

Division of Marine Environment

The ocean currently covers 71% of the earth's surface. Around two thirds of earth's land area is found in the Northern Hemisphere which means the ocean covers 61% of the total area. The rest (39%) is land however the southern Hemisphere the ocean covers of the area as much as 80% of the area and the rest (20%) is land. marine ecosystem is the largest aquatic system of the planet which includes oceans, coral reefs, and estuaries. Since it is a single large and a complex system, it is very difficult to deal with it as a whole. Therefore the oceanographers have divided the ocean into many zones according to physical characteristics, mainly based on depth, light and temperature. The two major zones of the ocean are the entire sea floor, or bottom region of the sea, called the benthic realm and the watery region above the sea floor is called the pelagic realm. Each of these is further subdivided into many different zones based on environmental conditions.

Pelagic realm

The pelagic realm is further subdivided vertically into five zones viz. epi pelagic, mesopelagic , bathypelagic , abyssopelagic and hadalpelagic zones.

- i. Epipelagic zone It covers from the surface of the ocean and extends upto 200m depth (all light rays are seen here initially) It is also called as the photic zone or euphotic zone.
- ii. Mesopelagic zone -It extends from 200 to 1000 meters depth. It is also called as disphotic zone as; only blue light is seen here. It is also referred to as the "twilight zone"; its lower boundary in the tropics is the 10° C isotherm.
- iii. Bathypelagic zone - This zone extends from 1000 upto 4000 meters deep (aphotic zone; no light reaches this depth, there is total darkness); It lies between the boundaries of water with 10 and 4° C isotherm layers.
- iv. Abyssopelagic zone – It lies below 2000 and extends upto 6000 meters depth (aphotic zone).
- v. Hadalpelagic zone - has a depth of 6000-10000 meters (aphotic zone).

The epipelagic photic euphotic zone is the ideal place for about 90% of all ocean life to live because of warm temperature and sunlight . This is the only zone to support plant life because it has the light needed for photosynthesis. As this region supports diverse plant life, variety of animals such as zooplankton, crustaceans, mollusks, sharks, sting rays, mackerels, tuna, seals, sea lions, sea turtles, etc., are abundant here.

Therefore this region has to plant life though some sunlight penetrates through mesopelagic zone, it is not enough for photosynthesis. However this zone has octopus, squid, and hatchet fish. These animals tolerate cold temperatures, increased water pressure and darkness . Some fish

have extra big eyes to help them see, while others produce their own light called bioluminescence using special organs in their bodies called photophores. Most fish do not chase their food but either wait for it or stalk it. Some have sharp fangs or big mouths to help them catch their food.

The bathypelagic and hadalpelagic zones, do not have as many fish as the earlier zones. The coloration of the fish is black or red, and have bioluminescence (used to lure prey). The shape of the fishes living here is globular (round in shape and no streamlining). Most are weak swimmers live here and the fishes are mostly small but some are large. The eyes of the fishes are almost small or absent.

This zone is also called midnight zone or dark zone. This zone has a very intense water pressure which can be as great as two tons per square inch. Just like the mesopelagic zone, there are no plants and fewer animals which include vampire squid, giant squid, amphipod, slime stars, snake dragon fish, anglerfish, oarfish and gulper eel. The sperm whale dives to these depths search of food. Only about 1 % of all ocean species live in this zone, and some do not have eyes.

The Hadal zone covers the deepest parts of the ocean. This zone is totally dark and cold, with intense pressure. Creatures found here have adapted themselves to the darkness by reducing the use of eyesight. Fishes occurring here do have eyes, and they are usually enormous, which indicates enough flashes of bioluminescent light to keep their eyes from totally deteriorating.

Benthic realm

The term benthic, means the bottom ranging from the deepest parts of the ocean to the tide influenced areas. The most productive region of the benthic zone is the area over the continental margin, which is unaffected by the tides. Many groups and varieties of animals live here, a few are worms, sea pens, crustaceans, stars, and protozoa. The life in this zone is mostly made up of bottom dwellers which get most of their food from dead and decaying organisms. Therefore most of the organisms in the benthic zone are scavengers because they depend on dead flesh as their main food source.

A cross section of the ocean, from the shore line to the deepsea, showing the location of major habitats.

- i. Intertidal zone – the area between the lowest low tide and highest high tide markings, it is sometimes called the littoral zone.

- ii. Sublittoral zone – from the lowest low tide mark to the shelf break, about 200 m deep. This area essentially coincides with the continental shelf.

- iii. Bathyal zone – from the shelf break to 4000 m. This area coincides with the continental slope and rise.

- iv. Abyssal zone – from 4000 to 6000 m. This includes the average depth of the deep ocean floor.

- v. Hadal zone – sea floor deeper than 6000 m. This includes the trenches, the deepest part of the sea floor.