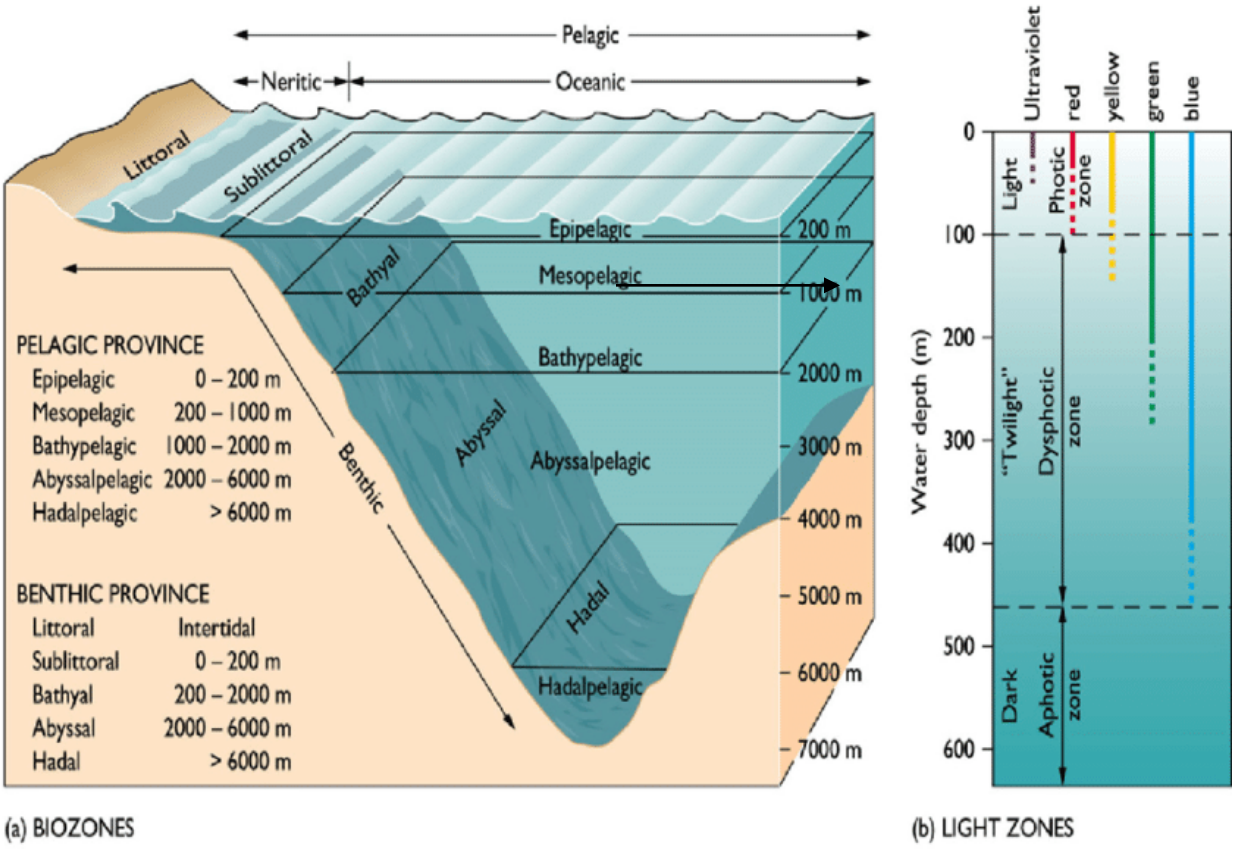
Divisions of Marine Environment

Introduction

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 in the southern Hemisphere the ocean covers 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 most basic division of the ocean based on location is between the water column and the bottom. The water portion is called the ***"Pelagic zone"*** (Greek *pelagikos* meaning *sea*) and the bottom is called the *Benthic zone* (Greek *benthos meaning depths of sea*). Each of these has subdivisions.

Mariana Trench or Marianas Trench is the deepest natural trench in the world.



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Photic or euphotic zone:

The photic zone, euphotic zone (Greek for "well lit" or "light"), or sunlight (or sunlit) zone is the uppermost layer of water in a lake or ocean that is exposed to intense sunlight. It can also be measured as the depth where at least 1% light is available. This is the zone for primary production and respiration.

Aphotic zone:

The aphotic zone (aphotic from Greek prefix "without light") is the portion of a lake or ocean where there is little or no sunlight. It is formally defined as the depths beyond which less than 1% of sunlight penetrates. Consequently, bioluminescence is essentially the only light found in this zone. Most food in this zone comes from dead organisms sinking to the bottom of the lake or ocean from overlying waters.

The depth of the aphotic zone can be greatly affected by such things as turbidity and the season of the year. The aphotic zone underlies the photic zone, which is that portion of a lake or ocean directly affected by sunlight. Depending on how aphotic zone is defined, the aphotic zone of the ocean begins between depths of roughly 200 m (660 ft) to 1,000 m (3,300 ft), and extends to the ocean floor. Temperatures can range from roughly 0 °C (32 °F) to 6 °C (43 °F. Unusual and unique creatures dwell in this expanse of pitch black water, such as the gulper eel, the giant squid, the anglerfish, and the vampire squid.

Pelagic realm

The pelagic realm or zone is divided into 2 horizontal zones- **neritic** and **oceanic**. The neritic zone is the water area between the low tide marks to the edge of the continental shelf. Instead of neritic many use the term *continental shelf or coastal.*

The oceanic zone is the open water area beyond that. The oce- anic zone is further divided into vertical regions called the epipelagic zone, mesopelagic zone, bathypelagic zone, abyssalpelagic zone, and hadalpelagic zone. These vertical regions can also be labeled as sunlit, twilight, midnight and abyssal (the very deep region).

Epipelagic zone:

The epipelagic zone is the top layer that sunlight penetrates (Greek *epi* meaning *over* or *before*). It extends up-to 200m depth (all light rays are seen here initially). It is also called as the photic zone or euphotic 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.

The majority of the epipelagic zone receives sun- light and lies in the photic zone - also simply called the sunlit zone. The photic zone is further divided between the euphotic (lighted) and dysphotic (dimly lit) zones. The aphotic zone is in constant dark- ness and comprise the seas below approximately 1,000 meters (3,280 feet).

Mesopelagic zone (Greek mesos meaning middle):

It extends from 200 to1000 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^{o} C isotherm. “Heterotrophic bacteria” is dominant sp. in this zone.

Though some sunlight penetrates through this zone, it is not enough for photosynthesis. However this zone has octopus, squid etc. There animals tolerate cold temperatures, increased water pressure and darkness (like Squid and cuttlefish). 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 don’t chase their food but either wait for it or stalk it. Some have sharp fangs or big mouths to help them catch their food.

Bathypelagic zone (Greek bathos meaning deep):

This zone extends from 1000 up-to 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^{o} C isotherm layers.

Abyssopelagic zone (Greek abyssos meaning bottomless):

It lies below 2000 and extends up-to 6000 meters depth (aphotic zone).

Hadalpelagic zone (Greek Hades meaning the underground abode of the dead)-

It has a depth of 6000-10000 meters (aphotic zone). The Hadal zone is 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.

Collectively, these zones (bathypelagic, abyssalpelagic, and hadalpelagic) are simply called the “midnight” zone. 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 have is globular (round is shape and no streamlining). Most the 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.

Benthic zone:

The benthic zone is divided based on depth. Moving from shore toward the open ocean, the first zone is the supralittoral zone (Latin supra meaning upper and litus meaning shore). This is the zone that water splashes, but does not remain submerged. Beyond that lies the littoral zone. It is defined as the water area near the land or shore.

Beyond the littoral zone is the continental shelf. This area is divided into the sublittoral zone, which is the ocean bottom close to shore, and the outer sublittoral zone, which is the ocean bottom out to the edge of the continental shelf. The bathyal zone is the bottom along the continental slope down to the deep open ocean bottom. The deep open ocean bottom is called the abyssal zone. The deepest zone, areas below 6,000 meters (19,685 feet), is the hadal zone. Commonly you'll hear the bathyal, abyssal, and hadal zones.