FACTSHEET:

COASTAL ECOSYSTEMS

Coastal ecosystems provide natural shoreline protection, enhance food security, and support coastal economies, all while absorbing tons of carbon. However, these ecosystems are increasingly threatened by climate change, coastal development, and pollution. According to the National Oceanic and Atmospheric Administration (NOAA), the U.S. loses an estimated 125 square miles of coastal wetlands each year.

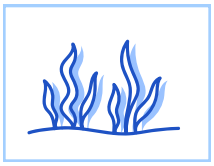
WHAT ARE COASTAL ECOSYSTEMS?

SALT MARSHES

Salt marshes are coastal wetlands made up of grasses, herbs, and low shrubs. These intertidal areas fill and drain with ocean tides and provide food, refuge, and nursery habitat for many species while stabilizing coastlines. About half of salt marshes in the U.S. are found along the Gulf Coast. Despite global restoration efforts, salt marshes are still in decline; between 2000–2019, over 270 square miles of salt marshes were lost overall—an area nearly the size of New York City.

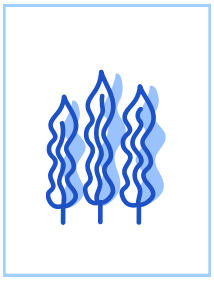
MANGROVE FORESTS

These woody trees and shrubs are the only tree species capable of tolerating saltwater, and are found in subtropical and tropical intertidal, brackish coastline environments. In the continental U.S., 98.1% of all mangrove forests are located in the state of Florida—mangroves can also be found in the states of Texas and Louisiana. Mangrove forests are carbon-rich ecosystems and absorb an estimated 24 million tons of carbon globally each year. Since 1996, over 3% of the world's mangrove forests have been destroyed.



SEAGRASS MEADOWS

Seagrasses are aquatic flowering plants that aggregate into meadows in the shallow coastal waters of bays and estuaries along the East and West Coasts of the U.S. Seagrass meadows act as biodiversity hotspots and powerful carbon sinks. Since 1880, almost 20% of seagrass meadows have been lost globally.



KELP FORESTS

Kelp is a type of macroalgae that grows in cool, nutrient-rich, shallow waters close to shore. Kelp forests are mostly found along the West Coast of the U.S., ranging from Alaska down to California. Globally, wild kelp forests have the potential to sequester about 173 teragrams of carbon each year as bits of kelp break off, float out to sea, sink to the ocean floor and get buried under ocean sediments along with their carbon. Kelp forests are in global decline due to rising ocean temperatures, increasing damage from sea urchins, overharvesting, and water pollution.

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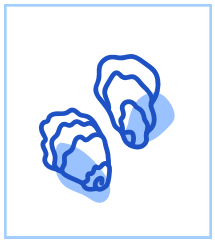
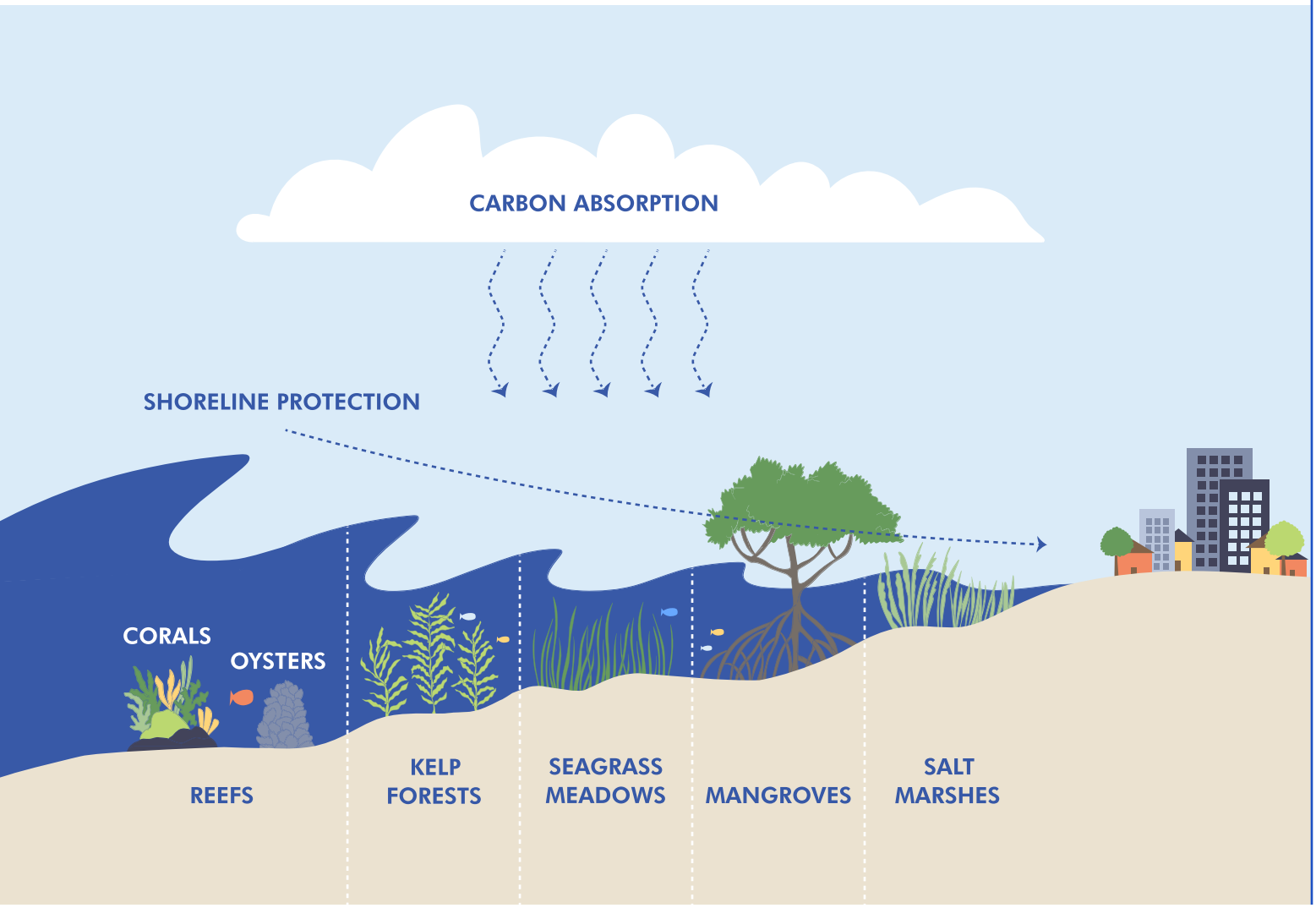


OYSTER REEFS

Oysters are powerful filters—a single oyster can filter up to 50 gallons of water each day. When oysters accumulate and fuse together, they form reefs that provide nursery habitats for marine species and protect shorelines. Oyster reefs thrive in low wave energy environments and can be found along all coastlines of the continental U.S. Over the last century, oyster reefs have declined by around 85% globally.

CORAL REEFS

Coral reefs are home to around 25% of all named marine species and provide natural shoreline protection. In the U.S., coral reefs can be found along the coastlines of Hawai'i, Florida, and the island territories of Puerto Rico, the Virgin Islands, Guam, the Northern Mariana Islands, and American Samoa. Globally, mass coral bleaching has become 5 times more frequent since 1980. Even with drastic reductions in carbon emissions, coral production will decrease by 77% by the end of the century.



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WHAT THREATENS COASTAL ECOSYSTEMS?

CLIMATE CHANGE

The ocean has absorbed more than 90% of the excess heat trapped by greenhouse gases. This has caused sea surface temperatures to rise over 1.5 degrees Fahrenheit since 1901. Ocean warming leads to deoxygenation and sea level rise—affecting marine species and ecosystems. Warmer waters cause coral bleaching, threatening their existence. Sea level rise exacerbates coastal erosion and saltwater intrusion, contributing to habitat loss. The ocean has absorbed around 30% of the excess carbon dioxide released into the atmosphere by burning fossil fuels. The increased concentration of human-caused carbon dioxide emissions in seawater has increased the ocean's acidity by 30%, making it harder for shellfish and corals to grow their shells and skeletons.

COASTAL DEVELOPMENT

Population density in coastal areas is nearly 6 times greater than the global average. In the U.S., nearly 40% of the population lives along the coast, 20% in coastal cities. As natural areas are transformed for housing, infrastructure, agriculture, industry, and tourism, coastal ecosystems are degraded or destroyed. Worldwide, nearly 85% of coastal ecosystems have been disturbed by human activity. In the Tampa Bay, Florida watershed, over 50 square miles of wetlands have been lost almost entirely to coastal development. As sea level rises, coastal ecosystems need to migrate inland but are blocked by coastal development—a phenomenon known as "coastal squeeze".

POLLUTION

Land based sources of pollution, such as domestic sewage, rainwater runoff, industrial wastewater (from agriculture and the petrochemical industry), and plastic waste are responsible for 80% of marine pollution. Combined sewer overflows (CSOs)—which occur when an excess of untreated or partially treated stormwater and wastewater is discharged directly into streams, rivers, or other bodies of water —disrupt coastal ecosystem functions and contribute to biodiversity loss. Excess nitrogen and phosphorus from CSOs can cause eutrophication, creating ocean dead zones and harmful algal blooms.

WHY DO THEY MATTER?

THEY PROVIDE NATURAL SHORELINE PROTECTION.

Coastal ecosystems are a communities' first line of defense against storm surges and sea level rise, as they reduce wave energy, absorb floodwaters, and prevent shoreline erosion. Coastal ecosystems can also provide cheaper and more effective shoreline protection than sea walls. Each year, coral reefs provide an estimated $10.9 billion of flood protection, and mangrove forests provide an average of $65 billion of flood protection. By 2012, New York and New Jersey had already lost 85% of their coastal wetlands; what little remained reduced damages from Superstorm Sandy by $560 million.

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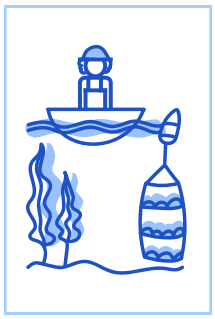
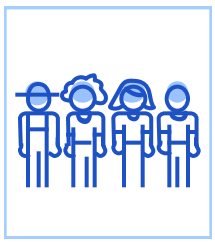


THEY ENHANCE FOOD SECURITY AND SUPPORT COASTAL ECONOMIES.

Globally, aquatic foods provide about 17% of animal protein consumed. Declining fish and shellfish populations, caused by changing ocean conditions, are a threat to food security. Coastal ecosystems support the blue economy through commercial and recreational fishing (around 600 million people depend on fisheries or aquaculture for their livelihoods); tourism and recreation; and other activities. In the U.S., the blue economy contributed $361 billion to the 2020 GDP. Coral reefs alone generate $35.8 billion per year globally through tourism, and support half of all federally managed fisheries in the U.S.



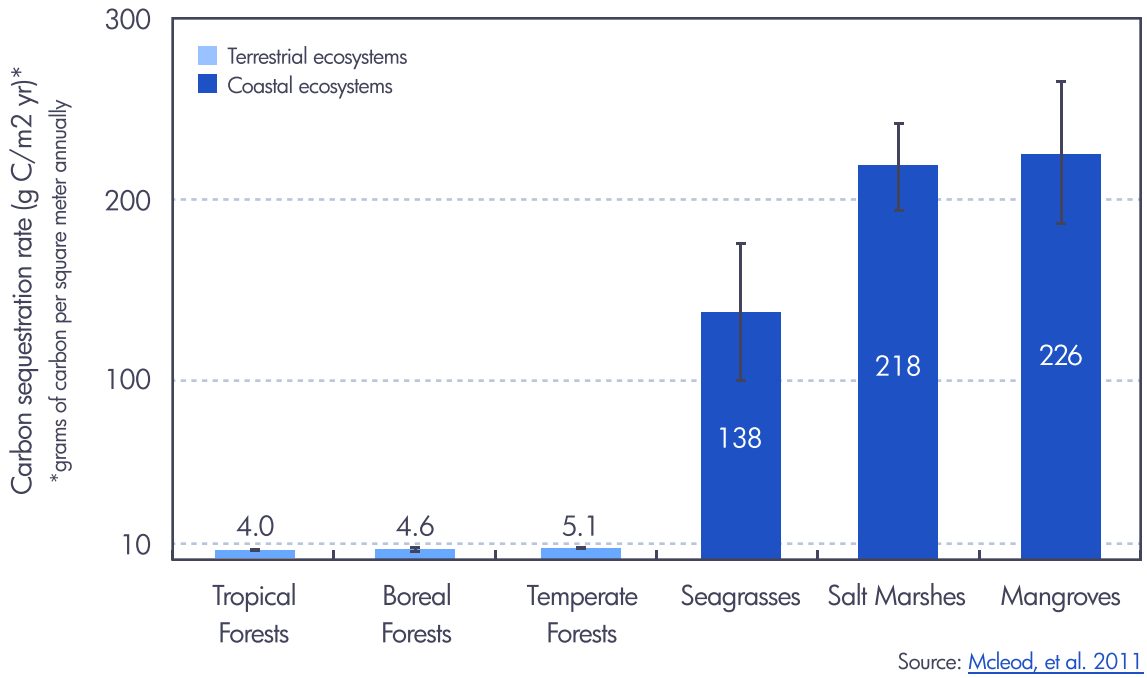
THIS IS AN ENVIRONMENTAL AND OCEAN JUSTICE ISSUE.

Discriminatory housing and land use policies, like redlining and restrictive zoning, have led to historically underserved and low-income communities being disproportionately exposed to toxic waterways and increased flood risk. Climate change will only intensify these inequities. Fair access to healthy coastal ecosystems can facilitate improved stormwater filtration and flood protection for these communities, and will be important for advancing ocean justice.

THEY ABSORB CARBON AND HELP MITIGATE CLIMATE CHANGE.

Though their global footprint is smaller than terrestrial forest ecosystems, coastal wetlands—like salt marshes, seagrass meadows, and mangrove forests—sequester carbon up to 50 times faster (according to the most recent data available), making them a particularly important climate solution for cities (which are responsible for 70% of global carbon emissions). Disturbing coastal ecosystems not only inhibits their ability to absorb carbon, but also releases previously stored carbon and methane. If the degradation and destruction of coastal ecosystems continues, an estimated 3.4 billion tons of sequestered carbon could be released by the end of the century.

Carbon sequestration rates for coastal and terrestrial forest ecosystems



Source: Mcleod, et al. 2011

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WHAT CAN WE DO?

PROTECT AND RESTORE COASTAL ECOSYSTEMS.

Funding restoration projects; incorporating nature-based solutions (such as floodplain restoration, greenways, stormwater parks, and bioswales) to absorb and filter stormwater runoff before it can reach coastal ecosystems; creating and maintaining natural infrastructure (such as living shorelines); and establishing marine protected areas help to ensure healthy and functioning coastal ecosystems. The White House recognized the importance of nature-based solutions for coastal ecosystems, and Congress has allocated over $4 billion ($2.6 billion through the Inflation Reduction Act and $1.5 billion through the Climate Ready Coasts Initiative) specifically for coastal communities to implement nature-based solutions and better protect coastal ecosystems.

ADVANCE REGENERATIVE OCEAN FARMING.

Regenerative ocean farming is a climate-friendly form of aquaculture that has the potential to increase the domestic supply of seaweed and shellfish while improving water quality, mitigating ocean acidification locally, and increasing biodiversity. In addition, scaling regenerative ocean farming has the potential to create up to 50 million direct jobs and 100 million associated jobs globally.

CHANGE LAND USE POLICIES.

Review and change land use and zoning policies to adopt setbacks and buffer zones to restrict (re)development in hazardous coastal areas. Land use policies should ensure that development along coastlines reduces soil erosion, maintains permeability and green space, and does not encroach upon coastal ecosystems. In the case of rebuilding after disasters or in high hazard coastal areas, climate-driven relocation of people, homes, and infrastructure away from coastlines might need to be considered for the safety and well-being of coastal communities and ecosystems. It is imperative to prioritize equity in land use planning to avoid climate gentrification and to ensure that all people have equal access to safe and affordable housing, as well as coastal ecosystem services.

ADVANCE BLUE CARBON CREDITS TO INCLUDE ALL TYPES OF COASTAL ECOSYSTEMS.

In 2016, the U.S. became the first country to include blue carbon in the national greenhouse gas emissions inventory, allowing conservation and restoration efforts in coastal ecosystems to receive carbon credits in the carbon market. Mangrove restoration has the most potential for blue carbon storage. However, expanding the system to include all coastal ecosystems, including salt marshes, seagrasses, kelp forests, oysters, and coral reefs, would accelerate their restoration and help finance coastal resilience projects.

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