



The Deep Sea: The Largest Habitat on Earth

An Oceans and Communities Fact Sheet

What is the Deep Sea?

The oceans cover 71% of the Earth's surface. And while we are familiar with the oceans from the perspective of the shore and the creatures that swim along its surface on the high seas, most of us are not familiar with the deep sea and the amazing creatures that inhabit this black ocean.

The ocean is divided in 3 layers: the pelagic, the benthic, and the abyss. These latter two are defined as the deep sea. The benthic lies just beneath the pelagic, and extends from 150 meters to depths of 700 to 1000 meters. The abyss lies beneath the benthic and has been recorded as deep as 11,524 meters. In fact, more than 60% of our planet is covered by water more than a mile deep, making it the largest habitat on earth!

What are Conditions like in the Deep Sea?

The deep sea is characterized by three major conditions – total darkness, extreme cold and great pressure.

Below 150 meters, there is no longer enough light for photosynthesis. The only light is produced through bioluminescence, a chemical reaction that creates light like seen in fireflies. In fact, more than 90% of the animals that live in the mid-water of the deep sea are bioluminescent. Absolutely no sunlight reaches the abyss, creating a black ocean.



The deep sea is also characterized by extreme cold with temperatures ranging from 2-4°C. The exception to this are the hydrothermal vent communities on the ocean floor where hot water gushes out with temperatures as high as 400°C.

The other unique characteristic of the deep sea is the great pressure because of the great volume of pressure overhead. 1,000 meters below the surface, the pressure is 100 times greater. And at 10,000 meters, 1,000 times greater.

Further, the deep sea is an oxygen poor environment and food is scarce, often descending as detritus from decaying plants and animals from the upper ocean zones.

What is Life like in the Deep Sea?

Animals and plants living in the deep sea have adapted to the total darkness, extreme cold and great pressure, resulting in some of most interesting and unique creatures on the earth.

Because the deep sea is an area of darkness, animals have adapted large eyes, developed the ability to produce their own light to attract prey and even potential mates, adapted camouflage colors and transparency to hide from predators, and developed a powerful sense of smell.

To adapt to great pressure beneath the surface, creatures have developed bodies without excess cavities such as swim bladders and soft and flabby bones and flesh.

Due to the limited food supply in the deep sea, some deep sea fish have developed large mouths with extremely long teeth. Other fish, such as the deep sea anglerfish and viperfish, use bioluminescent fins to lure prey. Some deep sea fish also have large, expandable stomachs that can allow them to eat prey as large as themselves.



What are Hydrothermal Vent Communities

One of the most unique and interesting environments in the deep sea is the hydrothermal vent communities. These are places in the ocean floor where water heated to as high as 400°C by molten lava gushes out of cracks in the crust.

As the water moves through this process, oxygen is removed, the water becomes acidic, it picks up dissolved metal, such as iron, copper, and zinc, and hydrogen sulfides, and when the water jets from the vents they form black smokers from the mix of sulfur and metals. The dispelled metals fall around the vents and form chimneys that support a vibrant, living community.

One of the great questions around these communities of tube worms, crabs, clams and other life is how they survive in the absence of life. When the tubeworms were examined, they had no mouth or gut. Scientists discovered that the tubeworms had chemosynthetic bacteria, which could convert hydrogen sulfide into energy, much the same as plants convert sunlight into energy.

What are the Threats to the Deep Sea?

As is the case with every ocean ecosystem, the deep sea is threatened by unsustainable human activities. Deep sea trawling threatens cold water corals and deep sea fish populations. Trash has been found littering the bottom of the sea. Proposed deep sea mining activities could destroy unique hydrothermal vent communities.