Lesson 3 Act for Our Planet

Whales, the Earth's Guardians

Over the past two centuries, human activities have generated a significant amount of carbon dioxide, commonly referred to as CO_2. This gas itself is not dangerous when we encounter it in everyday situations. However, excessive amounts of this gas in the atmosphere have contributed to the greenhouse effect, resulting in a gradual increase in the Earth's surface temperature. To make matters worse, this increase has sped up in recent years and is seriously threatening life on our planet. We must act immediately to stop any further climate change.

While many high-tech solutions such as carbon capture have been proposed, they are often too expensive to be used widely. Fortunately, there are also low-tech, economical, and even long-lasting solutions available. In this report, we will focus on one of the most powerful nature-based solutions to climate change: whales, the giant helpers living under the sea.

Whales are amazing creatures. They are enormous and live incredibly long lives. The largest blue whales can grow as long as 30 meters and weigh over 200 tons, and some whales have been known to live for more than 100 years. These giants do extremely beneficial things for the environment throughout their long lives and even after death. According to scientists, a single whale can absorb about 550 kilograms of CO_2 per year, while a tree can absorb only 22.

Moreover, after they die, whales sink to the ocean floor with all the CO_2 they absorbed during their lives. Their bodies then become food and habitats for deep-sea creatures. This process is called a whale fall. Whale falls permanently bury about 145,000 tons of CO_2 under the sea every year. This achievement is basically what expensive carbon capture technologies aim to do—capture carbon and then store it underground.

In addition to their direct absorption and burial of CO_2 through whale falls, whales also make a significant indirect contribution to reducing CO_2 through an act called a whale pump. This refers to the vertical movements of whales that help circulate nutrients across different depths of the ocean. Whales dive deep into the ocean to feed on prey such as krill and small fish, and they occasionally swim up to the surface to breathe. When they near the surface, they release an enormous amount of waste. This waste is rich in nutrients that are essential for creatures living in that area. Specifically, it creates the perfect growing conditions for some microscopic creatures floating at the surface of the ocean.

These creatures, called phytoplankton, may look tiny and insignificant, but when taken together, they play a significant role in reducing CO_2. They absorb about 40% of the carbon in the atmosphere and produce about 50% of the atmosphere's oxygen. They do this through photosynthesis, a process that creates energy using carbon, water, and light. It is estimated that increasing the world's phytoplankton by 1% is equivalent to planting 2 billion new trees.

Whale pumps deliver nutrients not only to the ocean surface but also to deeper areas of the ocean. As whales swim back down to feed at the ocean's bottom, their movements stir up the water and bring nutrients down to the creatures living below. Whale pumps promote the growth of marine life at various depths throughout the ocean.

Whales spread nutrients in the ocean not only vertically but also horizontally through a process called the great whale conveyor belt. These giant mammals migrate over long distances at certain times of the year. For example, in the summer, humpback whales tend to stay near Alaska, where the water is cold but rich in nutrients and prey for them to feed on. As winter approaches, they travel up to 4,800 kilometers to breed in the warm waters near Hawaii.

Nutrients are relatively scarce in warm waters, which makes it difficult for phytoplankton to survive. Fortunately, when the whales arrive in Hawaii after eating their fill in Alaska, they release a large amount of nutrient-rich waste. This process can be thought of as a conveyor belt that moves nutrients from cold waters to warm waters. These nutrients support the life of many marine animals and, importantly, encourage the growth of phytoplankton even in warm waters. The spread of phytoplankton leads to increased carbon absorption throughout the entire ocean. Whales circulate water and nutrients to every corner of the ocean, helping to combat climate change.

Despite the important roles of whales in our environment, their lives are at serious risk. The number of whales had dramatically dropped until killing them for commercial purposes was officially banned in 1986. It is estimated that the global whale population fell from 4 to 5 million to just over 1 million during the decades before the ban. Today, whales are still threatened by various man-made dangers, such as fishing nets, ship strikes, and microplastic pollution in the ocean.

It is important to recognize that whales are valuable partners in our fight against the climate crisis and that protecting them is an effective and cost-efficient way to address this global challenge. Let's take action to help more whales live longer and healthier lives.