

Human impacts of coral bleaching in the great barrier reef



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How does human impact contribute to coral bleaching of the Great Barrier Reef, and how does this in turn impact the entire ecosystem, as well as the surrounding coastal population?

Introduction

The world's largest living creature stretches 1,400 miles long from tip to tip. The living creature is so large it is visible from space and is roughly half the size of the state of Texas (Great Barrier Reef). While this living creature has no legs, tail, head, and does not move, its effects on the planet are unrivaled. Listed as one of the Seven Natural Wonders, the Great Barrier Reef located off the coast of Queensland, Australia is the largest living structure that is composed of billions of types of organisms. According to the *Australian Government: Great Barrier Reef Marine Park Authority*, the Great Barrier Reef is home to "3,000 coral reefs, 600 continental islands, 1,625 species of fish, 133 varieties of sharks and rays, and 600 types of soft and hard corals" (Australian Government: Great Barrier Reef Marine Park Authority, 2018). Coral reefs, especially the Great Barrier Reef, are currently one of the most biodiverse areas on the planet. However, the coral reef is being threatened and is currently on the verge of complete collapse.

According to an article in *The Atlantic*, "In 2016, the Great Barrier Reef lost about 29 percent of its corals, and in 2017, another 22 percent. All of this was a part of a global bleaching event that lasted for three years from 2014 to 2017" (Meyer, 2018). This problem is only persisting, as the forecast from the U. S. National Oceanographic and Atmospheric Administration (NOAA) for November 2018 to February 2019 indicates that the whole reef has a 60 percent chance of reaching "alert level one," under which bleaching is "

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likely” (Corbett, 2018). Coral bleaching in the Great Barrier Reef that results from human impact will contribute to the suffering of billions of sea life species, resources for millions of people would be lost, and economies would endure a major loss.

Background

Coral bleaching is a serious problem that is greatly affecting the state of the Great Barrier Reef. As stated in *Environment: The Science Behind the Stories, 6th Edition* by Jay Withgott and Matthew Laposata, a coral reef is “ a mass of calcium carbonate composed of the shells of tiny marine animals known as corals” (Withgott & Laposata, 2018, pg 426). According to the NOAA, coral bleaching is when “ corals are stressed by changes in conditions such as temperature, light, or nutrients. They expel the symbiotic algae living in their tissues, causing them to turn completely white” (NOAA, 2018). According to the Arc Centre of Excellence for Coral Reef Studies, “ zooxanthellae are tiny, colourful marine algae, which live inside corals, providing them with much of their color and, most importantly, their primary supply of energy.” However, if the water temperature becomes too warm, such as during climate change, the algae die (CoralCOE, 2018). The loss of these zooxanthellae is what we refer to as ‘ coral bleaching’. “ Without zooxanthellae, coral tissue becomes transparent, revealing the white coral skeleton beneath it” (CoralCOE, 2018). Once this happens, the corals can die if they are unable to recover. However, if the sea temperatures can return to normal, corals can regain their zooxanthellae, but a decrease in reproduction and growth is likely due to the stress that the corals endured. (CoralCOE, 2018). Bleached corals are highly probable to result in a reduction in growth <https://assignbuster.com/human-impacts-of-coral-bleaching-in-the-great-barrier-reef/>

rates, a decrease in reproductive capacity, and an increase in the susceptibility to diseases, along with higher levels of death. Causes of coral bleaching can be attributed to increased water temperatures due to global warming and ocean acidification from pesticides and greenhouse gasses. According to *The Australian Institute of Marine Science*, industries such as Agriculture release a variety of chemicals into coastal waters. Pesticides and fertilizers used in agricultural development projects and at family homes are carried in run off to the sea and have been known to take part in coral reef destruction (Australian Institute of Marine Science). Zooplankton and reef communities are highly susceptible to pesticides. “ The discharge of fertilizers, waste feed, and other materials from aquaculture and agriculture into coastal waters can result in nutrient loading. The introduction of organic compounds results in eutrophication and subsequent oxygen depletion” (Australian Institute of Marine Science). Coral reefs, particularly the Great Barrier Reef, are an important and crucial aspect to the world’s ecosystem. The damages being done to the reef have many impacts.

Environmental Impacts

Coral bleaching in the Great Barrier Reef that results from human impact will contribute to the suffering of billions of sea life species. Coral reefs are among the most diverse ecosystems on Earth. According to Nancy Knowlton of *Smithsonian Ocean*, “ 25% of fish species spend some part of their life cycle in reefs, despite the fact that coral reefs cover less than 1% of the ocean floor” (Knowlton, 2018). Bleaching leaves corals more susceptible to a reduction in growth rates, a decrease in reproductive capacity, and along with higher levels of death that will impact the species that rely on the coral <https://assignbuster.com/human-impacts-of-coral-bleaching-in-the-great-barrier-reef/>

reefs. Severe bleaching kills the corals. Bleaching of corals results in the colorful and biodiverse reef becoming dead, which can no longer support all the fish and other animals that depend on live coral. This brings upon the displacement of thousands of animal species and the potential of extinction. Millions of animals that rely on coral for protection and cover would be negatively impacted. This would also disrupt the natural balance of the food chain as certain species would die off, leaving holes in the food chain. Without corals and the fish species that rely on them, the entire ecosystem crashes, and seaweed forests take over. According to *Algae-Dominated Reefs*, what will be left is “dead coral and algal-dominated ecosystems from which the benefits of coral reefs, or hotspots of biodiversity and productive fisheries, will vanish” (Vroom et al., 2006). In addition to the loss of biodiversity, the Great Barrier Reef protects the Australian coastline from the damaging effects of wave action and tropical storms. The Great Barrier Reef also provides homes and habitats for millions of marine species, provides sources of nitrogen and other crucial nutrients for marine food chains, along with assisting in the fixation of nitrogen and carbon, and help to recycle nutrients. All of these factors work together to make coral reefs “hotspots of biodiversity”. However, complex interactions and threats leave the Great Barrier Reef vulnerable and weak. According to *Climate Change and Its Effect on Coral Reefs*, “climate change will cause the rise of sea levels so that it may result in drowned coral reefs, and more intense storms that produce excessive nutrient or sediment runoff. The overfishing of herbivorous fish and excess nutrients decreases coral’s resilience in the face of increased carbon dioxide; rising ocean acidity lowers the threshold at which corals bleach” (Weston Jr, 2000). The importance of the Great Barrier

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Reef is underappreciated as coral reefs are also key indicators of global ecosystem health. “ They serve as an early warning sign of what may happen to other less sensitive systems, such as river deltas, if climate change is not urgently addressed. Once the tipping point for the survival of coral reefs is passed, the deterioration of other systems may cascade more quickly and irreversibly” (Meyer, 2018).

Social Impacts

Coral bleaching in the Great Barrier Reef that results from human impact will contribute to millions of people losing their most significant resources. The Great Barrier Reef is not just important to the environment, but it is extremely crucial to the human population. The Great Barrier Reef provides people with valuable natural resources, such as foods and drugs. Corals provide housing and shelters, they feed fish, and produce the other marine animals that humans eat. According to *Saltwater Science* published in *Nature* by Jessica Carilli, “ some estimates say that over 1 billion people depend on food from coral reefs” (Carilli, 2013). Without the Great Barrier Reef, people will be forced to find new sources of food. The prosperous environment of coral reefs has also helped scientists and researchers discover new medical advancements. According to the *The Nature Conservancy*, “ the study of marine life has enabled the development of treatments for diseases like asthma, soft-tissue sarcoma, and certain lung cancers. Scientists are also reportedly using bivalves like clams from the Great Barrier Reef to study the aging process, and molecules in certain aquatic invertebrates could have anti-viral, antibacterial, and anti-tumor properties” (The Nature Conservancy, 2018). As the coral in the Great <https://assignbuster.com/human-impacts-of-coral-bleaching-in-the-great-barrier-reef/>

Barrier Reef becomes bleached, the resources people are harvesting from the reef are diminishing and becoming unavailable. The more coral that dies, the less people have, which will impact the lives of millions of people as they have to find new resources to consume. In addition to providing food and medicine, the Great Barrier Reef also provides protection to the tourist-reliant coastlines. According to “ The terrible things that would happen if all the coral reefs died off” published in *Business Insider* , “ the reefs act as natural barriers, canceling out 97% of a wave’s strength and protecting more than 200 million people.... Building seawalls for the same protection costs \$2. 5 million per mile” (Sharma & Reilly, 2018). Without the Great Barrier Reef, the town of Queensland, Australia will become more susceptible to natural disasters since there will no longer be any coral to protect the town, potentially harming thousands of people. The Great Barrier Reef also acts as a place for social interactions among people. Recreational activities, such as those found in the Great Barrier Reef, create cultural and social experiences that people like to visit and that can only be found in the World Heritage spot. The Great Barrier Reef attracts millions of people every year who come to observe and participate in the culture and experiences that can only be found at the reef.

Economic Impacts

The Great Barrier Reef not only has environmental and social impacts, but it also has a large influence on the economy. The Australian government has said that the Great Barrier reef “ contributes at least \$6. 4 billion a year to the economy, and that at least 64, 000 people have jobs that depend on the reef” (O’Mahony et al., 2017, pg 05). Industries such as Australia relies <https://assignbuster.com/human-impacts-of-coral-bleaching-in-the-great-barrier-reef/>

heavily on the revenue that comes from the Great Barrier Reef and as the coral reef becomes bleached, Australia is risking their economic well-being. *Great Barrier Bleached* states that “ polling shows that if severe coral bleaching continues, Great Barrier Reef tourism areas are at risk of losing over 1 million visitors per year and 10, 000 tourism jobs. 175, 000 potential visitors may not come to Australia at all, risking \$1 billion of expenditure per year” (Swann & Campbell, 2016).

Discussion

A future without the world’s largest coral reef is unimaginable. While the Great Barrier Reef is experiencing a lethal crisis, there are solutions that can be done to help solve the disaster. Climate change is considered the most significant threat to the Great Barrier Reef, so reducing the effects of global warming is a top priority. According to *The Atlantic* , “ If climate change continues unabated, all the coral reefs on the planet could be gone within one human generation...That means all the global coral reef systems, with all of its biodiversity and fisheries supporting millions of people around the world, will be wiped out” (Meyer, 2018). There will be cascading effects on the rest of the ocean’s marine habitats as well, and as a result there will be widespread hunger, poverty, and political and economic instability.

Currently, the surrounding area around the Great Barrier Reef are taking steps to limit climate change, however this needs to extend to everyone. The goals are to reduce climate emissions, use alternative energy sources, and be overall more sustainable. In Queensland, Australia, limiting the amount of nutrient runoff is an important action that needs to be taken. “ Recent

advances in agricultural practices and additional government programs has seen a reduction in sediment and nutrient inputs into some coastal river systems, but a long lag time is expected before there are positive effects on marine water quality (Australian Institute of Marine Science). According to an article in *Business Insider*, the Australian government has announced that it plans to spend “ about \$379 million on improving water quality to protect coral reefs; reef restoration; and helping to fight predatory starfish” (Loria, 2018). The Australian government is also attempting to rezone and create new laws for people to abide by in the reef. According to *Protecting Australia’s Great Barrier Reef*, the Representative Areas Program (RAP) took “ a systematic approach to the rezoning to ensure that the range of biodiversity within the Great Barrier Reef was adequately protected. When the revised zoning plan for the marine park came into effect in July 2004, the proportion of the park protected by no-take zones increased to more than 33 percent. This comprises the world’s largest network of no-take zones” (Day, 2011). Also, starting recently in November 2018, project IVF For The Great Barrier Reef has begun. This is an effort by scientists to regenerate dying corals. Professor Peter Harrison, from Southern Cross University, said researchers were collecting millions of coral eggs and sperm. Scientists will grow corals from the samples collected in floating booms for about a week. Once the corals were ready they would be introduced into the most damaged parts of the reef (Robitzski, 2018). A combination of economic, social, and environmental practices can help restore the Great Barrier Reef.

Conclusion

Some of the most vivid colors, unique sea creatures, and breathtaking adventures can only be found in the Great Barrier Reef. The reef offers the opportunity for great adventure and a great opportunity for learning.

However the reef is currently in an extremely fragile state, where the coral are fighting for their lives in a battle between coral bleaching and survival.

Coral bleaching in the Great Barrier Reef that results from human impact will contribute to the suffering of billions of sea life species, resources for millions of people would be lost, and economies would endure a major loss.

The survival of the coral reef is crucial to the survival and well-being of humans because it provides food, medicine, biodiversity, and economic stability. Plans to help fix the Great Barrier Reef include plans to transplant live coral, increase awareness, and reduce the effects of climate change. The Great Barrier Reef has proven to be much more than just 'great', it is indispensable. There is a reason why it is currently listed as a World Heritage site, but mainly for its biodiversity. The amount of organisms and cycles that depend on the survival of the Reef is astronomical. According to *Time*, "reefs occupy just 1% of the world's marine environment, but they provide a home to a quarter of marine species—including a unique set of fish, turtles and algae" (Worland, 2018). Many species could be lost forever. As temperatures continue to rise, it is improbable that reefs will be able to rebuild. The importance of the Great Barrier Reef in Australia cannot be stressed enough.

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