

Encyclopedia of Earth

# Marine ecosystem services

**Lead Author:** J. Emmett Duffy (other articles)

**Article Topics:** Biodiversity and Oceans

**This article has been reviewed and approved by the following Topic Editor:** Walker Smith (other articles)

**Last Updated:** October 16, 2006

## Table of Contents

- 1 Introduction
- 2 Types of marine ecosystem services
- 3 Threats to marine ecosystems and the services they provide
- 4 Further reading

## Introduction

Marine ecosystem services refer to benefits that people obtain from marine ecosystems, including the open ocean, coastal seas, and estuaries. More than one third of the world's population lives in coastal areas (Table 1), and people throughout the world depend intimately on the oceans and coasts, and the resources they provide, for survival and well-being. Yet marine ecosystems, and the resources they provide, are increasingly threatened by land-use change, overfishing, climate change, invasion of non-native species, and other impacts of a rapidly growing human population.

Subtypes	Population	Share of World Population (%)	Share of Coastal Population (%)
Estuaries	1 598 940 542	27	71
Coral reefs	710 583 010	12	31
Mangroves	1 030 295 102	18	45
Seagrass	1 146 100 829	19	49
Total	5 996 803 192		

Table 1. From the Millennium Ecosystem Assessment, UNEP. 2006

## Types of marine ecosystem services

Ecosystem services can be divided into several categories (Table 2):

**Provisioning services.** These include food, water, timber, and fiber. More than a billion people worldwide rely on fish as their main source of protein. Fisheries and associated industries employ 38 million people directly, and another 162 million are indirectly supported. Other provisioning services from marine ecosystems include building materials from mangrove and coral reef areas, and pharmaceutical compounds derived from marine algae and invertebrates.

**Regulating services.** These include regulation of climate, natural hazards such as floods, disease, wastes, and water quality. For example, coastal wetlands play an important role in water quality regulation by capturing and filtering sediments and organic wastes in transit from inland regions to the ocean. On a global scale, fixation of atmospheric carbon by oceanic algae and its eventual deposition in deep water represents an important part of the global carbon cycle and thus influences climate trends.

**Cultural services.** These include recreational, esthetic, and spiritual benefits derived from nature. Coastal tourism is the

ECOSYSTEM SERVICES	Coastal									Marine		
	Estuaries and marshes	Mangroves	Lagoon and salt ponds	Intertidal	Kelp	Rock and shellfish	Seagrass	Coral reefs	Inner shelf	Outer shelves edges slopes	Samsoons demersal ocean ridges	Deep sea and coral type
Biodiversity	X	X	X	X	X	X	X	X	X	X	X	X
Provisioning services												
Food	X	X	X	X	X	X	X	X		X	X	X
Fibre, timber, fuel	X	X	X						X	X		X
Medicines, other resources	X	X	X		X			X	X			
Regulating services												
Biological regulation	X	X	X	X		X		X				
Freshwater storage and retention	X		X					X				
Hydrological balance	X		X									
Atmospheric and climate regulation	X	X	X	X		X	X	X	X	X		X
Human disease control	X	X	X	X		X	X	X				
Waste processing	X	X	X				X	X				
Flood/storm protection	X	X	X	X	X	X	X	X				
Erosion control	X	X	X				X	X				
Cultural and amenity	X	X	X	X	X	X	X	X	X			
Recreational	X	X	X	X	X			X				
Aesthetics	X	X	X	X				X				
Education and research	X	X	X	X	X	X	X	X	X	X	X	X
Supporting services												
Biochemical	X	X			X			X				
Nutrient cycling and fertility	X	X	X	X	X	X	X	X	X	X	X	X

Table 2. From the Millennium Ecosystem Assessment, UNEP. 2006

fastest-growing sector of the global tourism industry, and is a major part of the economies of many small island developing nations. Scuba diving and other nature-based tourism on coral reefs, for example, is estimated to contribute \$30 billion to the global economy each year. Moreover, the cultures and traditions of many coastal peoples are intimately tied to the marine ecosystems on which they depend.

**Supporting services.** These include soil formation, photosynthesis, and nutrient cycling by healthy ecosystems, which support goods and services used more directly by humans. Coastal habitats such as seagrass beds and mangroves are important nursery areas for the young stages of fishes and invertebrates that support coastal communities and commercial and recreational fisheries.

## Threats to marine ecosystems and the services they provide

Unsustainable use of marine resources poses serious threats to food security of many coastal nations, particularly in the developing world. Destruction and degradation of coastal habitats such as coral reefs, seagrass beds, and mangroves, increases risks to coastal communities from natural and human-induced hazards such as hurricanes. Coastal pollution and habitat degradation also endanger economies of coastal areas that depend on tourism.

## Further reading

- Costanza, R., et al. 1997. The value of the world's ecosystem services and natural capital. *Nature* 387: 253-260.
- Daily, G.C. (Editor). 1997. *Nature's Services*. Island Press.
- Daily, G.C. et al. 1997. Ecosystem services: Benefits supplied to human societies by natural ecosystems. *Issues in Ecology* 2:1-16.
- Dobson, A., et al. 2006. Habitat loss, trophic collapse, and the decline of ecosystem services. *Ecology* 87:1915-1924.
- UNEP. 2006. *Marine and Coastal Ecosystems & Human Well-being: A synthesis report based on the findings of the Millenium Ecosystem Assessment*. UNEP. 76 pp.

---

## Citation

Duffy, J Emmett (Lead Author); Walker Smith (Topic Editor). 2006. "Marine ecosystem services." In: *Encyclopedia of Earth*. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the *Encyclopedia of Earth* October 10, 2006; Last revised October 16, 2006; Retrieved February 10, 2009]. <[http://www.eoearth.org/article/Marine\\_ecosystem\\_services](http://www.eoearth.org/article/Marine_ecosystem_services)>

## Editing this Article

EoE Authors can click [here](#) to access this article within the editor wiki

If you are an expert, but not yet an Author, click [here](#)

---

Unless otherwise noted, all text is available under the terms of the Creative Commons Attribution-Share Alike license.  
Please see the Encyclopedia of Earth's website for Terms of Use information.  
Supported by the Environmental Information Coalition and the National Council for Science and the Environment.