

Impacts Of Ocean Acidification

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A lot of carbon dioxide found on Earth is concentrated in the atmosphere. Much of this gas is absorbed in the oceans, which plays a vital role in the uptake of almost a third of the carbon dioxide emitted by human activities such as deforestation, burning fossil fuels, and industrial operations such as cement production. The atmosphere has a high concentration of carbon dioxide. Once the carbon dioxide moves down and diffuses in the seawater, it produces an aqueous carbon dioxide, which leads to the formation of carbonic acid. Carbonic acid undergoes rapid dissociation, producing bicarbonate ions, which later split down to form carbonate ions. However, hydrogen protons are also produced during the process, thus lowering the pH of the solution and leading to more acidity in the seawater.

A simplified explanation of the issue is that large amounts of carbon dioxide are ejected into the atmosphere through various human activities. This results in global warming and eventual climate change. Most of the carbon IV oxide released to the atmosphere is absorbed in the water bodies, especially the oceans and seas. Despite the fact that this process helps in the reduction of the rate of global warming as well as climatic changes that take place, it also has a direct chemical impact on seawaters, which is referred to as ocean acidification (Carballo and Bell). Ocean acidification has various impacts on both the society and marine ecosystem.

Effects Of Ocean Acidification On Human Beings

Human societies are likely to suffer consequences as a result of changes in marine ecosystems according to the goods and services offered by these ecosystems. The effects suffered by the community can include loss of livelihoods and employment and a decline in revenue, among other indirect economic losses. Some of the impacts experienced include food insecurity. While ocean acidification has the potential to affect food security, the impacted ecologically and commercially significant species respond in differing ways. Among the most sensitive groups include mollusks such as mussels and oysters (The Environmental And Economic Impacts Of Ocean Acidification).

Coastal protection is also bleached. Shorelines are protected from the destructive processes of cyclones and storm surges by marine ecosystems such as coral reefs. These protective barriers shelter the only habitable regions for several island countries. The protective role of these reefs helps in the curbing of property damage, loss of life as well as erosion. Tourism is another sector affected severely by acidification processes. This is majorly tied to the effects of acidification on marine ecosystems such as coral reefs. While these features face erosion and destruction, there could be a likely decline in the number of tourists attracted by these ecosystems. Ocean acidification impacts carbon reservoirs as well as climate regulation. There is a notable decrease in the capacity of an ocean to absorb carbon dioxide with an increase in ocean acidification. This makes the oceans less

effective in the moderation of climate change as they turn more acidic (Review Of The Federal Ocean Acidification Research And Monitoring Plan).

Impacts Of Ocean Acidification On Marine Organisms And Ecosystems

Carbonate is a major building block in seawater, which is reduced by ocean acidification. This, therefore, adversely affects marine organisms such as a variety of plankton and coral by affecting their formation of skeletons and shells while the already existing shells may dissolve. The current pH of the seawater is significantly variable, and an individual organism can adapt to the fluctuations of various pH levels in various phases of their lifetime (Carballo and Bell).

However, there is no uniformity in the impacts of ocean acidification across all species. Some seagrass and algae are likely to benefit from the high concentrations of carbon dioxide as it may enhance their growth and photosynthetic rates. Other species, such as corals, a variety of plankton, and mollusks, can be affected adversely by the more acidic environments. The skeletons and shells of these creatures are likely to become weak and less dense. In a coral reef scenario, this process may make them more vulnerable, exposing them to storm damage and slow rates of recovery (The Environmental And Economic Impacts Of Ocean Acidification).

Adaptation And Mitigation Measures

While undertaking the reduction of global greenhouse gas emissions as the most applicable solution to ocean acidification, the implementation of some challenging actions and decisions can assist in the preparations against adverse impacts associated with ocean acidification. Various management and policy options, applicable at the local levels, outlined below can be necessary for minimizing and reducing the negative impacts of other local stressors. These options can, therefore, help, in the long run, enable marine ecosystems to cope better with the changing climatic and environmental conditions (Review Of The Federal Ocean Acidification Research And Monitoring Plan).

One of the options is ensuring improvements in water quality. This can be done through monitoring and regulation of the localized point sources of acidification from pollutants such as agricultural chemicals and fertilizers, as well as runoff. There can be the regulation of catches to curb overfishing as well as the establishment of long-term bycatch through the development of sustainable fisheries management actions and practices. Another applicable strategy is implementing new and advanced technologies as well as applying various techniques according to the industry.

For instance, in the aquaculture sector, modern forecasting systems have been established with the aim of accounting for seasonal upwellings that result in low pH seawaters to the ocean surfaces, leading to major shellfish die-offs. Sustainable habits can be managed by reducing sediment loading,

enhancing coastal protection, and implementing marine spatial planning. Consequently, marine protected areas can be established and maintained, thus safeguarding the highly endangered and vulnerable marine ecosystems (Review Of The Federal Ocean Acidification Research And Monitoring Plan).

From the precedent, it is notable that ocean acidification is largely caused by human activities that lead to the release of carbon dioxide, which later defuses in water. The process has significant impacts on marine ecosystems as well as human populations. However, a number of strategic options can be applied to deal with this problem.

References

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