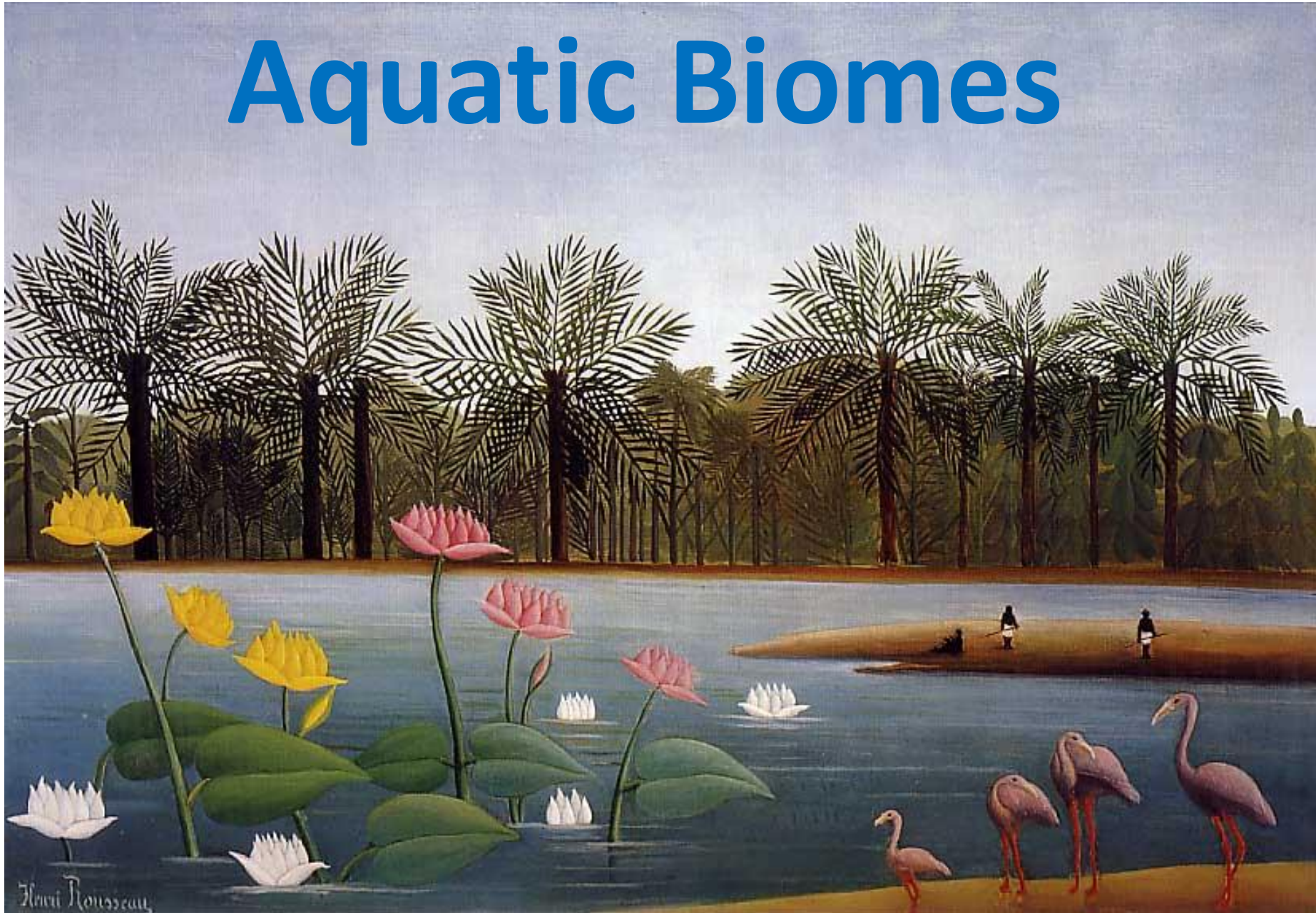


Aquatic Biomes



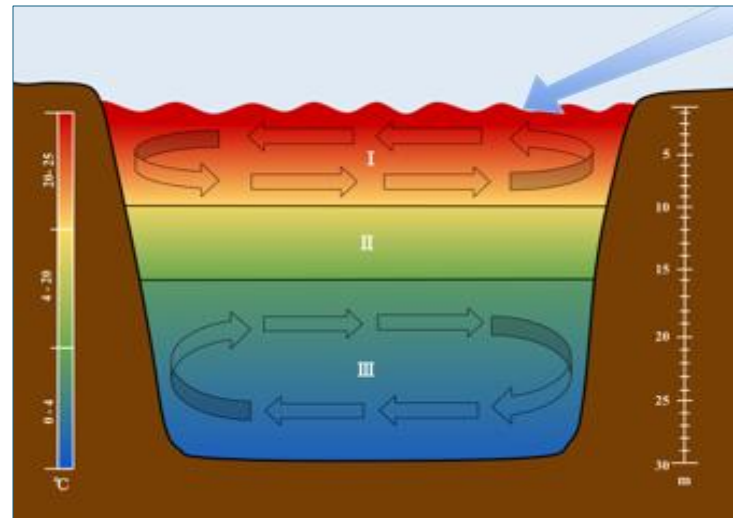
"The Flamingos" by Henri Rousseau



Rivers and their **tributaries** contain **moving water** provided by aquifers and runoff from the watershed. Nearly all rivers flow into the ocean.

Lakes and **ponds** are **standing waters** that vary in size. The lack of flow results in **thermal stratification** of the waters in the summer.


Wetlands are **shallow, slow-moving** bodies of water which may or may not seasonally dry out. Freshwater wetlands include swamps, marshes, and bogs.




Wetlands only occupy about 6% of the continuous US, but their ecological importance in **water purification** and **flood control** cannot be underestimated.

Unfortunately, the expression “draining the swamp” did not always refer fighting government corruption: **Wetlands have been drained for centuries** to for urban and agricultural development, and despite growing awareness of their ecological value, wetlands are still disappearing faster than they are being restored.

Wetlands act as “nature’s kidneys” to filter and absorb pollution.




1.5 million gallons of floodwater can be stored by one acre of wetlands.

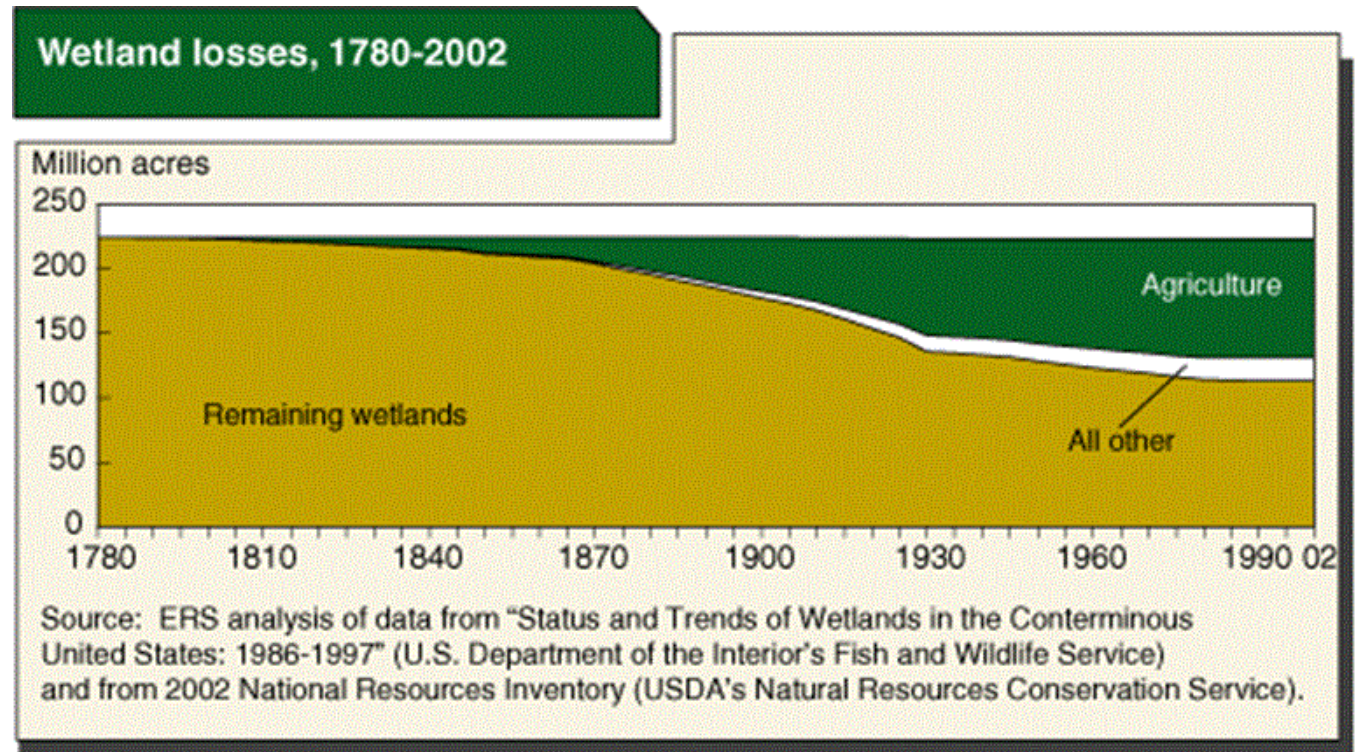


\$23 billion in annual coastal protection services are provided by wetlands.

During storms, coastal wetlands absorb floods and wave energy, decreasing property damage by up to **20%.**

More information: <https://fisheries.noaa.gov/habitat-conservation>

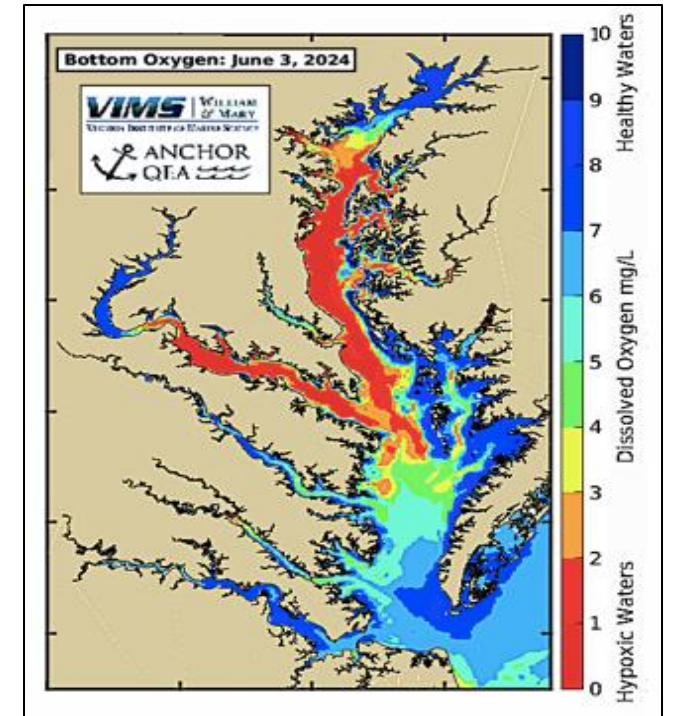




Estuaries occur where rivers empty into the ocean. Estuarine waters are **rich in nutrients** because of the accumulated organic matter they bring from the land by means of tributaries and runoff.

Estuaries serve as a “nursery” for many marine species because they are **rich in phytoplankton** and sheltered from strong waves. All species living in this ecosystem are adapted to large **fluctuations in salinity** as the result of tidal activity and rainfall.

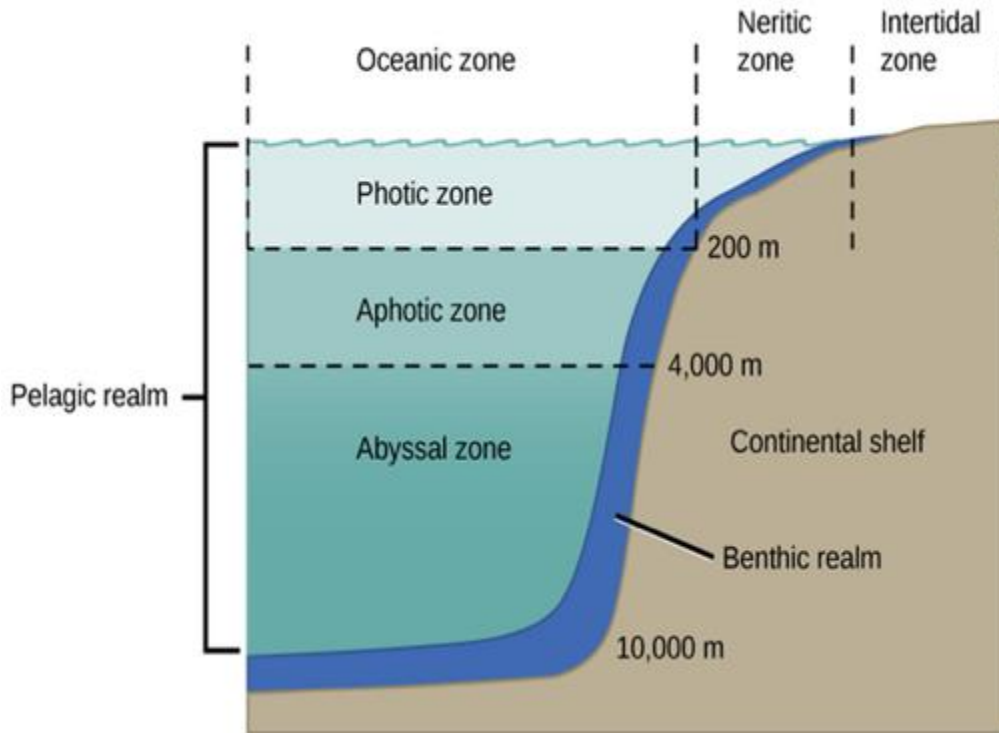
Due to the magnitude of their **watersheds**, estuaries accumulate large concentrations of **nutrient pollution** from rural and urban sources that cause algae blooms that die off and generate “**dead zones**” of anoxic waters that kill fish and invertebrates.



Map downloaded from the Virginia Institute of Marine Science: <https://www.vims.edu/research/products/cbefs/cbay/>

Map based on research by Beaver et al., 2021: <https://www.sciencedirect.com/science/article/pii/S1364815221000797?via%3Dihub>

Marine Zones

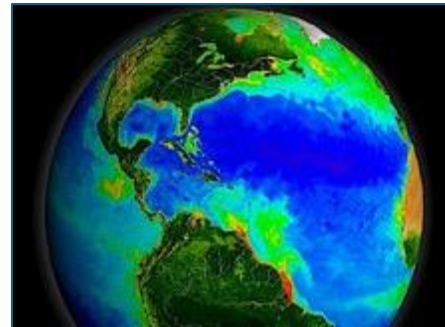
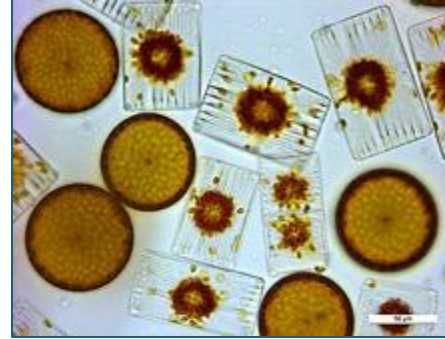
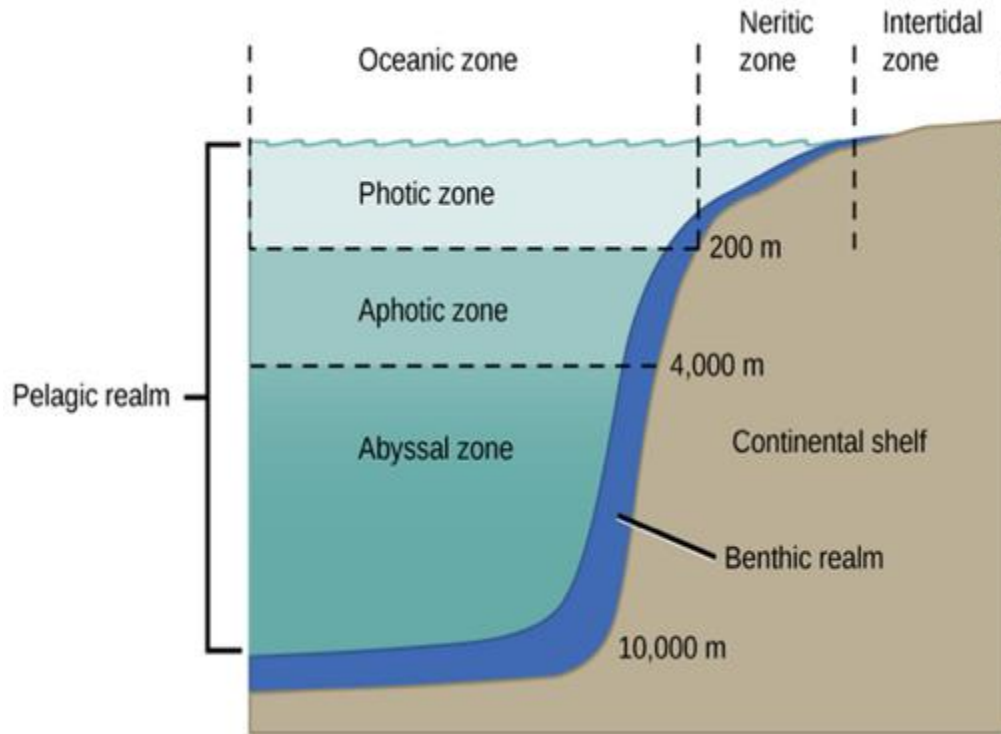


The **intertidal zone** is the portion that is dry when the tide is low. Species adapted for this portion are tolerant to crashing waves and exposure to air. Some remain behind in tide pools that retain water during low tides.

The **neritic zone** remains submerged at low tide, and extends to the edge of the **continental shelf**. This portion is occupied by small fish and crustaceans.

The **oceanic zone** is much deeper and accommodates the larger animals. Since it is poor in nutrients, it is very sparsely populated.

Marine Levels



All **photosynthesis** occurs in the **photic zone**.

In the **abyssal zone** the only light available is generated by means of **bioluminescence**.

Organisms that inhabit the **pelagic realm** either float or swim.

The **benthic realm** is dominated by species that crawl or remain sessile.

Mangroves are found in marine and estuarine tropical waters within 25° north and south of the equator. Their **large stilt-like roots** are designed for protection from ocean waves. Consequently, mangrove forests also **protect the land from erosion** and provide **habitat and shelter** for species seeking protection from predators.

Mangroves are currently threatened by coastal development and shrimp farming.

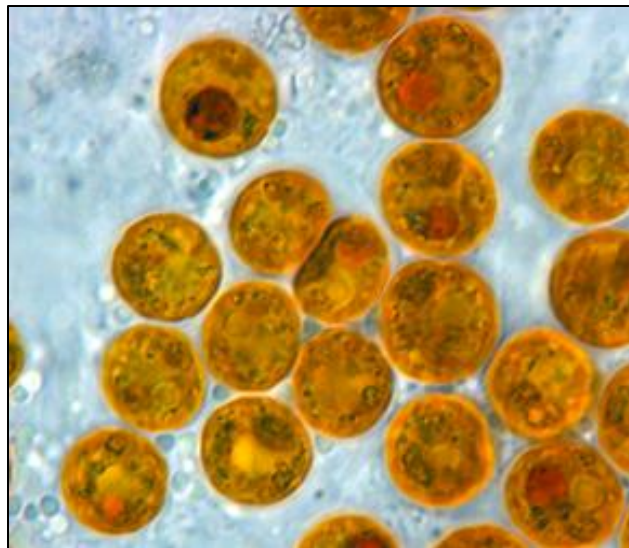




Coral reefs are found in **nutrient-poor warm waters** within 30° north or south of the equator. Coral reef communities are the most **biodiverse** ecosystems in the aquatic world

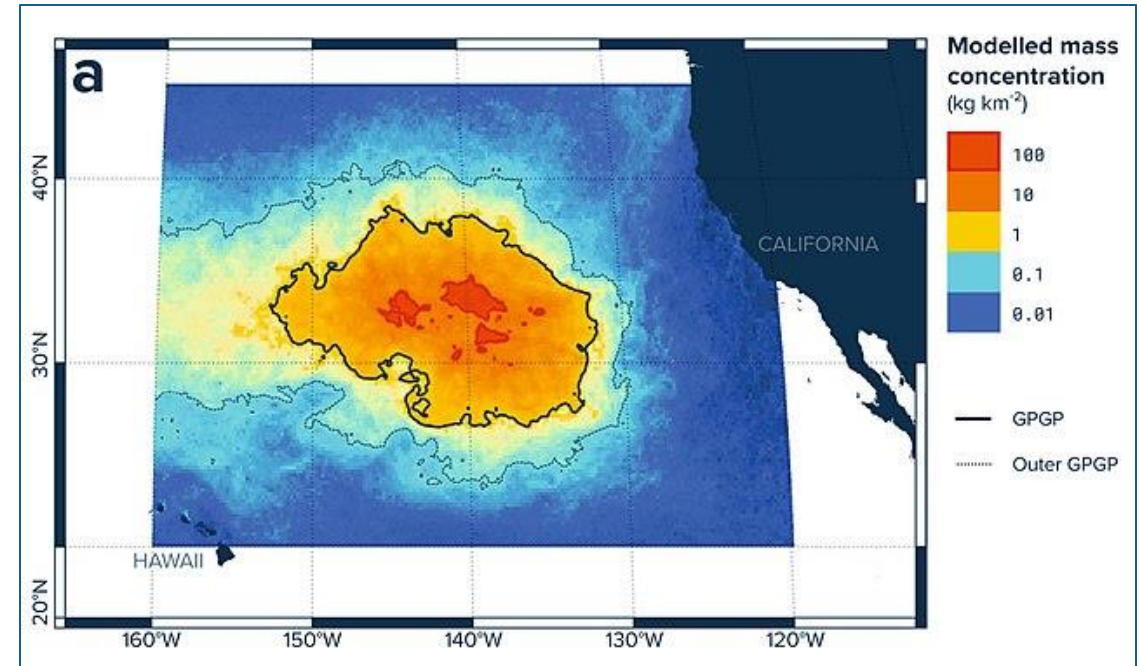
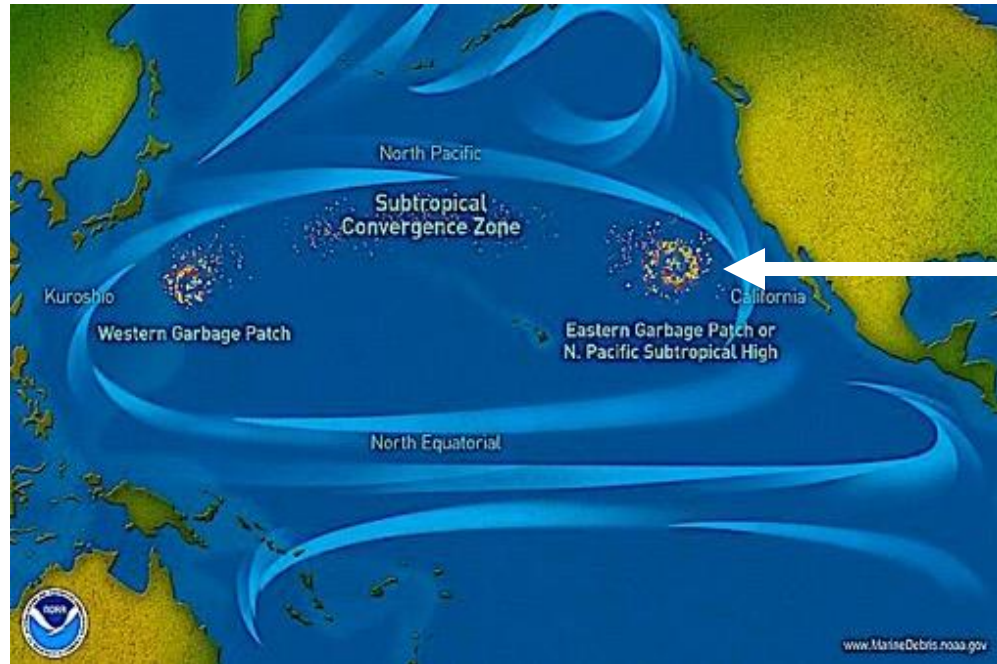
Most corals are found in **clear, shallow waters** favorable to the **mutualistic symbiotic algae** living in the polyp tissues.

Unfortunately, corals are **now dying at alarming rates** as the result of nutrient pollution, sediment pollution, and rising water temperatures.



One of the greatest ongoing threats to the ocean is **plastic pollution**, and even though most of this waste stays near the shoreline, large amounts are carried thousands of miles by ocean currents to form massive cumulative “garbage patches” of **microplastics** that **block sunlight** needed for photosynthesis and harm the sea animals that **ingest them by mistake**. To date, there is no practical way to clean this up.

The “**Great Pacific Garbage Patch**” alone is about twice the size of Texas.



Acknowledgement:



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