Presentation given at the Marine Katoomba meeting

Katoomba XVI:
Building a Blueprint to Harness New Investment for the Protection of Marine and Coastal Ecosystem Services

February 9-10, 2010
Moore Foundation, Palo Alto, CA

Hosted by the Katoomba Group

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Protecting Shorelines and Beaches: Natural Coastal Infrastructure for the Sun and Sand Tourism Industry

Marine Katoomba
February 2010

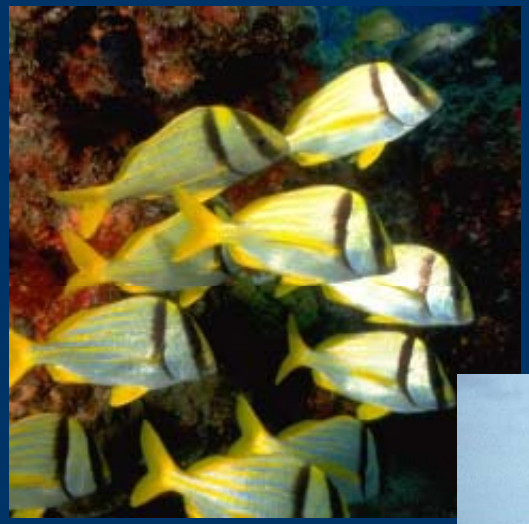
Lauretta Burke

World Resources Institute (WRI)

WRI

Beautiful

Valuable



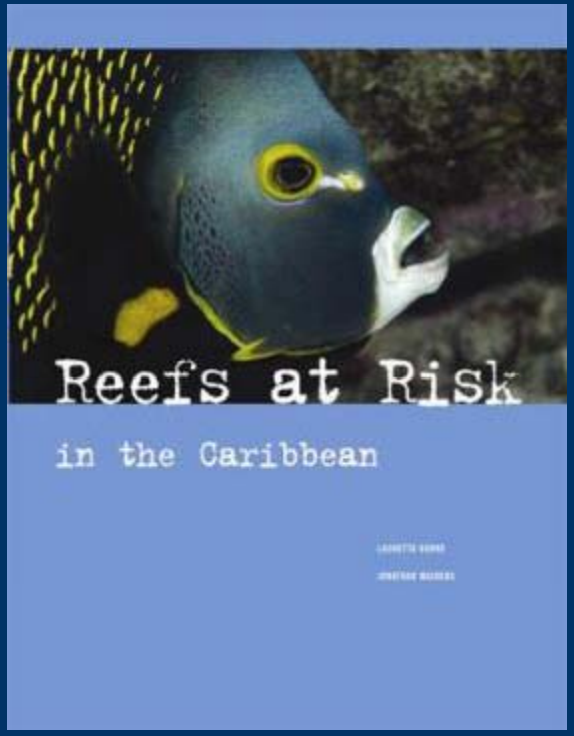
Valuable

Photos: Krishna Desai, L. Burke

Threatened

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

Reefs at Risk in the Caribbean (2004)



Threat analysis fed into evaluation of economic losses

- Coastal Development
- Watershed-based sources of sediment and pollution
- Marine-based threat
- Overfishing

Nearly two-thirds of Caribbean coral reefs are threatened by human activities.

Estimated threat

- Low
- Medium
- High
- Very High

Valuation: Dive Tourism

- Net annual revenues of over US$2B in 2000.
- Coral degradation could results in a 2–5% reduction in revenues by 2015

- Estimated loss of net revenues between US$100–300M per year by 2015.

Valuation: Shoreline Protection

- Over 20% of Caribbean coastline protected by coral reefs.
- Estimated value of this service is between US$700M–$2.2B.

- Reef degradation could result in losses estimated between US$140M–420M per year by 2050.

Photo: WWF

Overview

- Valuing coral reef-associated tourism
- Valuing beaches and protection of the shoreline
- Issues and limitations

Photos: WRI, WWF

Valuing Coral Reef-Associated Tourism

- Economic Impact

- Difficult to identify “coral reef-associated” visitors
  - Reef-associated visitor days?
  - Would visitors come if no reef?
  - Would visitors come if degraded reef?
  - Beach users?

Photo: WRI

Tourism data needs

- Visitor numbers (stay-over, cruise)
- Hotel prices and occupancy rates
- Activity surveys
- Marine recreation operations and revenue

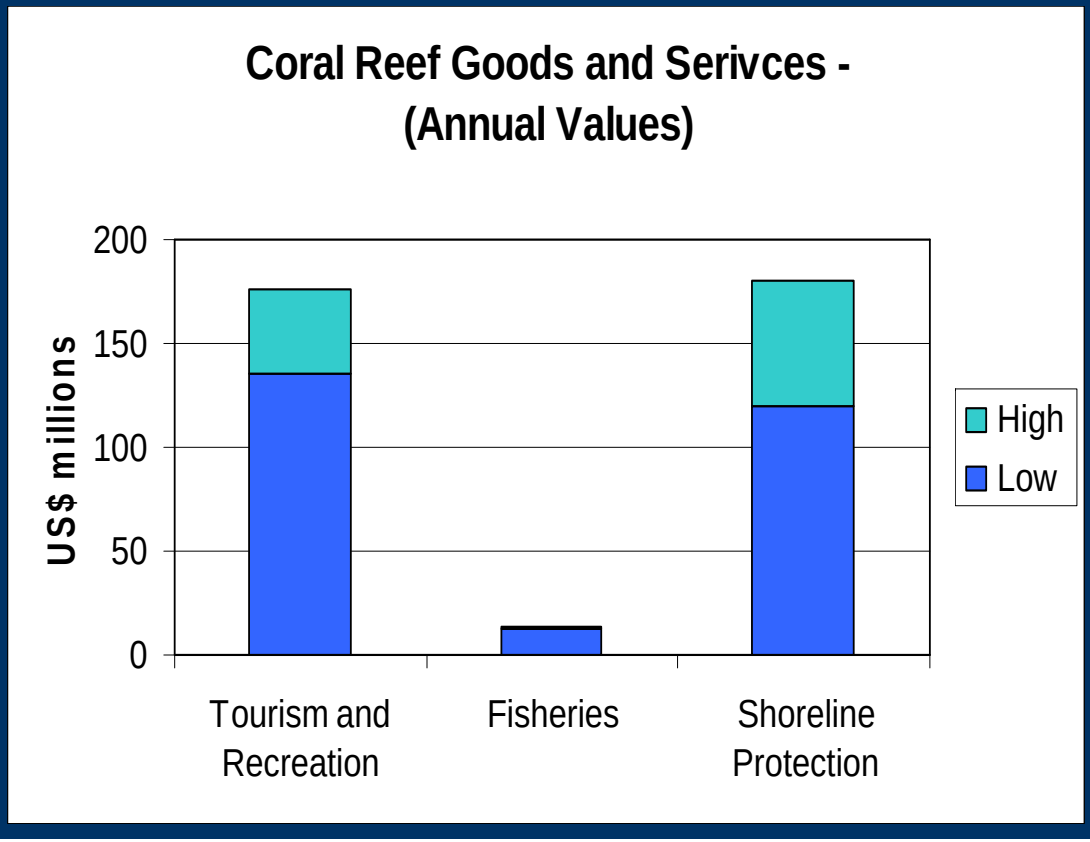
- Some MPAs have good visitation numbers – Bonaire, SMMA, Hol Chan

Photo: WRI

Annual economic contribution of coral reefs in Belize

US $270M–370M (2007)
including over $135M from tourism

64% of tourist nights were coastal (reef or mangrove-associated)



Reef-Associated Tourism in Belize

Reef-associated:	**(Pct of Total)**
Accommodation	38%
Recreation	25%
Other Visitor Expenses	22%
Marine Park Fees	1%
Taxes and Service Charges	11%
Cruise Tourism (revenues & taxes)	3%
Total Direct Impacts	**US$135M–175M**

Direct Economic Impact from Coral Reef-Associated Tourism

Location	Direct Economic Impact (US$)	% of GDP
Tobago	$43M	15%
St. Lucia	$92M	11%
Belize	$135M–175M	11–13%

Tourism in Dominican Republic and Jamaica

Motivation for DR

- 25% - beach quality
- 37% - climate

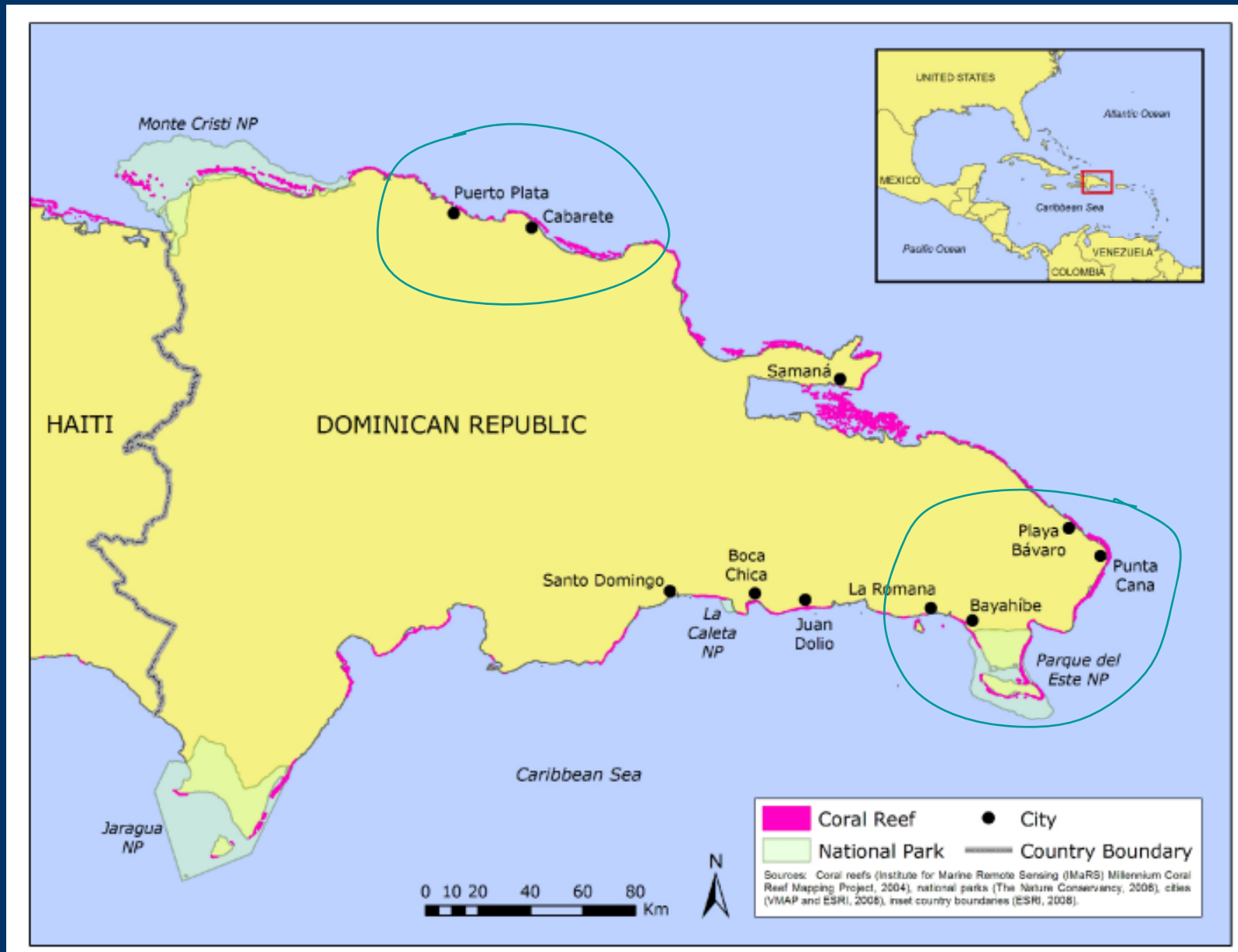
Interests in Jamaica

- 78% - Beaches
- 49% - “Other”

Coral Reefs – Protecting Beaches and Tourism

- Estimate beach loss due to coral degradation
- Estimate loss of hotel revenue due to reduced width of beach

Photo: WRI


Monte Cristi NP
Puerto Plata
Cabarete
Samaná
HAITI
DOMINICAN REPUBLIC
Playa Bávaro
Punta Cana
Boca Chica
Santo Domingo
La Romana
Bayahíbe
La Caleta NP
Juan Dolio
Parque del Este NP
Caribbean Sea
Jaragua NP
0 10 20 40 60 80
Km
N
Coral Reef
City
National Park
Country Boundary
Sources: Coral reefs (Institute for Marine Remote Sensing (IMaRS) Millennium Coral Reef Mapping Project, 2004), national parks (The Nature Conservancy, 2006), cities (VMAP and ESRI, 2005), inset country boundaries (ESRI, 2006).
UNITED STATES
Atlantic Ocean
MEXICO
Caribbean Sea
Pacific Ocean
VENEZUELA
COLOMBIA

Beach Erosion in the DR

- Average erosion 0.5 m / yr
- Erosion due to coral degradation, development, SLR
- In 2007, DR govt. spent US$18M on beach replenishment for Puerto Plata and Juan Dolio
- Coral degradation and loss will increase beach erosion by 65–100% in next 10 years

Beach Loss Results for DR

- Each m of beach width adds US$1.57 to average nightly (pp) room price
- If degradation and erosion continue at current rates, resorts will lose US$52M-100M over next 10 years.
- Based on beach erosion ~ 0.5 m / yr due to development, reef degradation and SLR

Photo: WRI

Jamaica – 3D modeling of beach erosion and shoreline protection

Hydrodynamic modeling (Mike 21)

Inputs:

- 3D bathymetry
- Wind speed
- Wave heights
- Wave angles
- Shoreline profile
- Coral reef depth
- Coral rugosity

Jamaica – 3D modeling of beach erosion and shoreline protection

Hydrodynamic modeling (Mike 21)

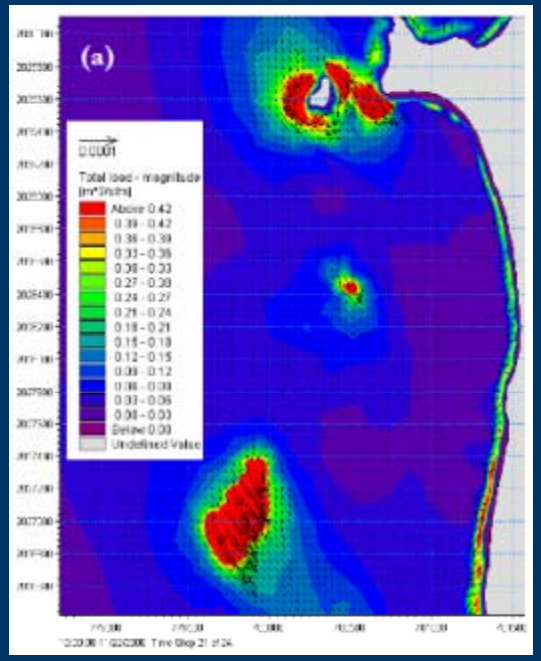


Image courtesy of Negril Coral Reef Preservation Society

Outputs:

- Change in beach erosion
- Shoreline retreat
- Change in wave “run-up” and inundated area during storms

Coral Reef Valuation Issues

Economic Impact:

- Many assumptions; estimates are subjective
- Uncertainty – ranges are appropriate
- Data availability

Shoreline issues:

- Difficult to isolate the role of the coral reef
- Rate of reef erosion and discount rate are highly influential

Economic Valuation Applications

- Highlight economic contribution to GDP
- Compare benefits of development / management options
- Encourage increased investment in coastal management / MPAs / fisheries management
- Guide setting of User Fees
- Input to PES
- Support damage assessment

THOUGHTS

- Enforce coastal development regulations
- Protect mangroves
- Internalize externalities , where possible
  - true cost of development
  - true cost of fertilizer and pesticide application

For More Information...

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Photo: WRI