

# **A Deep Dive into the Abyss:**

## **Exploring the Opportunities of Hydrothermal Vents**

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Seawater seeps through the cracks in the ocean floor and gets heated by hot magma beneath the earth's crust. The water becomes 'superheated' and loaded with dissolved minerals. Eventually the water will get pushed out of the ocean floor and as the mineral-rich fluids meet the cold ocean water, they cool rapidly. The mineral deposits build up and create the chimneys we see, called hydrothermal vents. Extreme depths and different mineral compositions of the seafloor makes different kinds of vents. Different vents create different niches for special and new species to be found.

The extreme pressure in the deep makes the boiling point of the water hundreds of degrees. With vents as deep as 4000m and temperatures up to 400°C. The sunlight cannot reach this depth, making the ecosystems live in complete darkness with alternative energy sources. Chemoautotrophs serve as primary producers, and the chemicals released from the vents provide the energy source for chemosynthetic ecosystems.

The extreme conditions favor unique species found nowhere else. Species like plastic-degrading microbes with enzymes that can break down synthetic and natural plastics. Fungi, bacteria, and sponges important for medical breakthroughs within cancer research, antibiotics and covid medicine. As well as special and rare octopus and crab species with unique adaptations. Vent microbes diverse physiological process, might offer solutions for more sustainable energy and fuel production.

Studying hydrothermal vents and their surrounding ecosystems, can help us reach multiple sustainability goals. This includes research and development with medicine (SDG3) and increasing scientific knowledge and technology for ocean health, conservation of marine areas and reduce marine pollution (SDG14). It also has potential for affordable and clean energy (SDG8), and industry, innovation and infrastructure (SDG9). Lastly, it can help with reaching responsible consumption and production (SDG12), and climate action (SDG13).

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