

Coastal Capital – Economic Valuation of Coral Reefs in Tobago and St. Lucia

by Laretta Burke, Suzie Greenhalgh, Daniel Prager and Emily Cooper

Final Report - June, 2008



This project received generous financial support from the John D. and Catherine T. MacArthur Foundation, the United Nations Environment Program – Caribbean Environment Program, the Ocean Foundation, the Henry Foundation, the Curtis and Edith Munson Foundation, the Chino Cienega Foundation, the Netherlands Ministry of Foreign Affairs, SwedBio, the International Coral Reef Action Network and the Buccoo Reef Trust.

The project was led by the World Resources Institute, and was implemented in close collaboration with the Institute of Marine Affairs, the Buccoo Reef Trust, the Caribbean Natural Resources Institute, the University of the West Indies-Sustainable Economic Development Unit, the Tobago House of Assembly and the Government of St. Lucia.





Saint Lucia



The John D. and Catherine T. MacArthur Foundation



THE OCEAN FOUNDATION



The *Economic Valuation of Coral Reefs in the Caribbean* project was led by the World Resources Institute, and was implemented in close collaboration with:

Institute of Marine Affairs (IMA),

Buccoo Reef Trust (BRT),

Caribbean Natural Resources Institute (CANARI),

University of the West Indies-Sustainable Economic Development Unit (UWI-SEDU),

Tobago House of Assembly (THA) and the Government of St. Lucia.

This project received generous financial support from:

The John D. and Catherine T. MacArthur Foundation

The United Nations Environment Program – Caribbean Environment Program,

The Ocean Foundation,

The Henry Foundation,

The Curtis and Edith Munson Foundation,

The Chino Cienega Foundation,

The Netherlands Ministry of Foreign Affairs,

SwedBio, and

The International Coral Reef Action Network (ICRAN) through the Buccoo Reef Trust.

Executive Summary

The economic benefits derived from coral reefs are vital to the economies of small island states in the Caribbean. Economic valuation of these benefits helps to guide the wise, sustainable use of these resources.

Coral reefs provide many benefits, sometimes called ecosystem goods and services, which are of high value and critical importance to local and national economies in the Caribbean. These values are frequently overlooked or underappreciated in coastal investment, development and policy decisions, resulting in short-sighted decisions that do not maximize the long-term economic potential of coastal areas. This project focuses on development of a valuation methodology that will be broadly applicable in countries across the Caribbean, supporting wise, long-term coastal policy and management. This report provides a comprehensive summary of the valuation methodology as well as valuation results from implementation in two pilot sites in the Eastern Caribbean (St. Lucia and Tobago). Shorter, island-specific summaries of results, along with an Excel-based Valuation Tool for implementing the methodology are available from www.wri.org/project/valuation-caribbean-reefs.

Estimating the economic benefits of coral reefs to local economies is neither easy nor straightforward, due to the range of approaches available and frequent limitations of underlying data. Many valuation methods exist, and results are rarely comparable. A priority for this project has been the development of a simple, broadly applicable methodology to value coral reef goods and services, based predominantly on commonly available data. Use of a consistent approach should lead to more comparable estimates of value for different places and time periods. An easily replicable methodology can also be applied while varying key assumptions in order to assess the impacts of different development and management options. This methodology does not assess Total Economic Value (TEV), but rather focuses on three key goods and services: coral reef-associated tourism, fisheries, and shoreline protection services. These goods and services were chosen because of their importance to local economies and because data are available to support estimation of these values. The method was developed based on literature review, feedback from local partners and examination of coral reef use and data availability in two pilot locations (St. Lucia and Tobago).

The results from the economic valuation of coral reefs in St. Lucia and Tobago—sites with very different coastal management and data richness situations—are presented below. Even assessing only a subset of goods and services demonstrates that the benefits provided by coral reefs are economically significant, particularly with respect to island GDP. These estimates should be viewed as lower bound (partial) estimates of the economic contribution of coral reefs to the economy of these two islands.

The economic impact of coral reef-associated tourism and recreation and fisheries is evaluated using a financial analysis method—tracking the financial flows generated by these two industries, and their wider impact on the economy. Shoreline protection services are evaluated using a modified avoided damages approach, where the value of a reduction in wave-induced erosion and property damage due to coral reefs is estimated. The methodology, as well as the Valuation Tool, uses a tiered approach, allowing results to be calculated at different levels of detail depending upon the data available.

Results

Tourism and Recreation. Coral reef-associated tourism contributes significantly to the economies of both pilot sites. The valuation focuses on tourists visiting at least in part due to coral reefs—estimated at 40% of visitors to Tobago and 25% in St. Lucia. Direct economic impacts from visitor spending on accommodation, reef recreation, and miscellaneous expenditures in 2006 are estimated at US\$ 43.5

million for Tobago and US\$ 91.6 million for St. Lucia. This comprises 15% and 11% of GDP, respectively, in Tobago and St. Lucia. Additional indirect economic impacts, driven by the need for goods to support tourism (such as boats, towels and beverages) contribute another US\$ 58–86 million to the national economy in Trinidad and Tobago and US\$ 68–102 million in St. Lucia. The resulting combined direct and indirect impacts from coral reef associated tourism equal an estimated US\$ 101–130 million for Tobago and US\$ 160–194 million for St. Lucia in 2006.

The study also produced rough estimates of two values not currently captured within the economy. These include the annual value of local residents' use of the reefs and coralline beaches—estimated at US\$ 13–44 million in Tobago and US\$ 52–109 million in St. Lucia—as well as consumer surplus from reef recreation (i.e. the additional satisfaction derived by participants above what they paid for dive and snorkel trips). Consumer surplus was estimated at US\$ 2.3 million for St. Lucia and \$1 million for Tobago.

Fisheries. Coral reef-associated fisheries have a much smaller economic impact, but provide other important values including jobs, cultural value, and a social safety net. The annual direct economic impact of coral reef associated fisheries is estimated at US\$ 0.7 – 1.1 million for Tobago and US\$ 0.4 – 0.7 million for St. Lucia. Additional indirect impacts from the need for boats, fuel, nets, etc. is estimated at about US\$ 0.1 – 0.2 million for both islands, resulting in a total economic impact of about US\$ 0.8 – 1.1 million per year in Tobago and US\$ 0.5 – 0.8 million per year in St. Lucia.

Shoreline Protection. Coral reefs play a vital role protecting the shorelines of both St. Lucia and Tobago. This project developed an innovative method for evaluating the role of coral reefs in protecting the shoreline. Coral reefs contribute to the protection of over 40 percent of the shoreline of both islands (about 44 percent for St. Lucia and nearly 50 percent for Tobago). Although both islands have steep topography, extensive cliffed coastlines, and relatively little coastal lowland area, there is still significant land area that is vulnerable to wave-induced erosion and storm damage—about six percent of land in Tobago and four percent of land in St. Lucia. Of this vulnerable area, approximately 10 sq km is protected by coral reefs for both islands—about three percent of Tobago's total land area and 1.5 percent of land in St. Lucia.

In both islands, the relative share of protection provided by coral reefs varies greatly with coastal context—the elevation and slope of the shore, the geologic origin of the area (and resistance to erosion), and the wave energy along the coast. In all areas where corals are present, they are estimated to provide at least 20 percent of the shoreline stability. In some areas, this share is over 40 percent. The annual value of shoreline protection services provided by coral reefs (in potentially avoided damages) is estimated to be between US\$ 18 and 33 million for Tobago and US\$ 28 to 50 million for St. Lucia in 2007. The importance of coral reefs in protecting the shoreline will increase with rising sea level and increased storm intensity associated with warming seas.

Limitations

The valuation methodology focuses on valuing a subset of ecosystem goods and services related to coral reefs in the Caribbean. It is designed to provide consistent and replicable results, allowing comparisons over time and among areas. The methodology does not attempt to provide the total economic value of coral reefs. Some of the values that are not captured include poverty reduction and the nutritional benefits of subsistence fishing; social, spiritual, religious or inspirational values of coral reefs; pharmaceutical or bioprospecting values; existence values; and the value of coral and sand as building materials. Overall, the values from this valuation methodology should be considered a lower bound estimate of the “true” value of these reefs.

Some of the main challenges for implementing the valuation methodology are:

- a) Distinguishing reef-related visitors from non-reef-related visitors in support of determining which expenditures should be attributed to the presence of coral reefs;
- b) Estimating the use of coralline beaches and reefs for informal recreation and fishing by local residents;
- c) Estimating the catch of coral reef-associated fish species, as data are often limited or unreliable. In addition, the methodology focuses on current economic benefits, but does not take into account whether fishing is occurring at sustainable levels.
- d) Validating the shoreline protection model, as data on wave-induced storm damage are limited; and
- e) Evaluating visitor responses to marginal changes in reef quality, as data are rarely available. This is a potentially important factor for assessing future scenarios of reef use.

An additional limitation of the methodology is the focus on current financial value and economic impact, rather than on underlying economic value and future “potential value.” This is most important in evaluating tourism value, which emphasizes current expenditures by tourists, giving credit (value) only to areas where tourism is developed. This focus on financial analysis and economic impact consequently undervalues those coral reefs that may have significant non-use values but limited financial or economic impact.

Summary of Coral Reef Valuation Results

	Tobago	St Lucia
Island GDP (for reference)	US\$286 million (2006)	US\$825 million (2005)
Coral Reef-associated Tourism and Recreation	(\$US million)	(\$US million)
<i>Percent of visitors classified as visiting at least in part due to the coral reef</i>	40%	25%
Total Direct Impact	43.5	91.6
Indirect economic impact	58 – 86 ^a	68 – 102
Total Impact (Direct and Indirect)	\$101 – 130	\$160 – 194
<i>Other Values</i>		
Consumer Surplus	1.0	2.3
Local Use	13 – 44	52 – 109
Coral Reef-associated Fisheries		
Total Direct Impact	.7 – 1.1	.4 – .7
Indirect economic impact	.1 – .2	.1 – .2
Total Impact (Direct and Indirect)	US\$.8 – 1.3 million	US\$.5 – .8 million
Local Use Value	Estimate not reliable; probably small.	.2 – .8
Shoreline Protection by Coral Reefs		
Land Area (sq km)	300 km ²	610 km ²
Vulnerable Land Area (sq km)	6%	4%
Vulnerable Area Protected by reefs (sq km)	3%	1.50%
Potentially Avoided Damages (annual value - 2007)	US \$18 – 33 million	US \$28 – 50 million

^a Indirect economic impacts are a benefit to both Trinidad and Tobago.

Conclusions

The importance of coral reefs to local economies is frequently underappreciated by government officials, coastal developers, and the wider population. A clear presentation of the magnitude of these impacts (the economic values derived from coral reefs) can provide support for appropriate policy, investment, and development decisions. Decisions on land use, including the removal of mangroves and other wetlands, development along the coast, construction of roads, and management of agriculture can all have significant negative effects on coastal water quality and coral reef health. Managing the pressures from fisheries and tourism is also a delicate process with important consequences for reef condition.

In many areas, coastal and marine management policies and regulations exist to limit pressure on coastal ecosystems, including coral reefs. But these regulations are often not enforced—even in Marine Protected Areas—often due to a lack of resources for enforcement (staff, boats, fuel, etc.). At the heart of many of these management concerns is the problem of assessing trade-offs. Investing in better enforcement, capping tourist numbers, or limiting coastal development, for example, all have economic consequences for individuals and for the economy. However, longer-term revenue streams and societal benefits from the goods and services provided by healthier reefs are often not included in the equation. Adding these factors to the decision-making process is an important step toward better resource management.

This study includes a policy application focused on the Buccoo Reef Marine Park in southwest Tobago, which explores three management options for reducing pollutant discharge and one focused on reducing overfishing in and around the Bon Accord Lagoon. The study compares the long-term economic benefits of a healthy reef with the approximate costs of these interventions, finding that there is a strong economic argument for investment in improved water quality in the lagoon and more active management of the Buccoo Reef.

In St. Lucia, valuation results will be useful for guiding future development planning, including evaluating potential impacts on coral reef goods and services from proposed Marina developments along the central west and east coasts of the island, and resort developments elsewhere along the coast. Economic valuation can also be used to help weigh the benefits of investing in reef health through improved sewage treatment, enhanced management of Soufriere Marine Management Area (SMMA), and other management options.

On both islands, valuation results can help decision-makers to get a sense of the magnitude of some of the important services provided by the reef, and to do a better job of weighing these services against the benefits of alternative policy options. In all cases, additional considerations—including distributional effects (who will benefit) and the importance of cultural, bequest, and other values not counted here—need to be acknowledged in order to make well-informed decisions on coastal and marine management.