The Economic Value of Expanding Marine Protected Areas in the Cayman Islands

El Valor Económico de la Expansión de las Áreas Marinas Protegidas de las Islas Caimán

La Valeur Économique de L'Expansion des Aires Marines Protégées dans les Îles Caïmans

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EXTENDED ABSTRACT

The Challenge

Healthy marine ecosystems, such as corals reefs and mangrove forests, are critical to the economy and well-being on the Cayman Islands. In the last decades, local and global developments have resulted in serious threats to these fragile ecosystems, thereby jeopardizing the foundations of the local economy. To protect the marine environment from these looming threats, the Department of Environment of the Cayman Islands Government (DoE) has developed a proposal to expand its marine protected areas (MPAs). To support well-founded decision-making around the proposed plans, it is crucial to understand how the marine environment contributes to the economy and human wellbeing. Therefore, this study aims to assess the economic value and the societal importance of the main ecosystem services provided by natural capital of Grand Cayman, Cayman Brac, and Little Cayman. By estimating the potential changes in ecosystem service values over time, the socioeconomic effects of the proposed MPA expansion are assessed. This will support the development of long-term policy that ensures sustainable economic development on the Cayman Islands.

Tools

From the outset of the study, stakeholders participated by facilitating the data collection process and simultaneously creating support for the concept of ecosystem services. The study addresses the most relevant marine ecosystems and ecosystem services in the Cayman Islands and applies a wide range of economic valuation tools to estimate the value of these. A wide range of existing economic data has been used to assess the importance of natural capital for the public and private sectors. Furthermore, by surveying over 800 people, including tourists and residents of the Cayman Islands, the study estimates the willingness to pay (WTP) by individuals to conserve ecosystem services provided by the marine environment. Based on the valuation results, the change in ecosystem services is modeled in a scenario analysis to assess the costs and benefits of the proposed MPA expansion.

Value of Ecosystem Services Provided by the Marine Environment

To assess the importance of the marine ecosystems for wellbeing on the Cayman Islands, the economic value of the key ecosystem services is estimated. Together, the ecosystem services identified provide an annual total economic value (TEV) of **US$195 million.**

Tourism — The ecosystem services that support the tourism industry contribute most to the TEV. Although tourism arrivals vary over time, approximately 380,000 stay over tourists and 1,600,000 cruise tourists visit the Cayman Islands each year. Many of these tourists choose the islands as their holiday destination because of the beautiful marine environment (i.e. beaches, coral reefs and mangroves). In this study it shows, that the total value of the marine environment as production factor in the tourism industry has an estimated financial value of US$69 million. This implies that almost 40% of the added value created in the tourism industry on the Cayman Islands can be attributed to the marine environment. In addition to this, the results indicate that tourists have an aggregate annual WTP for conservation of the marine environment of US$94 million. The high WTP of visitors for nature conservation suggests that a user fee system could be implemented without having an effect on the number of tourists visiting the islands. Together, the financial value and the WTP add up to a total economic tourism value of US$163 million per year.

Local residents — Many residents on the Cayman Islands engage in recreational activities, such as swimming, going to the beach, and diving. Furthermore, a pristine natural environment is important for the cultural identity of the inhabitants. To quantify the value of the marine environment to the residents of the Cayman Islands, the WTP for an expansion of the MPAs is estimated trough a household survey. Per year, local households would be willing to contribute a total of US$5.6 million for an increase in protected areas and conserve the ecosystem services provided by the marine environment. The

results of the household survey conducted in the light of this study in 2014, indicate that the expansion plans are supported by 58% of the population on Grand Cayman, 63% of the population on Cayman Brac and 85% of the population on Little Cayman.

Ecosystems as amenity to houses — Marine ecosystems also can be an important amenity to properties on the Cayman Islands. A hedonic pricing analysis was conducted to assess this importance. Based on a large database with real estate transactions provided by CIREBA, it is estimated that the vicinity to mangrove areas, beaches, and waterfronts are all positively correlated to property prices (after controlling for other explanatory variables). This indicates marine ecosystems contribute to higher property values in the Cayman Islands.

Fisheries — The Cayman Islands are home to a small artisanal fishing industry. People on the Cayman Islands fish for the recreation, subsistence and commercial purposes, and a single fisherman can be motivated by a combination of these reasons. Because the study focusses on the coastal marine ecosystems of the Cayman Islands, only the catch of reef-related species is accounted for in the economic valuation of fisheries. It is estimated that the total reef-related catch is worth roughly US$2.3 million per year.

Production of cosmetic products — Coral reefs are studied all over the world for their application to pharmaceutical products. On the Cayman Islands, a cosmetic company discovered that the coral species Caribbean Sea Whip (*Plexaura homomalla*) could be used to produce black-sea red oil (BSRO), which is subsequently used to produce a cosmetic eyelash maintaining serum. The company reached an understanding with the Department of Environment to harvest a sustainable amount of coral in exchange for royalties. In addition, the value of this natural resource has a value as a production factor for the cosmetic products. The total economic value is estimated at US$1.6 - 13.6 million per year.

Regulating services — The marine environment also provides important regulating ecosystem services. On a local scale, coral reefs protect the shorelines of the Cayman Islands against storms and hurricanes. This prevents erosion, flooding and thereby destruction of properties and infrastructure. If these reefs would severely degrade, the protective capacity would be lost. The damage that is avoided if the quality of coral reefs is maintained, amounts to 16 million US$ per year. On a global scale, the carbon sequestered by mangrove forests, sea grass beds and peat habitats contribute to climate regulation. Especially, the large mangrove and seagrass areas on Grand Cayman function as carbon sinks. In total, these ecosystems are expected to sequester around 15,000 mega gram (MG; equal to metric ton) per year. Based on the global market prices in carbon trading schemes, this ecosystem service can be valued at 290,000 US$ per year.

Economic Effects of Expanding Marine Protected Areas (MPAs)

If current environmental degradation continues, the value of these ecosystem services will decrease. To prevent further degradation of, and conserve the benefits provided by the marine environment, the DoE proposes to expand the coverage of the Marine Protected Areas (MPAs) in the Cayman Islands. The changes would with imply an overall increase of 15% in protected area. Furthermore, by restructuring the different user zones within the MPAs, the total area classified as "marine reserve" would increase substantially. To analyze the socioeconomic effects of these plans, the future development of the ecosystem service values obtained in this study is compared in two policy scenarios:

i) Maintaining the current network of MPAs, and
ii) Expanding and restructuring the MPAs according to the plans proposed by the DoE.

Without considering any factors that were not included in the study, analysis of the effects on ecosystem services over 25 years indicates that expanding the MPAs leads to the highest economic value (scenario 1 < scenario 2). In the last year of the analysis, total net benefits are likely to be 7% higher in the scenario with the MPA expansion (154 million US$ in scenario 2, compared to 144 million US$ in scenario 1 in year 25 of the analysis). The stakeholders that benefit most from improved ecosystem services in scenario 2 (MPA expansion) are those involved in the tourism industry and local households. Also, fisheries and coastal protection are expected to benefit. Most importantly, none of the ecosystem services analysed in the study are expected to decrease in the scenario with the MPA expansion. A sensitivity analysis indicates that even if MPA management proves to be ineffective in reversing the current rates of environmental degradation, the MPA expansion is unlikely to lead to a loss in wellbeing on the Cayman Islands (based on the ecosystem services analysed in this study). In other words, the society as a whole can only gain in overall economic benefits if the MPA expansion are implemented. In addition, the DoE has stated that minimal funds are required to realize the expansion plans. Given this information, it can be concluded that the MPA expansion is a low-cost and low-risk investment with the opportunity to improve overall wellbeing on the Cayman Islands substantially.

KEYWORDS: MPA Management, ecosystem Services, cost-benefit analysis, wellbeing, stakeholder assesment

For more information regarding the study, please contact Wolfs Company: info@wolfscompany.com