

The following information may help to summarize some key points about the marine habitats*¹:

A habitat is a place where organisms live

The three main habitats of the ocean are the open water, the soft sandy to muddy bottom and the hard shore. These habitats are known by different names and each of the three categories is broken down even more.

In terms of covering area of the globe, the open water habitat is very large, the soft sandy to muddy bottom habitat is large, and the hard shore (often called rocky or coral shore) is very small.

Species that are found in one habitat may often be found in another as well. For example, a worm may be found in the muddy bottom or lodged in a crevice in the rocky bottom. A sponge found in the rocky bottom might be found stuck on a shell in the sandy bottom.

Although the rocky shore habitat is the smallest in area, it has the highest biodiversity of species. (Biodiversity means the variation of life forms in an ecosystem). The biggest threat to the rocky shore is run off from the land, which may include polluted runoff, which could contain excess nutrients, oil, or other pollutants and the negative impacts of sedimentation.

The commercial fishing industry focuses on the open water and soft sandy to muddy bottom habitats.

Although the rocky shore has been relatively unexploited commercially, now there are a few exceptions with the harvesting of periwinkles and seaweed.

All seas are interconnected, unlike land habitats, so animal eggs and plant spores can travel.

SOME PHYSICAL FACTORS THAT AFFECT MARINE HABITATS:

TEMPERATURE-A difference of 3^o can double or cut in half an organism's metabolic rate. It takes much energy (thus food) for aquatic animals to maintain a temperature slightly higher than their surroundings (whales, dolphins, tuna, swordfish)

Temperature appears to affect grazing fish more so than predators

SALINITY-Aquatic animals have a mechanism that maintains their body salts at a constant level

Seawater has 3.5% salinity; rivers and estuaries show a gradual transition of salinity; fresh water has 0% salinity

¹ From www.seafriends.org in "Marine habitats, principles and factors". J Floor Anthoni, Dr. 1997. pages 1-8.

Some plants (eel grass) and some animals (eels, salmon, smelts, and alewives) can survive the salinity change

Salt water is heavier than fresh water and has more lift. A person weighs 3.5% X (their weight) less in salt water

TIDES-The rotation of the earth and the gravitational forces of the earth, sun and moon combine to produce a twice- daily (some areas of the world only once) rise and fall of water called tides.

Tidal currents of .5-5km occur 4 times a day in most places due to the mixing of waters during the tidal rise and fall (the salinity, temperature, and nutrient content add to the current)

The changing water level affects the top 2 to 6 meters of coastline

Plants and animals must be able to resist dehydration, temperature changes, and changes in salinity (tide pools)

CURRENTS-Three kinds of currents exist in the ocean produced by wind, tide and global circulation

Wind direction affects the top layer of water. Winds can blow across warm land to cold water, across cold land to warm water, across warm water to cold land, and across cold water, to warm land. The mixing in the top layer causes temperatures to rise or drop and create currents.

See Tidal currents in the previous section on Tides

Global circulation causes a mixing of cold and warm water and creates a current with a range of .5-1 km per hour distributing heat from the Tropics to the Poles, and cold from the Poles to the Tropics. In places, there is an upwelling of cold water that is nutrient rich.

WIND-This land phenomenon doesn't affect most aquatic life except for those in the intertidal zone. Desiccation or drying out can be worse from the wind than the sunshine's heat

Winds cause waves, which can change the substrate or bottom of the marine habitat, for example, from, mud to coarse sand and vice versa.

Winds cause waves that pile up sand on beaches where only a few organisms can live

WAVE ACTION-Prolonged action of the wind on the water's surface causes waves. Short waves called chop or short fetch lose power rapidly. Long waves called swell or long fetch arise from distant storms, can travel 60-100 km/hr, and create a long ground swell of water hundreds of meters between wave crests. Damage to creatures on the ocean bottom can be catastrophic because, ironically as the water depth causes wave action to decrease, the wave action increases again near the ocean bottom. (A study of Oceanography and waves could provide more detail for instructors who wish to pursue this concept)

LIGHT-In the ocean, light diminishes with depth. Even when the sun is out, and it is full daylight, at 20 m of depth, vision is 2 m. Compare this to a night with no moon.

First infrareds go, then ultraviolets, then reds, finally yellows. The deep sea turns from purplish to black by 600-800m

Visibility varies in different bodies of water. In muddy estuaries (.2m), in coastal areas to barrier islands (15 m), in open ocean (40m), and in the Antarctic (100m)

Visibility is affected by leachates (tea), mud particles (coffee), and plankton (soup).

SUBSTRATE-The bottom of the ocean is called substrate. Many marine habitats take their names from the substrate.

It can be hard, soft, coarse, smooth, muddy, sandy, grainy, shell-covered, pebbly, or boulder-covered.

It can be broken, fissured, shelved, tunneled, caved, or arched

Dead organisms (leaves and roots) can be substrate, too

ASPECT-Called the "slope of the shore", the aspect is important to what lives on it and around it.

Steep slopes bounce waves back without dissipating energy; gradual slopes dissipate the energy without bouncing the waves back.

SOME BIOTIC (LIVING) FACTORS THAT AFFECT MARINE HABITATS:

TO BE FIRST-Sometimes the organism that makes it into a habitat first takes over, spawns profusely (like barnacles), and is hard to remove or displace.

COMPETITION-Organisms crowd each other out by smothering or by biochemical warfare; small differences in suitability give preference to one species over another.

CO-OPERATION-Without realizing it, species co-operate to make life easier for some other species or worse for some other species.

ALTERING THE ENVIRONMENT-Animals graze to suit themselves, and leave a "space" where something else can flourish.

PREDATION-Predators limit the number of grazing animals and remove the sick and dying. Predators help grazers from reaching overpopulation.

DISEASE-The habitat's balance could be upset if a disease removes one or more species totally. Other species would then have a chance to take their places.

EXTREMES-Weather (storms and drought), tectonic upheaval (volcanoes or island forming) and climate (severe heat or cold) can kill a large portion of a population.

