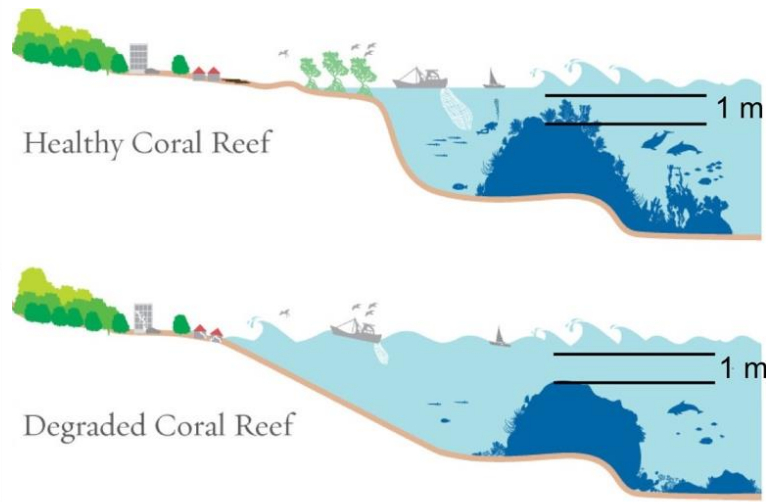
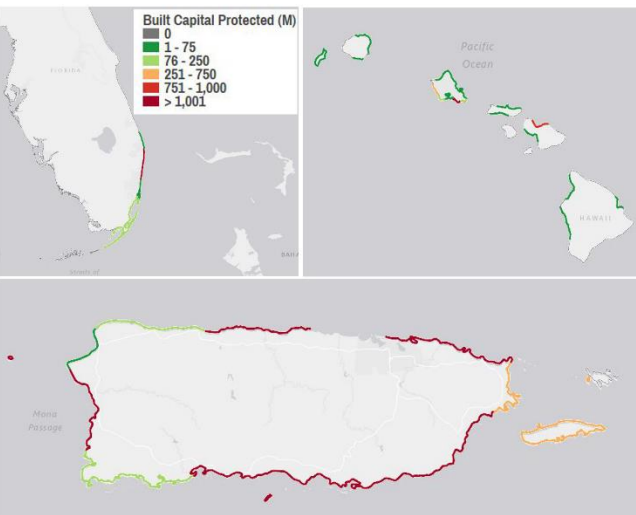


MAPPING OCEAN WEALTH

Coastal Protection from Coral Reefs Expected Benefits for the United States & Puerto Rico

Coral reefs provide significant coastal protection benefits to nations around the world. If just the top 1 meter of corals reefs are lost, annual expected damages from flooding more than double globally.



The flooding averted to built capital by conserving existing reefs (\$ US Millions)

Built Capital Damaged



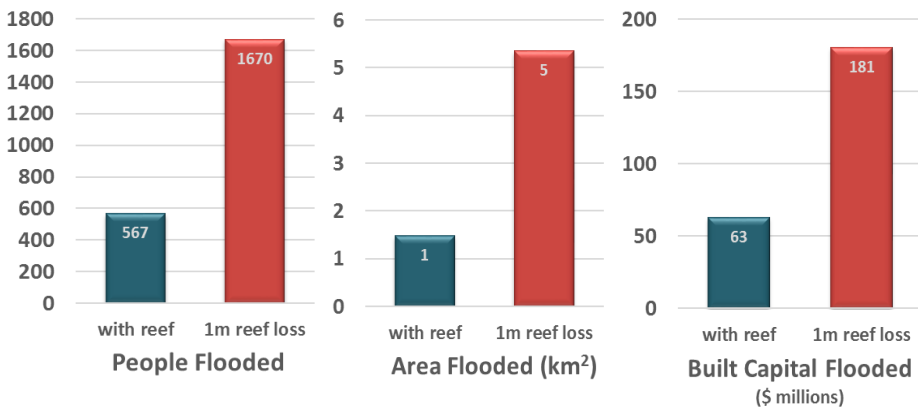
Annual Expected Benefits from Coral Reefs

Annual Flood Damages Averted	\$94 million USD
Annual Flood Damages Averted/GDP	0.0001%
Annual Averted Flooding of People	1,102
Annual Averted Flooding of Land	4 km²
Annual Averted Flood of Built Capital	\$118 million USD

The values are the expected flood damages to built capital at present and if there was 1 m loss of coral reefs. Damages are assessed by storm event return period (e.g., 1 in 100 year event)

MAPPING OCEAN WEALTH

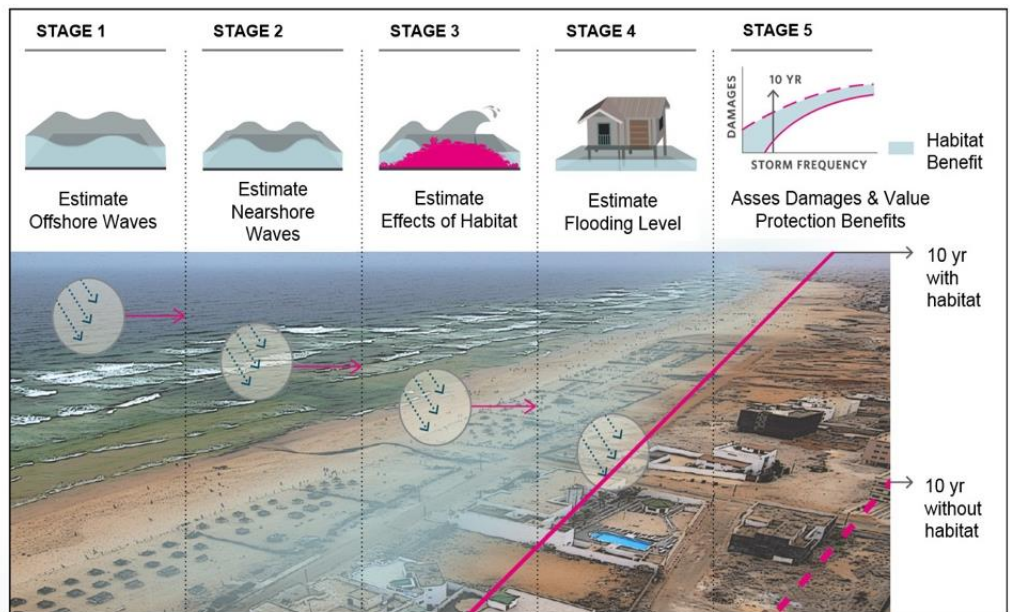
Annual Expected Flood Protection Benefits from Coral Reefs



Annual expected benefits from reefs for flood protection represents the predicted flooding avoided to land, people, and infrastructure by keeping coral reefs intact. It is an annualized benefit of the role of reefs in flood reduction that considers local factors such as reef condition, asset distribution, and storm frequency.

The five core steps that are central to estimating the flood protection benefits provided by coral reefs.

Stage 1: Estimate offshore hydrodynamics (waves and surge); *Stage 2:* Estimate nearshore hydrodynamics as they interact with the coastline; *Stage 3:* Estimate effects of coral reef on hydrodynamics; *Stage 4:* Estimate onshore flooding; and *Stage 5:* Assess expected and averted damages from flooding or erosion. (Beck and Lange, 2016)



World Bank. 2016. Managing Coasts with Natural Solutions: Guidelines for Measuring and Valuing the Coastal Protection Services of Mangroves and Coral Reefs. M. W. Beck and G-M. Lange, editors. Wealth Accounting and the Valuation of Ecosystem Services Partnership (WAVES), World Bank, Washington, DC. <https://www.wavespartnership.org/en/knowledge-center/managing-coasts-natural-solutions>



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