct quantification of fishing effort and catch rates, combined with research on biology of local shark populations, to assess vulnerability of sharks to "low" fishing pressure. MP
- Sea cucumbers: Re-examination of holothurian populations at the same sites examined in 2006 and 2010, to determine resource status.
- Monitor effects of recreational fishing in Diego Garcia and establish temporal zoning if needed.
- Assessment of impacts of Chagos MPA regulations on pelagic fish, in particular tuna species.

Cetacean work

- What is there, when, and how many?
- Use of predictive models (using Ecological Niche Models) of large pelagic / cetacean habitat and numbers.

Deep water work

- The scores of deep seamounts, abyssal plain and trench are now known to exist, but the deep water characteristics and life remains unknown. This important (but

expensive) research outline is identified in the document arising from the Southampton workshop.

- Detailed mapping of deep-sea habitats, including seamounts, canyons and other areas of potentially high biodiversity.
- Ecological surveys of priority deep-sea sites using submersibles, ROV and other non-intrusive or highly selective sampling techniques.

Turtles

- Using newly available historical data, determine trends of turtle numbers.
- Collect genetic samples from nesting green turtles to assess relationship between Chagos green turtles and those elsewhere in the Indian Ocean, to complement successful Hawksbill data.
- Continue monitoring growth rates, population numbers, and residency of the immature hawksbill population at Turtle Cove and in waters adjacent to Diego Garcia.
- Establish a year-round monitoring project at key nesting beaches of Diego Garcia.
- Use stable isotope analysis to compare the diets of immature hawksbill residing long-term inside Turtle Cove with those living on reefs in deeper water on the outer perimeter of Diego Garcia.

Island birds and vegetation

- Regular intervals of monitoring of the internationally important seabird colonies of the Chagos Archipelago to ascertain their true status and, importance in an Indian Ocean context.
- For the breeding seabirds with globally important populations, DNA analysis to determine how separated are the populations in Chagos.
- Vegetation and bird colony mapping, to form input layers into the GIS described above.
- Identification of unusual and rare areas and communities of vegetation, and of communities or species of plants and birds.
- Conduct island restoration work on prioritised islands involving restoring native trees to areas of former coconut plantations and eradicating introduced rats and where possible and practical introduced plants, to benefit indigenous avian and invertebrate communities.

Non-reefal/Lagoonal habitats

- Research into carbon flux in the newly discovered seagrass habitats, including biomass stock and turnover as well as sediment accretion, to serve as a reference site for studies seeking to ascertain the opportunities to manage seagrasses as a carbon sink.

APPENDIX 3: PAST AND CURRENT PROJECTS

Project date	Project name	Funded by	Main Outputs
2011	Birds in the British Indian Ocean Territory, RSPB	OTEP	<ul style="list-style-type: none"> • Production of a book of the birds of BIOT • Collation of historic records of birds in BIOT • Description of 50 common species
2010	Prioritisation of BIOT islands for island restoration		<ul style="list-style-type: none"> • Identified important bird/plant/dragonfly sites
2008 - 2010	Pilot project: Barton Point Restoration Project – Diego Garcia	Self-funded	<ul style="list-style-type: none"> • assess the most effective way of clearing former coconut plantations and restoration native vegetation
2006 - 2010	Two research expeditions to the general archipelago	OTEP	<ul style="list-style-type: none"> • £50,000 seed money for two major expeditions • Ecology, robustness, resilience, biomass and understanding of Chagos reefs and islands • Connectivity of Chagos in Indian Ocean
2008	Genetic connectivity of Chagos in the Indo-Pacific	Hawaii University	<ul style="list-style-type: none"> • Genetic connectivity of Chagos and Western Indian Ocean
2006	Rat eradication, FFI	OTEP	<ul style="list-style-type: none"> • Unsuccessful