Economic Valuation of Coastal Ecosystems and MPAs in Belize

Emily Cooper (WRI)

WRI

June 2008

Beautiful Valuable

Threatened

- **Coastal development**
- **Mangrove removal**
- **Sewage**
- **Dredging**
- **Runoff**
- **Tourism**
- **Overfishing**
- **Warming Seas**

Ecosystem Services from Coral Reefs

Provisioning Services

- fish and shellfish
- genetic resources
- natural medicines and pharmaceuticals
- ornamental resources
- building materials

Regulating Services

- erosion control
- storm protection

Cultural Services

- spiritual & religious values
- knowledge systems/ educational values
- inspiration
- aesthetic values
- social traditions
- sense of place
- recreation & tourism

Supporting Services - sand formation - primary production

Buccoo Reef Marine Park, Tobago

Important focal point for tourism - 60% of visitors to Tobago visit the BRMP

Critical Shoreline Protection Service – protects large, low-lying, developed area

Buccoo Reef Marine Park, Tobago

Important focal point for tourism - 60% of visitors to Tobago visit the BRMP

$140 – 250 m over 25 years

Critical Shoreline Protection Service – protects large, low-lying, developed area

$128 - 156 m over 25 years

Policy Options

- **Enforcement of no-fishing area in the MP**
- **Re-routing sewage drain**
- **Integrated watershed management**
- **Sewage treatment plant**

Annual costs for managing SMMA marine reserve in St. Lucia (similar size) $150,000 /yr

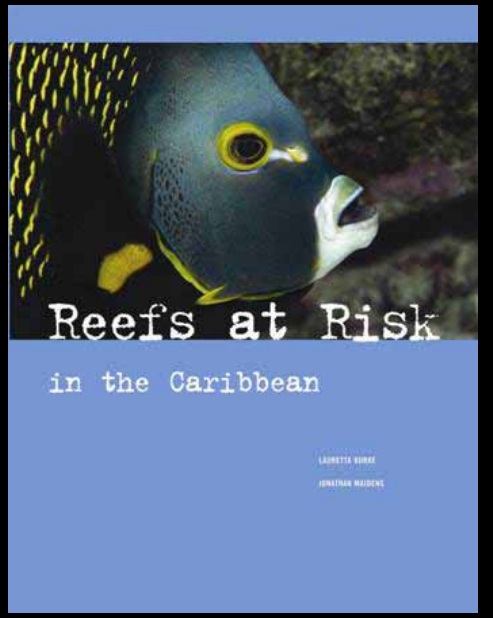
Why Economic Valuation?

$ Speaks – Many of these services go uncounted in decision-making

- Advocacy tool
- Decision-making tool
- Fee setting
- Damage compensation

Regional Valuation – Reefs at Risk in the Caribbean (2004)

- Value and losses due to degradation
  - Value = US$ 3.0 – 4.6 billion / year
  - Losses of US$ 350 - 870 million / year estimated to result from degradation



Approach

- Focus on economic impact which is meaningful to the country / government
- Emphasis on use of existing data
- Work towards a standard methodology for the Caribbean
- Identify policy applications & opportunities to put values to meaningful use
- Implement at multiple scales

Valuation – Main Components

Tourism

Method: Financial Analysis
(Net revenues plus transfers)

Fisheries

Method: Financial Analysis
(Net revenues plus transfers)

Shoreline Protection

Method: “Avoided Damages”

Services Not Valued

Total Economic Value (TEV) would also include:

Other Use Values:

- Research Values
- Option Values (e.g. pharmaceutical)
- Carbon storage

Non-Use Values

- Bequest Value
- Existence Value

We focus on values that can be reliably estimated using available data

3 Levels of Analysis

1. National Valuation

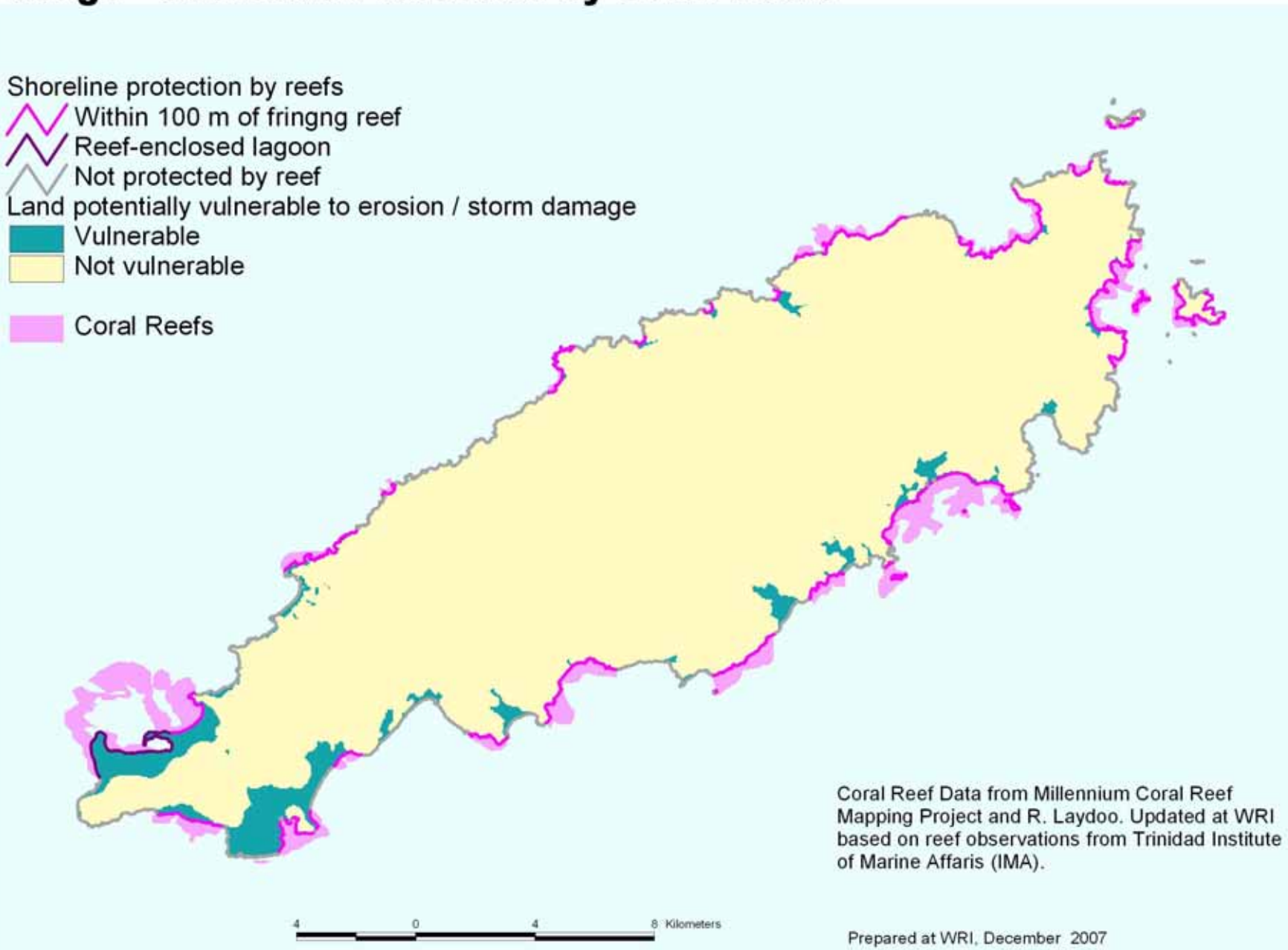
2. MPA System Valuation

3. Individual MPA Valuations

Assessing shoreline protection provided by coral reefs

- understanding the storm regime for an area (expected storm frequency, intensity, and associated storm surge and wave height), as well as the historic damage caused by these storms (particularly due to wave damage);
- identifying the land areas considered “vulnerable” to wave-induced erosion or storm damage (based on elevation & coastal proximity);
- identifying coastal segments which are protected by coral reefs;
- evaluating the overall stability of the shoreline as well as the share of coastal protection provided by coral reefs;
- estimating the property values (land and structures) of land areas identified as both vulnerable and protected by coral reefs
- combining these individual elements to estimate the reduction in potential damage attributable to the coral reefs.

Tobago - Shoreline Protection by Coral Reefs



Limitations

- Distinguishing reef / mangrove associated tourism and fisheries
- Data availability, data quality
- Estimating labor and other operating costs
- Valuing “local use”
- Estimating indirect economic impact (multipliers)
- Method values current use – not necessarily sustainable use
- Caution in presenting results – these are ***estimates*** and do **not** attempt to assess Total Economic Value
  - Undervalues MPAs, resources with little active use – these may be among the most valuable sites for other reasons

Status in Belize

- Revised preliminary estimates of Fisheries and Tourism Impact at National Level
- Refined the Shoreline Protection method for Belize's complex coastal environment
- 5 or 6 MPA level valuations underway in partnership with co-managing organizations
- Examining tourism value of Turneffe Atoll with a UB student
- Examining the financing situation of Belize's MPAs, working with co-managing organizations to highlight greatest needs – use valuation to highlight the incredibly high return for investment the government is getting from these MPAs – looking at a potentially drastic drop if quality continues to decline
- Hope to include an assessment of the value of the MPA system as a whole

Sport Fishing

Fedler 2008:

Economic Impact of Recreational Fishing for Bonefish, Permit and Tarpon in Belize

- BZ$ 25.2 m in direct economic impact per year
- BZ$ 56.5 m in total economic impact
- includes BZ$ 30 million in total wages (economy-wide)
- Generated an additional $2.7 million in taxes

Thank You

www.reefsatrisk.wri.org

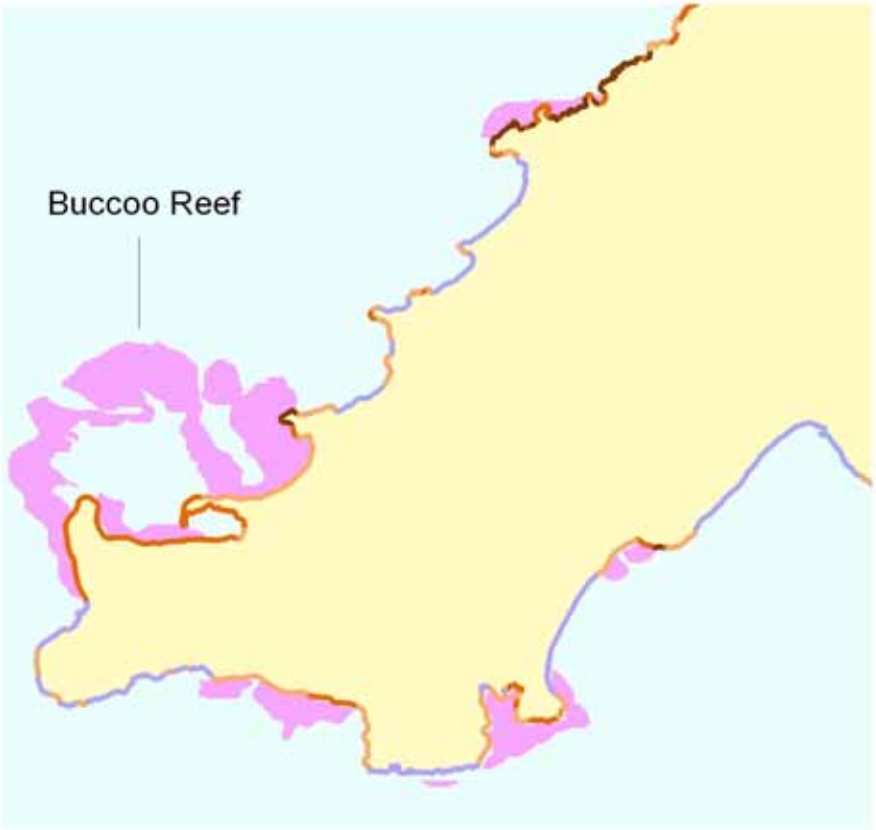
Contact:

ecooper@wri.org

lauretta@wri.org

Shoreline Stability with and without Coral Reefs

a. Coastal Stability (RTCP) with Reef



b. Coastal Stability (RTCP) without Reef

Relative Total Coastal Protection (RTCP) Index
- 1.2 - 1.7
- 1.7 - 2.2
- 2.2 - 2.5
- 2.5 - 3
- Coral Reefs

2 0 2 4 Kilometers

Coral Reef Data from Millennium Coral Reef Mapping Project and R. Laydoo. Updated at WRI based on reef observations from the Institute of Marine Affaris (IMA).

Shoreline stability analysis is a collaboration of IMA and WRI.

December, 2007.