

Economic Valuation of Coastal Resources Workshop

Belize City

Thursday, June 7th, 2007

World Resources Institute and WWF

Overview

On June 7, The World Resources Institute (WRI) and WWF-Central America held a workshop on economic valuation of coastal resources in Belize. The workshop provided an opportunity for 50 participants from the government, tourism and fisheries sectors, NGOs, and research institutes to learn about and discuss methods for deriving the economic value of coastal ecosystem goods and services, and to explore policy-relevant applications of these techniques. The outputs of the workshop will help to guide the design and implementation of WRI's economic valuation project in Belize and to provide the basis for continuing partnerships with many of the organizations in attendance. There is strong demand in Belize for accurate estimates of the value of coral reef and mangrove resources. We had an excellent turnout and lively discussion over the course of a tightly packed day.

The goals of the workshop were to:

- Exchange ideas on the important goods and services associated with coral reefs and mangroves in Belize and raise awareness about the utility of economic valuation techniques and their associated estimates;
- Review and adapt a coral reef valuation methodology currently being applied in other parts of the Caribbean to the Belizean context;
- Review an approach for valuing the shoreline protection services provided by coral reefs, and discuss how this approach can be extended to include mangrove ecosystems;
- Identify key data sources required for the implementation of the valuation;
- Discuss the types of project outputs and products that would be useful for influencing investment in coastal ecosystems in Belize;
- Discuss the application of economic valuation as an input to guide the sustainable financing of MPAs and explore other policy-relevant applications of the valuation methodology.
- Discuss the threats to coastal ecosystems posed by climate change, and how these changes may affect the values and policy recommendations of this study.
- Strengthen existing and new partnerships for collaboration on the project.

This document contains a brief summary of the workshop proceedings, a discussion of key conclusions and plans, and a list of organizations that have expressed interest in collaborating on the project. Annex 1 contains the list of workshop attendees, and Annex 2 contains the workshop agenda.

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Project Context

This workshop is part of a project led by WRI on the economic valuation of coral reef goods and services in the Caribbean. The project began in 2005 with two pilot analyses in St. Lucia and Tobago, and has recently expanded with funding from the Oak Foundation to include an analysis of the coastal ecosystems of Belize. A major change for Belize will be the addition of mangrove goods and services to the study, as well as consideration of threats associated with climate change. The project was designed with the goal of developing a valuation methodology that can be broadly and cost-effectively applied across the Caribbean and is based largely on existing data compiled by government agencies and NGOs. In addition, the project strives to evaluate the economic value of coral reefs under future scenarios of resource degradation or improvement resulting from economic changes or policy interventions. In Belize, we hope the project will contribute to improving coastal resource management by providing new, reliable information to key decision makers on the current value of goods and services associated with coral reefs, on losses likely to result from degradation, and on the long-term benefits of investment in coastal management.

Workshop Summary

Session 1: Project Overview, Background and Context

Imani Fairweather-Morrison (Oak Foundation) welcomed everyone to the workshop and expressed both her support of the project and a measure of sadness that there is in fact such a clear need for economic valuation of Belize's marine resources. Lauretta Burke then presented a brief introduction to the background of the project and the preliminary plans of the WRI team for work in Belize. Melanie McField (Smithsonian Institution) provided a synopsis on the ecological status of Belize's reefs, including the sobering findings that live coral cover has not recovered from Hurricane Mitch and the mass bleaching event of 1998, and that Belize has begun to fish down Barracuda and Parrotfish, in a trajectory that resembles the decline of Jamaica's marine resources. Subsequently, Venetia Hargreaves-Allen (Imperial College) gave a presentation on the basic principles of economic valuation, followed by an open discussion facilitated by Valdemar Andrade (PACT) on the application of economic valuation in Belize.

Key points from **Discussion 1:** A number of participants stressed the importance of engaging different sectors and particularly the government in the implementation of this project, as well as the importance of a good communication strategy. Current policy issues that could be informed by economic valuation include the rapid pace of mangrove clearing, the lack of a consistent policy on vegetative buffers, and the need to assess damages caused by groundings on the reef. There is also interest in assessing values as part of the Protected Areas System Plan.

Session 2: Economic Valuation Methodology Review

Lauretta Burke and Daniel Prager (WRI) presented WRI's current economic valuation methodology and its application in two pilot sites in the Eastern Caribbean. Daniel also introduced an Excel-based economic valuation tool that the team hopes to put into practice with

partners in Belize. The presentation included discussion of the three main services valued in the methodology - shoreline protection, tourism, and fisheries - and their application in the Belizean context. The methodology and Tool will be adapted for Belize, through modification and expansions, such as the inclusion of mangroves. Edilberto Romero (Program for Belize) then facilitated a follow-up discussion on reactions and comments on the methodology.

Key points from **Discussion 2:** Participants discussed a number of points relating to the application of the methodology in Belize, including: concern about whether the methodology can capture marginal changes in reef quality, and how to accurately assess user responses to these changes; how to count the value of fish from Belizean waters being landed in neighboring countries; and distinctions between shoreline protection services offered by reefs (which protect against wave action but not storm surge) and mangroves (which protect against both). The issue of high levels of foreign ownership of coastal property was also raised, including questions around what this should mean for calculating leakages, and how it might influence development of the coast. Participants also suggested several key values to capture in the Belize valuation, including: sport fishing, charismatic and endemic species, research value, and local use. Finally, some general concerns about economic valuation were raised - will it be of any use unless accompanied by good governance? What about ecosystem values not directly associated with human use?

Session 3: Lunchtime Breakout Sessions

Four breakout sessions were held during lunch: Tourism, Fisheries, Shoreline Protection, and Climate change. Key points raised in each:

Tourism:

The tourism group held a lively discussion about the different costs and benefits to the economy and environment of different types of tourism, and had helpful recommendations for changes to the methodology for the Belizean context (for instance, finding ways to account for package tours), as well as ideas for data sources. There was concern among the group over the considerable influence of the cruise industry, and the recommendation was made to improve engagement with the tourism industry as a whole – it would be good to get tour operators, BTIA, BTB, and policy-makers involved in the study and aware of the economic value of the reefs.

Fisheries:

The fisheries group identified a number of key additions to the methodology, including additional fish species, types of sport fishing, and aspects of the geography, processing, and sale of fish catches in Belize. The group was very helpful in identifying potential stumbling blocks as well as key sources for the data collection phase of the project. Important notes included the estimate that only 10-15% of scale fish are sold to the co-ops, and that a number of landing sites are in neighboring countries. The group identified a number of recent and pending changes to legislation, and felt that major areas for improvement include the fine for mangrove clearing (too small and unevenly enforced) and the lack of follow-up EIAs after projects are completed. The group was supportive of the idea of doing a local use survey to get at subsistence, pleasure, and local sales – felt the results would be useful but the process could be tricky.

Shoreline Protection:

The shoreline protection group identified some key suggestions for the methodology, including the need to take beach slope and reef depth/bathymetry into account, and to account for differences in shoreline protection services offered by reefs and mangroves. The group also discussed the growing problem of erosion along Belize's coastline, and identified a number of useful sources for data on mangrove cover. The addition of mangroves to the methodology was discussed more generally, including a helpful discussion of additional goods and services to take into account.

Climate Change:

The climate change group had a broad ranging discussion on the potential impacts of climate change on coral reefs. The group identified some key areas of concern, including: increasing intensity of storm events and runoff, temperature rise and sea level rise (with additional implications for aquifers), the transferring of dust and pathogens by increased wind activity, increasing UV penetration, and changes in the patterns of currents, with further impacts on species migration. The group identified potential collaborators and discussed some of the current challenges to climate change adaptation for Belize, including weak enforcement of regulations and a trend towards building further out to sea (reclaiming the seabed), despite the near and long-term consequences.

Session 4: Support for Sustainable Financing of MPAs

In the afternoon, Nadia Bood (WWF) presented her ongoing data compilation on the marine protected areas (MPAs) of Belize, noting the considerable range in usage, fees, and level of management among them. She also included a request for further information and collaboration with MPA managers. Carlos Morales (WWF) moved the discussion towards the issue of sustainable financing with a demonstration of the MAR Financial Tool. The tool enables MPA managers or other policy-makers to calculate itemized costs and potential/existing revenue sources for running a MPA. We then moved into a general discussion on MPA financing, facilitated by Marnix Perez (PACT).

Key points from **Discussion 4:** There was a lively discussion on sustainable financing of MPAs, with participants highlighting some of the flaws of the current system, and the challenges of improving it. A number of participants felt that current management practices lack transparency, and the system would benefit from the governance of an independent Protected Areas Board. There was general agreement that MPAs—particularly less visited areas—will not be able to sustain themselves from fee collection alone, and that longer term sources of funding need to be secured. Questions of how funds should be allocated and how financing and management effectiveness should be evaluated need to be settled as well. There was a general sense that economic valuation can lend clarity to some of these debates, as well as lend weight to arguments that these areas are worth investing in, as they provide valuable services to the economy and country as a whole.

Session 5: Threat Scenarios – Integrating Climate Change

Lauretta introduced the concept of using threat and policy scenarios as part of evaluating the costs and benefits of future actions. A key aspect of future threat stems from climate change. As the final speaker of the day, Dennis Gonguez (Belize Hydromet) did an admirable job of presenting on the current state of knowledge concerning the threats posed by climate change and what they could mean for the coastal resources of Belize. Carlos Fuller (CCCCC) did an equally admirable job facilitating the fourth and final discussion on the ambitious topic of climate change and economic valuation.

Key points from Discussion 5:

The discussion covered some of the areas for potential economic losses, including the costs of mitigation measures for flooding and siltation, damage to coral reefs from the factors discussed above, and the possibility that fish species such as yellow-fin tuna may move north due to changing temperatures and changing currents. There was also some discussion of improving overall awareness of climate change; current practices, including clearing buffer zones and reclaiming sea, could have dire consequences for coastal communities down the line. Better communication, policies, and enforcement, as well as continuing research on impacts, will all be needed for Belize to adapt to future threats. Economic valuation could be useful for informing these efforts, as well as providing numbers to put on potential losses at international climate conferences.

Key Conclusions and Plans

The workshop provided an opportunity to share project idea and plans, to gain feedback and vital input, and to build a partnership for project implementation. Some key conclusions include:

1) Communication of project and results.

Many workshop participants emphasized the importance of a communication strategy and the development of appropriate and targeted materials. WRI's first step has been to engage local partners, workshop participants, and other local stakeholders, both to improve the quality and usefulness of the results, and to begin a process of raising awareness about the project.

External review of the methodology and of preliminary results will be an important part of this process as well. All project documents will be posted on the project webpage at http://www.wri.org/biodiv/project_description2.cfm?pid=222, and periodic newsletters with project updates will be sent to all interested parties. We have also engaged a communications specialist to work with partners to identify the many components of our target audience, to develop an effective communication strategy, and to help to package information and results from the project in concise, accessible formats.

2) Economic Valuation Methodology

Several enhancements to the current methodology are planned and others will be explored based on recommendations from the workshop:

- We plan to expand the methodology to include mangroves. Goods and services to be explored include fisheries / nursery benefits; tourism; shoreline protection services; carbon sequestration; charcoal production; and water filtration / nutrient and sediment absorption.
- Sport fishing will be included.
- Cruise tourism has both significant costs and benefits for the local and national economy. The net benefits of cruise tourism will be examined and included in the methodology if appropriate.
- Local use and other non-market values are important components of the value of coral reefs and mangroves. We will explore means of including these non-market values, either through a local use survey or through contingent valuation surveys executed by a project partner.
- Coastal ecosystems in Belize have been the focus of considerable research by both national and international scientists. We will explore ways to incorporate the "research value" of coral reefs and mangroves in Belize.
- Leakages - The extent of foreign ownership of hotels and of coastal property in Belize is a topic high on the national consciousness. If possible, the project will attempt to identify the extent of these leakages. Also, as some fish caught in Belize are landed in other countries, the methodology may need to be adapted to allow consideration of these transnational benefits.

3) MPAs and Sustainable Financing

The debate on financing of Belize's MPA system will benefit from more up-to-date and comprehensive information on MPA management costs and potential revenue streams. Nadia

Bood (WWF) is compiling information on each MPA system, and the current data was shared at the workshop. Review, feedback, and provision of additional information by workshop participants will advance this effort. We plan to work with WWF and the MAR Fund to use this information to update estimates of financial needs of individual MPAs, the financial need of the overall system, and the potential revenue that can be generated through user fees. This will help to identify the financial gap within the MPA system. The economic valuation will help point to the value of these areas to the overall economy, and will help identify potential beneficiaries / sources of financial support.

4) Threat Scenarios and Climate

Threat and policy scenarios are an essential component of identifying the net benefits of a planned development or management intervention. For example, how might coastal development (the removal of mangrove and construction) affect the value of goods and services along that coast? How would additional investment in enforcement of fisheries regulations affect the values? How will scuba divers react to changes in reef condition? We plan to both use the available literature and work closely with partners to develop realistic scenarios of:

- the physical impact of different development and management options (to gauge the effect on coral reef and mangrove health);
- the secondary effect (implications for shoreline protection services and fisheries productivity); and
- the socioeconomic response to changes in coastal ecosystem health (such as diver response).

As we work through these relationships and scenarios, we must acknowledge the overarching threat of climate change and its associated impacts. Even without any future development or changes in coastal management, the goods and services provided by coral reefs will undoubtedly change. Sea surface temperature increases will damage coral through increased coral bleaching and coral disease, as well as through more intense storms. Sea level rise might outpace accretion in damaged coral, inundate mangroves unable to retreat landward, and increase the risk from storm surges. Increased CO₂ in the atmosphere might enhance mangrove growth, while increased CO₂ in the ocean will reduce the ability of corals to build their limestone skeletons, which will slow reef-building. These complex climate-related threats will be evaluated in partnership with several partners in Belize working on climate change, including CCCCC, Belize Hydromet, and WWF.

5) Implementing the Valuation

We plan to work with partners to implement a national-level valuation of fisheries, tourism, and shoreline protection services, as well as on valuations of individual atolls and MPAs. Partners will also be critical to identifying policy applications of the valuation project. The section on collaborations describes these plans.

Collaborations

As was emphasized at the workshop, collaboration with Belizean partners is a key part of this project. We expect that project partners will take a lead role in several areas, including data collection, evaluation of issues in MPA management, and implementation of site-specific valuations. The following reflects our (best) current understanding of partner commitments to date. Please advise us of any inaccuracies or omissions. We welcome any additional partners who wish to collaborate on the project.

Main

- o **World Wildlife Fund (WWF)** - Nadia Bood of WWF is our primary in-country presence, spearheading data collection for the project, organizing workshops, and facilitating communication with other partners. WWF also plays a critical role examining threats associated with climate change and coral bleaching; evaluating MPA status and financial needs; and will collaborate on the economic valuation of the Turneffe Atoll.

National-level Valuation

- o **Dept of Fisheries** – The Fisheries Dept. has provided some data on Belize fisheries and MPA visitation. We hope to provide training in the economic valuation Tool to Fisheries Dept. staff, and work together on valuation of coral reef and mangrove-associated fisheries in Belize. The MPA coordinator at Fisheries has also offered to provide information on the implementation of and revenue generation associated with MPA management in Belize.
- o **Dept of Forestry** – Collaboration with the Forestry Dept. would focus on mangroves and a GIS-based analysis of mangrove loss over time. The Dept. hopes to be able to provide spatial data on mangrove extent for several time periods.
- o **Tourism** – We are seeking one or more partners on tourism with national scope. The Belize Tourism Board (BTB) has provided tourism data and shown interest in the project. We will approach and seek further engagement from BTB, the Ministry of Tourism, BTIA, and the Belize Hotel Association.

MPAs

- o **Association of Protected Areas Management Organizations (APAMO)** – APAMO will be a valuable source of guidance on MPA administration, as well as providing a network for communication with all MPA managers in Belize. This network will be an important source of input on the project design and implementation, as well as a target audience for dissemination of the results.
- o **MAR Fund** – The MAR Fund, in close collaboration with WWF, has developed a tool for evaluating the financial needs of individual marine protected areas (MPAs). We expect to work closely with WWF and the MAR Fund to revise estimates of the financial needs of the MPAs within the Belize MPA system.

- o **Protected Areas Conservation Trust (PACT) and National Protected Areas System Plan (NPASP)** – PACT is very supportive of the project and wishes to work closely as this project supports a key requirement of the NPASP – economic valuation of protected areas. PACT will provide information on MPAs in Belize and will review intermediate outputs of the project.

Climate

- o **Belize Hydromet** – Hydromet is a key partner providing expertise on scenarios of climate change for Belize, including estimates of changes in storm surges.
- o **The Caribbean Community Climate Change Center (CCCCC)** – CCCCC has provided guidance on climate modeling and adaptation projects and has offered to review the modeling framework for evaluation of the shoreline protection services provided by coral reefs and mangroves.

Place-Based Valuations

- o **Belize Audubon Society (BAS)** – BAS staff are interested in collaborating on an economic valuation of the Blue Hole and Half Moon Caye MPAs on Lighthouse Atoll.
- o **Friends of Nature (FoN), TASTE** – FoN and TASTE have offered to provide information on their reserves and will review our summary on MPAs.
- o **Galen University** - The Economics Department of Galen University would like to explore non-market values associated with coral reefs and compare this approach to the results from application of this project's methodology. They will also be an important source of feedback on the methodology and valuation tool.
- o **Hol Chan Marine Reserve** – Staff from Hol Chan have already provided data on activities and finances at the reserve, and have been supportive of the project. We hope to collaborate on a valuation of the marine reserve.
- o **Imperial College London** – We will be collaborating with PhD student Venetia Hargreaves-Allen on several aspects of the project. Venetia is sharing data from a complementary, in-depth analysis of economic values at Gladden Spit, a FoN reserve. She is also providing valuable input on the methodology and its implementation in Belize.
- o **The Nature Conservancy (TNC)** – Staff from TNC offices in Belize, Guatemala, California, and Washington DC have expressed an interest in collaborating on this project. Opportunities for collaboration include economic valuation of Lighthouse Atoll (with BAS) and cooperation on GIS analysis for Belize, with emphasis on mangroves and shoreline protection services.
- o **University of Belize (UB)** – Faculty at UB are interested in collaborating on a valuation of the Turneffe Atoll (and its associated MPAs); UB has also expressed interest in training in economic valuation, and collaboration on the shoreline protection component of the project.

- o **World Conservation Society (WCS)** – Staff from WCS would like to collaborate on an economic valuation of Glover’s Reef Atoll.

Other Partners

- o **Coastal Zone Management Authority and Institute (CZMAI)** – Staff at CZMAI have expressed their support of the project and wish to be kept informed of project work plan; they are especially interested in the shoreline protection component.
- o **Dept of Environment (DOE)** – DOE is interested in receiving training in the economic valuation methodology and Tool, and applying them in damage assessments.
- o **National Emergency Management Organization (NEMO)** – We believe that NEMO staff are interested in collaborating in the project, can provide information on damage assessments done after storm events, and are interested in reviewing the shoreline protection valuation methodology.
- o **Program for Belize** – PFB’s activities are mostly terrestrial, though some of their projects include a coastal component. They have been supportive of the project, and have expressed interest in receiving training in the Valuation Tool.

We appreciate all of the valuable input provided by workshop participants, and the strong interest expressed in the project. We encourage your feedback on project plans, and welcome additional organizations interested in collaborating on the project.

Annex 1: Attendance List

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Annex 2 – Workshop Program

Program Agenda Economic Valuation of Coastal Ecosystems in Belize Belize City Thursday, June 7th, 2007

Morning

- 8:30 Welcome – Imani Fairweather-Morrison, Oak Foundation / Valdemar Andrade, PACT
- 8:45 Overview of Workshop Program and Goals – Laretta Burke, WRI (10 min)
- 8:55 Introductions of all participants (20 min)
- 9:15 Project Background - Laretta Burke (20 min)
- o Brief Introduction to Economic Valuation – Ecosystem goods and services
 - o Project History - Reefs at Risk - Values can change as resource base diminishes
 - o What is unique about our project and approach?
 - o Description of pilot applications in East Caribbean
 - o Preliminary Project Plans in Belize
- 9:35 Status of Coral Reefs in Belize – Melanie McField, Smithsonian Institution (10 - 15 min)
- 9:50 Economic Valuation Principles - Venetia Hargreaves-Allen, Imperial College (15-20 min)
- o Valuation principles and methods
 - o How managers can use economic valuation
 - o Current applications
- 10:10 Discussion on Application of Economic Valuation in Belize (Facilitator: Valdemar Andrade, PACT)
- o What are the important things to capture in coastal valuation in Belize?
 - o What policy applications would you like to see?
 - o What methods or products should be used to communicate results?
 - o Who needs to see the results and how can we insure this?
 - o What are the big coastal zone issues in Belize that might be addressed through valuation?
- 10:40 Tea Break
- 11:00 Development and application of an economic valuation methodology in two pilot countries in the Eastern Caribbean - Daniel Prager and Laretta Burke, WRI
- o Focus on three goods and services
 - o Tourism Method and Results
 - o Fisheries Method and Results
 - o The Excel-based Coral Reef Valuation Tool
 - o Shoreline Protection Method and Results

- o Incorporating Mangrove Ecosystems

- 12:00 Discussion on reaction to methodology (Facilitator: Edilberto Romero, PFB)
- o Reaction and comments on the proposed method
 - o Any important goods or services missing?
 - o What goods and services associated with mangroves should be included in the valuation?

12:30 LUNCH (1 hr) – Lunch will be four breakout groups in the four corners of the same room.

- a) Fisheries
- b) Tourism
- c) Shoreline
- d) Climate change

Breakout questions for Fisheries, Tourism, and Shoreline Protection

- o Does the methodology as presented adequately capture the value of Fisheries/Tourism/Shoreline Protection in Belize?
- o If not, what other associated services should be assessed?
- o How have these ecosystem services changed over the last decade? Are these services expected to improve or degrade?
- o Are there expected changes in the laws or regulations governing these ecosystem services?
- o What are important data sources for valuing these ecosystem services?

Breakout questions for Climate Change

- o How will climate change affect the goods and services provided by coral reef and mangrove ecosystems in Belize?
- o What groups within Belize are currently working on reef related climate change issues? What role could they play in project implementation?
- o Do existing national or international laws ensure that the coral reefs are adequately protected from threats to climate change? What new legislation is needed?

Afternoon

- 1:30 Brief reports back from the 4 groups – (30 min)
- 2:00 MPAs and Sustainable Financing (30 min)
- o Review of MPA data matrix (Nadia Bood, WWF)
 - o Methods for Determining Operating Costs (Carlos Morales, WWF)
- 2:30 Discussion session (Facilitator: Marnix Perez, PACT)
- o How can valuation estimates support the sustainable financing of the MPA system?
 - o What method of presentation of valuation estimates will be most useful / persuasive?
 - o How do you determine the best allocation of resources for MPAs?

- o To achieve sustainable financing of MPAs, what else is needed other than a source of funds?
- 3:15 Break
- 3:30 Innovations / New Analysis components – Lauretta Burke, WRI and Dennis Gonguez, Belize Department of Hydrometeorology
 - o Threat mapping for coral reefs and mangroves – Lauretta (10 min)
 - Past analyses – Reefs at Risk and Belize Threat Atlas
 - Moving from threat to ecosystem impacts to loss of goods and services and economic impacts
 - o Climate Change Scenarios for Belize – Dennis Gonguez, Hydromet (15 min)
 - What climate scenarios and impact scenarios are available for Belize? Warming; changes in precipitation;
 - Anticipated impacts to coral reefs and other coastal habitats in Belize;
- 4:00 Discussion – Linking Climate Change with Economic Valuation - Carlos Fuller, CCCCC
 - o Which aspects of climate change are most likely to impact the goods and services provided by coral reefs and mangroves?
 - o How can these impacts best be included in the threat scenarios and in the economic valuation?
 - o Do coral reefs and mangroves provide protection against threats from climate change such as storm surges and hurricanes?
- 4:45 Final Discussion on desired outputs, products and policy applications – Daniel Prager and Lauretta Burke, WRI
 - o Final comments on project design and implementation
 - o Commitments by partners on collaboration on components of valuation
 - o Next steps
- 5:00 Close