



INTERNATIONAL
SUSTAINABILITY UNIT



The Coral Reef Economy

**The business case for investment in the protection, preservation
and enhancement of coral reef health**

CREDITS

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SUGGESTED CITATION

UN Environment, ISU, ICRI and Trucost 2018. The Coral Reef Economy: The business case for investment in the protection, preservation and enhancement of coral reef health. 36pp

ACKNOWLEDGEMENTS

Invaluable support and in-kind contributions were provided by: Anders Nordheim, UN Environment Finance Initiative; Lida Pet-Soed, PT Hatfield Indonesia; Melanie McField, Healthy Reefs for Healthy People; Melanie Siggs, Global Aquaculture Alliance; Peter Mumby, University of Queensland; Mark Spalding, The Nature Conservancy; Rili Djohani, Coral Triangle Center; and Steve Box, Rare.

This work would not have been possible without the support of and commitment from HRH The Prince of Wales to improve the health of coral reefs globally.

The significant contribution of advice and data by The Nature Conservancy from the Mapping Ocean Wealth project is gratefully acknowledged.

This study was supported by the United States Department of State through its contribution to UN Environment's work on coral reefs. Copy editing and layout was supported by Sweden.

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October 2018



INTERNATIONAL SUSTAINABILITY UNIT

The Prince of Wales' International Sustainability Unit

Established in 2007 by HRH The Prince of Wales, the International Sustainability Unit (ISU), which closed in March 2018, addressed critical challenges facing the world, particularly the question of how to sustain the health of the environment while advancing development goals. The ISU commissioned this report in order to reveal and demonstrate how economic growth and ocean conservation need not be in conflict, and how sustainable development depends upon a healthy marine environment, especially for those countries that were dependent upon ocean ecosystems. www.princeofwalescharitablefoundation.org.uk/about-us/subsidiaries-and-programmes/international-sustainability-unit



United Nations Environment Programme

The United Nations Environment Programme (UN Environment) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment. www.unenvironment.org



International Coral Reef Initiative

The International Coral Reef Initiative (ICRI) is an informal partnership between nations and organizations which strives to preserve coral reefs and related ecosystems around the world. ICRI has declared 2018 the third international year of the reef. www.iyor2018.org
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Funded with the support of the government of Sweden

Contents

EXECUTIVE SUMMARY	5
KEY FINDINGS	6
INTRODUCTION	7
ABOUT THIS REPORT	7
CASE STUDY REGIONS	8
SECTOR DEFINITIONS	8
INTERVENTION DEFINITIONS	9
ECONOMIC VALUE OF CORAL REEFS TODAY	10
SCENARIO ANALYSIS: ECONOMIC VALUE OF HEALTHY AND DEGRADED REEFS	11
INTERVENTION ANALYSIS RESULTS	15
INTERVENTION NET-BENEFITS	15
EXPANSION OF NO-TAKE MARINE PROTECTED AREAS	17
CONSTRUCTED WETLANDS FOR ENHANCED WASTEWATER MANAGEMENT	18
AFFORESTATION TO REDUCE EROSION	19
VEGETATIVE FILTER STRIPS TO REDUCE EROSION ON CROPLAND	20
TOWARD A HEALTHY REEF SCENARIO	21
KEY CONCLUSIONS	22
TAKING ACTION	24
ANNEX 1: KEY LIMITATIONS	25
ANNEX 2: METHODOLOGY AND DATA SOURCES	26
KEY SECTORS	26
INTERVENTION METHODOLOGIES	29
REFERENCES	33



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Executive summary

Proactive policies to protect and restore the health of the world's coral reefs could generate a substantial economic gain, provide important societal benefits, including to local communities, and help deliver the UN Sustainable Development Goals.

This study presents new analysis of the value, costs and benefits of the coral reef economy to highlight that shifting the trajectory of coral reef health from one of continuing decline towards a healthy state could unlock tens of billions of dollars in additional value. The findings show that this shift can be largely achieved through strategic interventions using available tools and methods, indicating that the goal of closing the gap between the forecast benefits of a healthy reef and the current trend towards coral reef degradation is within our reach.

A quantitative model of selected interactions between live coral cover and the economic returns generated by three sectors that benefit directly from coral reefs – tourism, coastal development and commercial fisheries – was applied to two case study regions: the Coral Triangle in South East Asia and the Mesoamerican Reef in the Caribbean. The analysis found that a healthy coral reef scenario is expected to deliver additional economic benefits amounting to \$34.6 billion and \$36.7 billion in the Mesoamerica Reef and the Coral Triangle, respectively, between 2017 and 2030.

While much of the added financial value would be captured by the private sector, these gains could also create opportunities for governments to develop policies that redistribute part of this wealth to those adversely affected by changes in reef management, such as local fishing businesses. In addition, the societal co-benefits of ecosystem restoration to promote healthy reefs could potentially exceed the private gains, for example through improvements to municipal sanitation, more sustainable local fisheries, reduced soil erosion, and enhanced cultural heritage values.

Today the management of coral reef ecosystems is primarily funded by the public sector, but this is proving insufficient even to maintain reef health, let alone meet internationally adopted targets. The need for new sources of financing is now widely recognised, including in UN Environment Assembly resolution 2/12 adopted in 2016.

There is a strong business case to be made for both the private and public sectors to invest more in the protection, preservation

and enhancement of coral reef health. By quantifying the value of a healthy coral reef across three key sectors and highlighting the incentives for the private sector to finance interventions that improve coral reef health, this study is intended to support and inform active engagement and increased investment by governments and businesses alike.

Modelling a healthy coral reef future

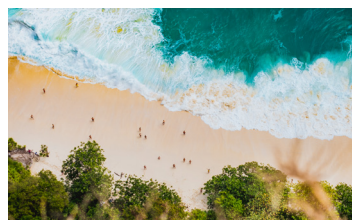
The magnitude of change that could be achieved by enhancing coral reef health is due to the exceptional value of the ecosystem services they provide. Reefs are a key source of food, livelihoods and economic opportunity to people in more than 100 countries and protect shorelines around the world from erosion. They host a quarter of all known marine species and attract national and international tourists alike.

This study is centred around two components: a scenario analysis and an intervention analysis. The scenario analysis estimated the economic returns attributable to the coral reefs in the two regions today, and modelled expected changes under a healthy reef scenario compared to a degraded (i.e. business-as-usual) scenario. The intervention analysis modelled a range of policies that could be adopted to achieve healthy reef status and estimated the expected economic net-benefits and returns on investment.

The four strategic interventions studied are: no-take marine protected areas; constructed wetlands for enhanced wastewater management; afforestation for erosion management; and vegetative filter strips to reduce erosion on cropland.

The results of the scenario and intervention analysis were then combined to assess the degree to which these four interventions could close the gap between the forecast benefits of a healthy reef and the business-as-usual scenario. The findings are encouraging: by 2030, the interventions could potentially reduce the gap by 70% in the Coral Triangle and by 45% in Mesoamerica.

The models developed for this study represent a simplification of complex interactions between coral reefs and the economy and do not capture the full value of coral reefs. However, conclusions based on the results can inform future advocacy and, in particular, help encourage the private sector to play a more active role. They also provide a foundation for further efforts to extend the analysis in the future.



The goal of transitioning toward healthy coral reef ecosystems links directly to the United Nations Sustainable Development Goals (SDGs), as do many of the interventions studied in this project.

KEY FINDINGS

The results of this study highlight that achieving improvements in coral reef health and unlocking major financial gains could be within reach.

Coral Reefs Underpin Significant Economic Value for the Private Sector

The private sector economic value of coral reefs across the tourism, commercial fisheries and coastal development sectors is linked to their health. Today, their economic value to these three sectors equals \$6.2 billion per annum in Mesoamerica and \$13.9 billion per annum in the Coral Triangle. If reefs continue to decline, their per annum value could fall by \$3.1 billion in Mesoamerica and \$2.2 billion in the Coral Triangle by 2030.

The Value of Future Healthy Coral Reefs is High

A shift toward a healthy state by 2030 could unlock an additional \$35 billion (or \$2.5 billion per annum) in additional value to the three sectors in Mesoamerica, and an additional \$37 billion (or \$2.6 billion per annum) in Indonesia. These potential returns highlight the financial business case for the private sector, along with governments and NGOs, to invest in coral reef health. Innovative and sustainable financing mechanisms will be essential to ensure investment flows.

Societal Co-Benefits of Healthy Coral Reefs Could Exceed Private Gains

The societal benefits of ecosystem restoration could be even greater than the financial gains of the private sector. For example, reducing the discharge of untreated municipal wastewater into coastal environments can create health benefits. Erosion management may reduce agricultural soil loss, while coastal afforestation can support sustainable forestry and increase carbon capture. The expansion of no-take zones promotes sustainable fisheries by preserving fish stocks and

diversity. The results of this study should therefore not be taken as a reflection of the total value of coral reefs, but as one component of the broader economic, social and environmental benefits of protecting coral reef assets.

Policies to Enhance Coral Reef Health Generate a Financial Return on Investment

A range of policies and interventions that could produce financial net benefits are available to governments and the private sector. The potential return on investment ranged from 44:1 for the expansion of no-take marine protected areas in Mesoamerica, to 9:1 for better erosion management on agricultural land in Indonesia. These findings should encourage businesses, policymakers and NGOs to devise policies and initiatives to help grow a sustainable reef-dependent economy.

Interventions to Protect Coral Reefs Contribute to the Sustainable Development Goals

Action to enhance the health of coral reefs will help deliver the 2030 Development Agenda and SDGs. The four interventions analysed all directly deliver on SDG 14 to conserve and sustainably use the oceans, seas and marine resource, while also contributing to SDG 6 on ensuring water and sanitation for all, and SDG 15 on the sustainable use of terrestrial ecosystems.

Climate Change Poses Significant Risk and Adds Uncertainty

Efforts to enhance coral reef health must be considered within the longer-term context of climate change, which presents an existential threat to many reefs. Even if the objectives of the Paris Agreement are achieved, reports warn that up to 90% of all coral reefs could be lost by 2050. Acting on local threats (including overfishing, erosion, and pollution) in order to maximise reef resilience may help moderate impacts, but climate change effects, including ocean warming and altered cyclone and rainfall patterns, add uncertainty to the analysis presented in this report.



© Year of the Reef Image Bank / Erik Lukas

Toward a Healthy Reef by 2030

This study shows that interventions targeting sustainable fisheries, wastewater and erosion management could have a positive impact on the health of coral reefs and the reef-dependent economy. In Mesoamerica, these interventions could close 45% of the gap between the estimated value derived from a degraded and a healthy reef by 2030. In the Coral Triangle, the interventions could close 70% of the gap. These results highlight that the goal of rapidly achieving major improvements in coral reef health could be within reach.



Introduction

ABOUT THIS REPORT

Coral reefs are exceptionally valuable in terms of the ecosystem services they deliver. They provide food, livelihoods and economic opportunity to people in more than 100 countries around the world, and protect shorelines from erosion. They are a source of enjoyment for national and international tourists alike. Hosting a quarter of all known marine species they also play a critical role in the broader coastal ecosystem.

Protection and management of coral reef ecosystems is mainly funded by the public sector, but it is widely recognized that, at current levels, this is insufficient to maintain reef health and meet internationally adopted targets (UN Environment, ICRI and UN Environment-WCMC, 2018). The need for new and innovative financing for coral reefs has been recognized e.g. in UN Environment Assembly resolution 2/12, by the International Coral Reef Initiative, and in the Coral Reef Life Declaration adopted in 2017.

This study highlights the economic business case for the private and public sector to invest in the protection, preservation and enhancement of coral reef health. Initiated by the Prince of Wales's International Sustainability Unit (ISU) and United Nations Environment Programme (UN Environment) and implemented in collaboration with Trucost and the International Coral Reef Initiative (ICRI), the analysis maps the value, costs and benefits and financial flows of the coral reef dependent economy. An advisory committee composed of experts representing multilateral development agencies, funds, civil society organizations and finance and insurance companies guided the analysis.

Key steps of the analysis included:

- Development of a quantitative model of selected interactions between live coral cover (a key marker of coral reef health) and the economic returns generated by three sectors that benefit from coral reefs: tourism, coastal development and commercial fisheries;
- Applications of the model to two case study regions: the Coral Triangle, South East Asia and the Mesoamerican Reef in the Caribbean;

Two case study regions were selected on the basis of data availability, ecological significance of the reef, and the scale and composition of the reef dependent economy in each location.

- Estimation of current economic returns to each sector that are attributable to the coral reefs in each region, and modelling of the expected changes in economic returns under a healthy reef scenario, in which coral reefs recover over time, and a degraded reef scenario, in which the historical decline in coral reef health continues (i.e. business as usual);
- Selection of practical interventions from the scientific literature that could be implemented in each region to help alleviate key coral reef stressors in the short to medium term, such as overfishing, erosion and improper wastewater management;
- Modelling the costs and benefits of each intervention on the economic returns to each sector in each region, and calculating the net benefit and return on investment in each intervention;
- Drawing conclusions based on the results to inform future advocacy to protect and enhance coral reef health globally.

This report presents the results of the study. A brief overview of the approach including case study regions, sectors, interventions as well as limitations of the study is provided below, with further detail in Annex 2. Intervention analysis results are presented in detail as graphs and tables with annotations in the text, followed by a summary of main conclusions.

The models developed represent a simplification of the complex interactions between coral reefs and the economy and thus are subject to limitations and do not capture the full value of coral reefs to the economy and society. However, by quantifying the business value of a healthy coral reef across three key sectors and highlighting the potential business case for the private sector to play a more active role in financing interventions to improve coral reef health, this study can support and inform efforts by governments and businesses alike. It also provides a foundation for further efforts to extend and improve the analysis in the future.

CASE STUDY REGIONS

Two case study regions were selected for consideration in the study on the basis of data availability, ecological significance of the reef, and the scale and composition of the reef-dependent economy in each location. The Great Barrier Reef in the subject of a major economic analysis published in 2017 (Deloitte, 2017).

Coral Triangle

The Coral Triangle is one of the most highly biodiverse and ecologically important coral reef regions in the world, containing 76% of all known coral species and 37% of all reef fish species (WWF, 2017a). The Coral Triangle spans six countries (Indonesia, the Philippines, Malaysia, Papua New Guinea, Solomon Islands and East Timor), however, the largest area falls within Indonesian territorial waters.

Mesoamerican Reef

The Mesoamerican Reef is the second-longest barrier reef in the world, following the Great Barrier

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