

Coral Reefs in the UK Overseas Territories: Status and Challenges

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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

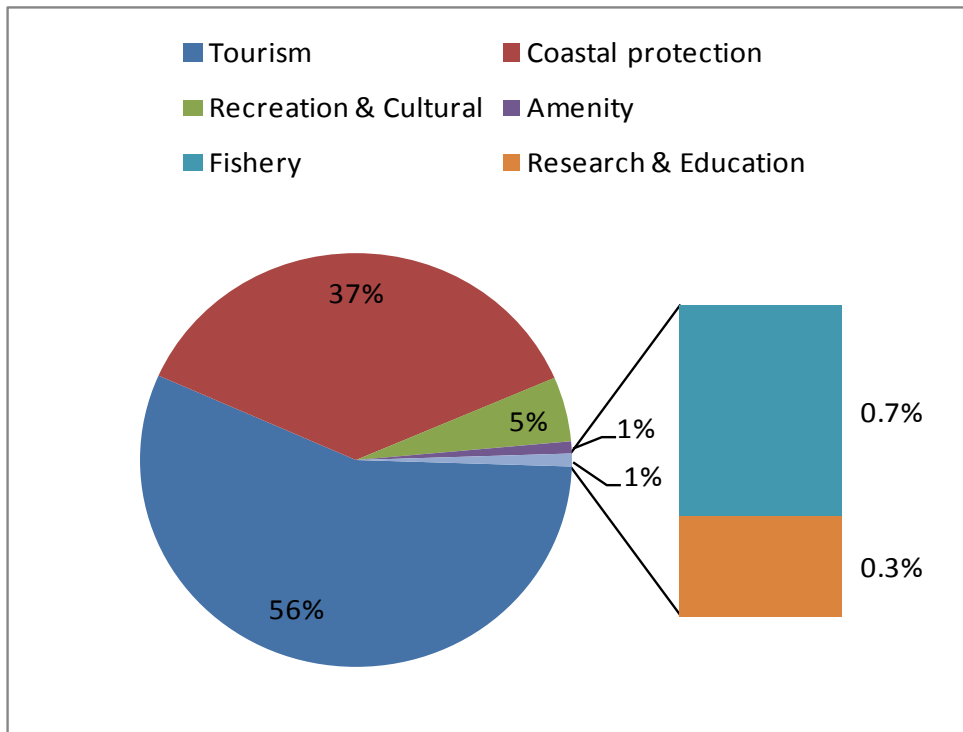
Total estimated coral reef area of UKOTs = **65,580 sq. km** (with BIOT) or
22% of World Reef Area

Economic Value of Coral Reefs

Bermuda

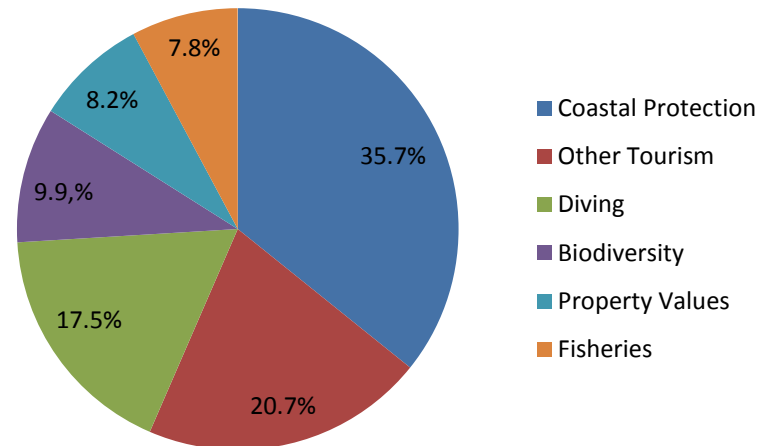
Coral reef economic value estimated average of **\$722 million per year** and up to **\$1.1 billion per year**

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

Non-Use Value

Direct Use Value

Indirect Use Value

Fisheries
Tourism

Coastal Protection
Amenity
Biodiversity
Recreational

Existence Value

(aesthetic enjoyment)

Bequest Value

(eg. Bermuda northernmost coral reef system)

TOURISM

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.

FISHERIES

Commercial and Recreational



S. Manuel

Commercial lobster fishery

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

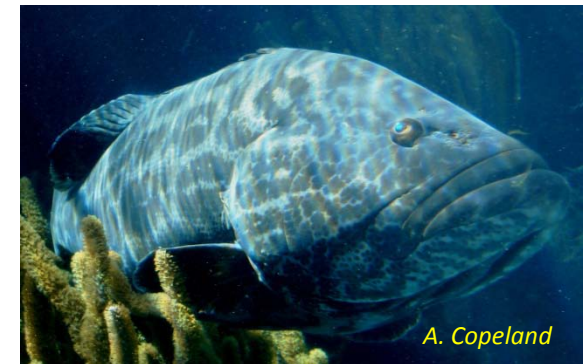


M. Outerbridge



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

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



A. Copeland

Black Grouper

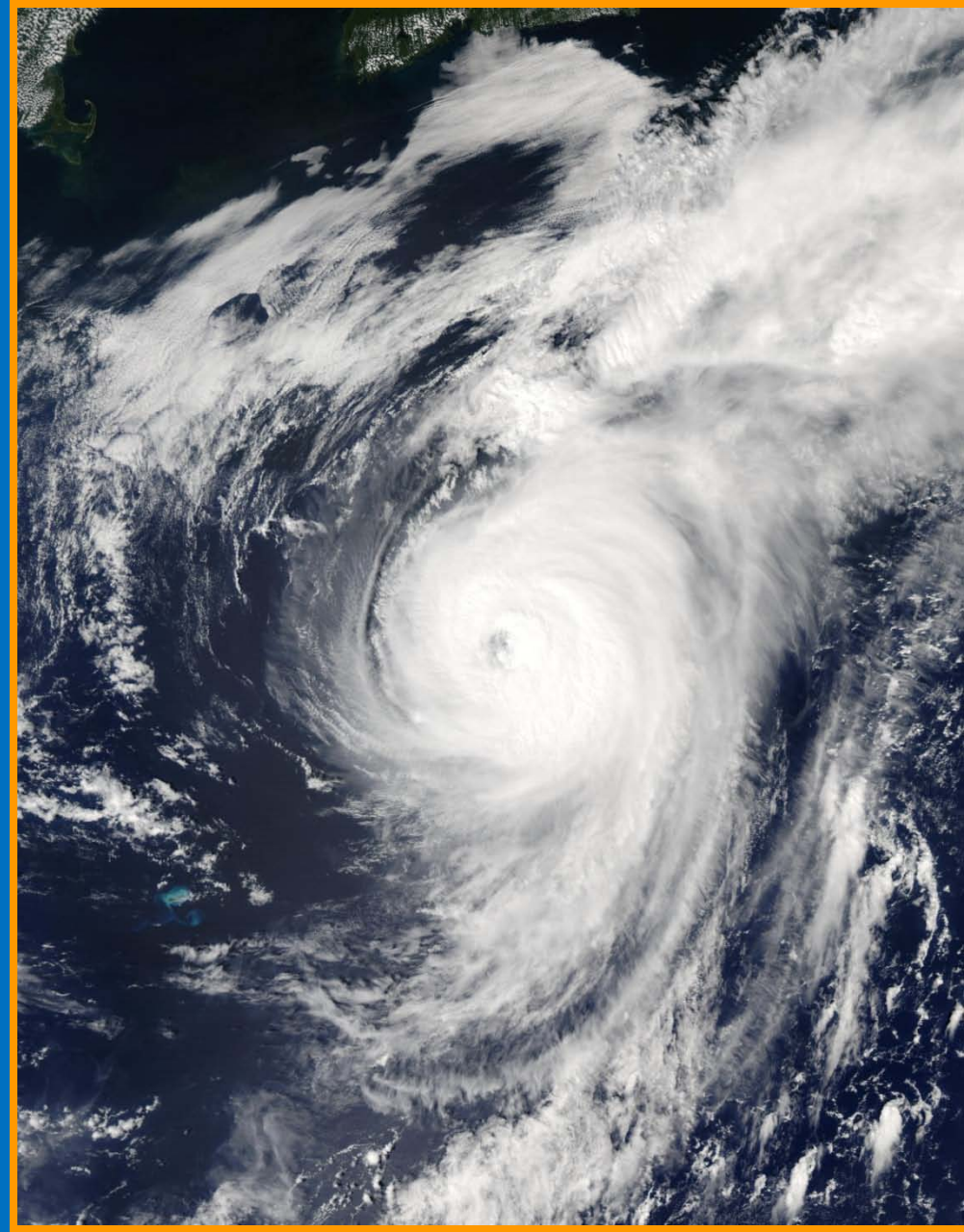
Coastal Protection

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 ¼ of properties damaged through flooding



Hurricane Fabian 2003

Biodiversity

Hogfish



A. Copeland



A. Copeland

Juvenile green turtle



Photo by:
Juan A. Sanchez
A. Copeland

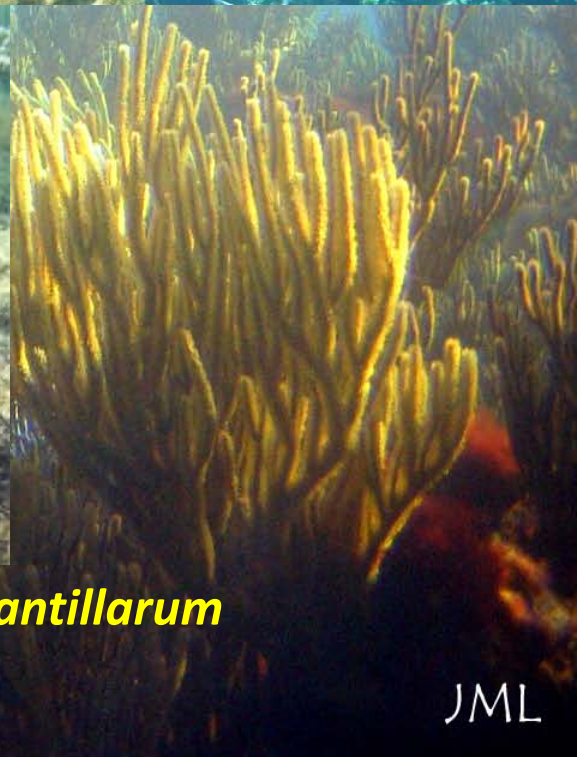


A. Copeland

Speckled moray eel



Diadema antillarum



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)

Territory	Location	Significant Event	Status (2007 based on coral cover)
Anguilla, British Virgin Islands, Cayman, Montserrat	Caribbean Sea	2005- Mass die-off (<i>Acropora</i>) Bleaching associated with increased sea surface temperatures	Declining
Bermuda	Wider Caribbean (1000 nautical miles north of Bahamas)	None	Steady over past 15 years minimum
British Indian Ocean Territory	Indian Ocean Remote	1998 die-off associated with increased seawater temperature	Recovering
Pitcairn Islands	Pacific Ocean Remote	No record	Healthy

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)

Cayman Islands, bleaching events 1987, 1991, 1994, 1998, 2003 and 2005



M. Frankes

British Virgin Islands were hit with Hugo (1989), Marilyn (1995), Bertha (1996), George (1998), Lenny (1999), and Frances (2004).

Partial bleaching

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)



Princess Parrotfish (Photo: A Copeland)

- **Anchor damage** from private mega-yachts, BVI

Direct Human Impact



Ship running aground

- **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

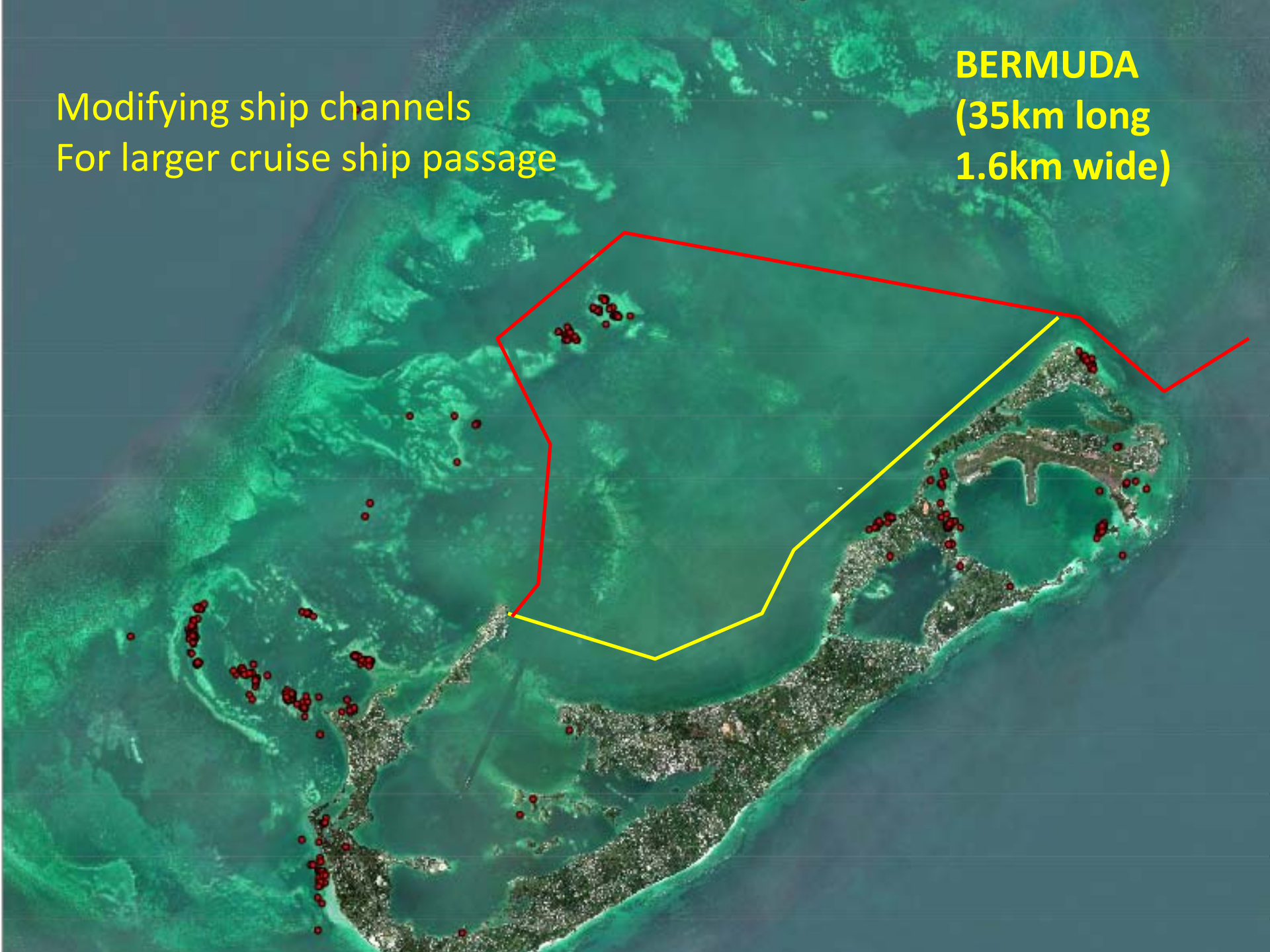
Coral reef damage following ship grounding
Bermuda, (Photo: T. Murdoch)

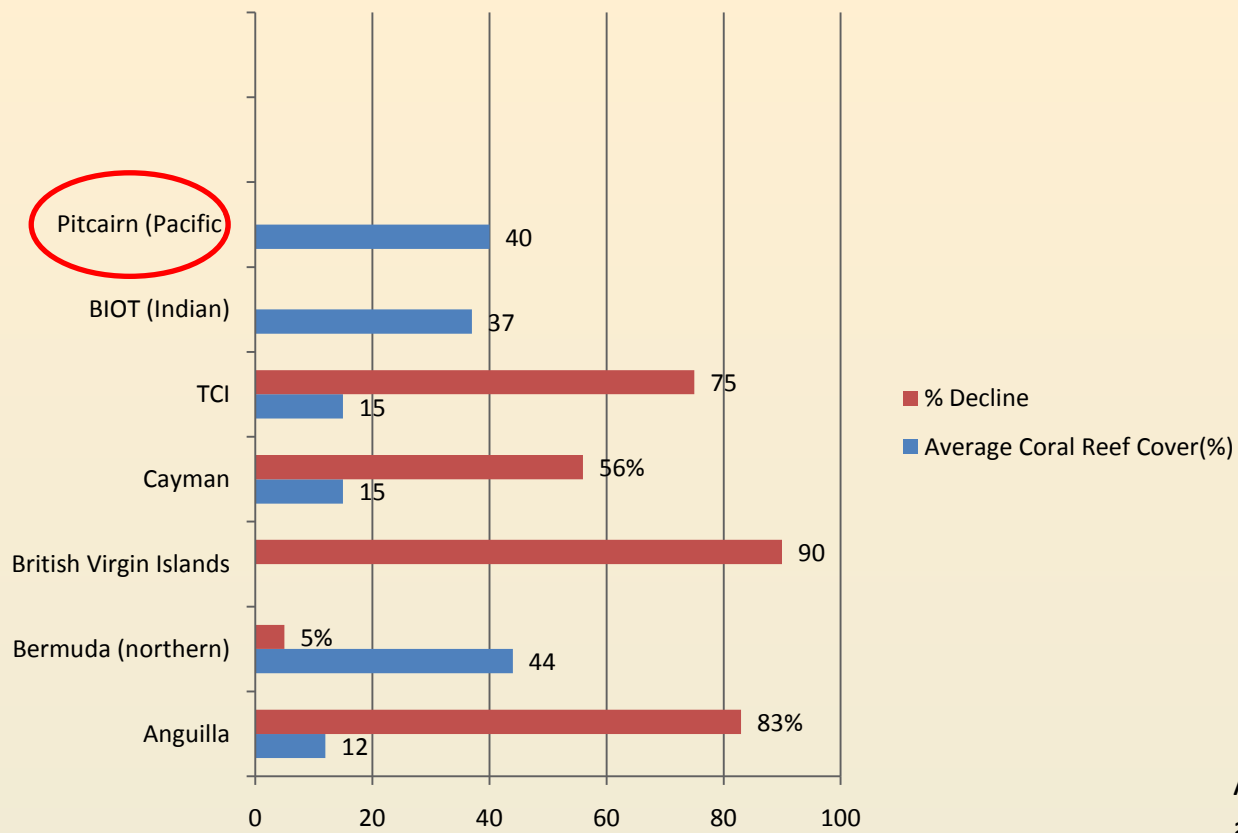


Sedimentation plumes following
ship passage (Photo: T. Murdoch)

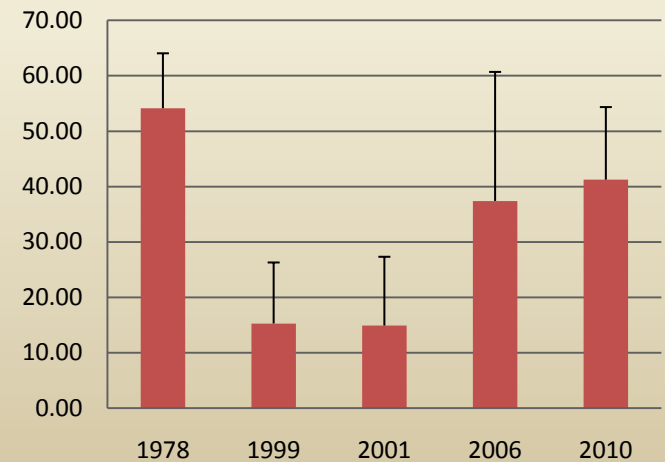
Modifying ship channels
For larger cruise ship passage

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.**

What Can We Do?



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'

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)



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

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)

A scuba diver is visible on the left side of the image, wearing a mask and breathing apparatus, surrounded by a vibrant underwater reef. The scene is filled with various types of coral, including branching and table corals, and small fish swimming in the clear blue water.

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