Coral Reefs in the UK Overseas Territories

World Reef Area = 284,300 sq. km
Total estimated coral reef area of UKOTs = 5,580 sq. km (without BIOT) or 1.9% of World Reef Area
Total estimated coral reef area of UKOTs = 65,580 sq. km (with BIOT) or 22% of World Reef Area

Six out of eight are in Caribbean Region
Economic Value of Coral Reefs

Bermuda

Coral reef economic value estimated average of $722 million per year and up to $1.1 billion per year

10-12% of GDP (2007)

(Sarkis et al., 2010)

Turks and Caicos Islands

Coral reef economic value estimated at $47 million per year

7.8% of GDP (Nautilus Consulting, 2008)
Total Economic Value

Use Value

Direct Use Value
- Fisheries
- Tourism

Indirect Use Value
- Coastal Protection
- Amenity
- Biodiversity
- Recreational

Non-Use Value

Existence Value
( aesthetic enjoyment)

Bequest Value
(eg. Bermuda northernmost coral reef system)
Prime Tourism Asset

40% of Bermuda tourists come for a coral-reef associated reason

Reef degradation = Loss of tourism

14% loss of tourists per year in Bermuda

4% loss of tourists per year in Turks and Caicos Is.

I. DIVING and other watersports for many islands - Turks and Caicos, British Virgin Islands, Cayman, Anguilla and Bermuda
II. BEACHES

1. Recreational value

2. Beach formation - Coralline origin
   Bermuda and TCI for latter.
Commercial and Recreational Fisheries

Queen conch, *Strombus gigas*
Turks and Caicos Islands, Anguilla

Habitat for early life stages of many commercially harvested finfish species - Groupers, Jacks, Snappers

*Eg. Bermuda: 42% of commercial catch is considered reef-dependent*
Coastal Protection

Break ocean waves prior to crashing on Coast

Eg. Bermuda: coastal protection is worth 37% of total coral reef economic value, or US$266 million per year

If we lose this service, average damage share will increase - i.e. % of properties damaged will be higher.

Eg. Bermuda: currently average damage share for Category 3 Hurricane is 27% - more than % of properties damaged through flooding
Coconut crab in Chagos (BIOT)- up to 4kg, and 300 individuals per hectare (Sheppard, 2011)

It is suggested that Chagos is an important larvae source and sink for the western Indian Ocean, or at least an important biological ‘stepping stone’ for east–west movement of larvae (Sheppard, 2011).

Hawksbill Turtle on Chagos Reefs- BIOT (Sheppard, 2011)
<table>
<thead>
<tr>
<th>Territory</th>
<th>Location</th>
<th>Significant Event</th>
<th>Status (2007 based on coral cover)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla, British Virgin Islands, Cayman, Montserrat</td>
<td>Caribbean Sea</td>
<td>2005- Mass die-off (<em>Acropora</em>) Bleaching associated with increased sea surface temperatures</td>
<td>Declining</td>
</tr>
<tr>
<td>Bermuda</td>
<td>Wider Caribbean (1000 nautical miles north of Bahamas)</td>
<td>None</td>
<td>Steady over past 15 years minimum</td>
</tr>
<tr>
<td>British Indian Ocean Territory</td>
<td>Indian Ocean Remote</td>
<td>1998 die-off associated with increased seawater temperature</td>
<td>Recovering</td>
</tr>
<tr>
<td>Pitcairn Islands</td>
<td>Pacific Ocean Remote</td>
<td>No record</td>
<td>Healthy</td>
</tr>
</tbody>
</table>
Threats- Climate Change

- **Bleaching** - increased sea surface temperature

- **Increased frequency and severity of storms and hurricanes** - broken coral, smothered by sand piles, and increased sedimentation.

- **Acidification** - By 2050, estimating 20-30% reduction in calcification on reefs (Bates and Knap, 2003)

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Disease

• **White band disease** - *Acropora palmata* die-off in 1980s, Anguilla

• **Black Band disease** - *Porites sp.*, Cayman, Bermuda

• **White Plague** - Cayman, Virgin Islands, Bermuda

• **Yellow blotch syndrome** - *Montastrea sp.* and *Diploria sp.*, 3% prevalence in Bermuda, 2005.

White Plague on *Montastrea annularis*, Following bleaching event of 2005 (Photo: C. Rogers)

Long spined sea urchin, *Diadema antillarum*- die-off in late 1980s major impact on Caribbean reefs-leads to high algal cover
Direct Human Impact

• **Overfishing of herbivores**- subsistence fishers- leads to high algal cover and smothering of corals. A threat to **60%** of Wider Caribbean’s reefs (WRI, 2004)

• **Diver damage**- Physical pressure and abrasion, Cayman, Turks and Caicos Islands

• **Nutrient pollution** from inadequately treated wastes and excessive use of fertilizers- **15%** of the Caribbean reefs threatened by marine-based sources (WRI, 2004)

• **Anchor damage** from private mega-yachts, BVI
Direct Human Impact

- Coastal development associated with tourism sector in great part 1/3 of Caribbean reefs threatened (up to 60% for some territories (WRI, 2004)

- Destruction of reefs
- Loss of habitat
- Increase in nutrient load

Coral reef damage following ship grounding Bermuda, (Photo: T. Murdoch)
Modifying ship channels
For larger cruise ship passage

BERMUDA
(35km long
1.6km wide)
Average Coral Cover on Chagos at 15 m depth (%) (Sheppard, *pers.comm.*)
Species Composition Effect

- Caribbean- 2005 bleaching event led to mass mortality of *Acropora palmata*
- Routine sedimentation originating from ship traffic led to difference in species composition in Bermuda (Murdoch, *pers.comm.*)
- BIOT- 1998 die-off possible greater effect on outer reefs than on lagoonal reefs (Sheppard, *pers.comm.*)
- TCI- increased nutrient load associated with zonation of many species in shallow locations
- Anguilla- *Hurricane Luis* resulted in 95% mortality of Montastrea sp. and 83% loss of Octocorals

Impact on reef-associated species, with respect to habitat and nursery functions. Eg. *Acropora* habitat for spiny lobster in TCI.
Lack sufficient capacity for coral reef monitoring, enforcement and effective management.

For remote OTs, no marine or fisheries management, no links to international conventions, regional or national policies (Pitcairn, BIOT).

Many MPAs have remained as ‘paper parks’.

**What Can We Do?**

Link with international agencies crucial:
- OTEP (Montserrat project)
- JNCC (short term training schemes; BSc and MSc scholarships, identification of research priorities for OTs, increased exchange of expertise among OTs and with the UK)
- The Nature Conservancy (BVI ground-truthing for MPAs)
Legislation for Conservation and Management

Examples:
Bermuda Coral Reef Preserve Act, 1966
Cayman Marine Conservation Regulations, 1998

• Continually improving legislation (Caribbean countries)
  - Permanent moorings, fishing quotas and licenses,
  - no-take zones,
  - Protected areas,
  - damage compensation fees,
  - mandatory EIS.

• Development of tools for educating and informing policy and decision-makers
  - Management and Recovery plans (Cayman- 30 recovery plans, Bermuda- 15 recovery plans)
  - Economic valuation- placing environment on an equal footing with other socio-economic factors
Raising Awareness Buy-in

- Youth
- General Community
- Watersport Operators, Hotels, etc. (Reef-Watch surveys)

Policy and decision-makers

The Caribbean Challenge - 20% of coastal resources protected by 2020

Well managed tourism - Netherlands Antilles (User fees application - buy in from tourists)

Oneo Atoll, Pitcairn Islands - Up to 70% coral cover (NASA, 2006)
THANK YOU!

JNCC
Charles Sheppard- BIOT
Terence Dawson- Pitcairn
Robert Irving- Pitcairn
Thad Murdoch- Bermuda
Robbie Smith- Bermuda
Jo Pitt- Bermuda
Alison Copeland- Bermuda
Mat Cottam- Cayman
Karim Hodge- Anguilla
Wesley Clerveaux- Turks and Caicos Islands