



Ocean Acidification's Consequences on Human Associations and Marine Ecosystems

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DESCRIPTION

Ocean acidification is a consequence of the absorption of excess atmospheric Carbon Dioxide (CO₂) by the world's ocean and it is emerging as a critical threat to marine ecosystems and the communities that depend on them. Coastal waters, in particular, face unique challenges due to their proximity to human activities and the potential amplification of acidification effects. This essay explores the implications of ocean acidification in coastal waters, examining its impact on marine ecosystems and the potential consequences for human communities that rely on these valuable environments.

Understanding ocean acidification

Ocean acidification occurs when seawater absorbs carbon dioxide (CO₂), leading to a series of chemical reactions that lower the pH of the water. The primary driver of this process is the increased concentration of CO₂ in the atmosphere, largely resulting from human activities such as burning fossil fuels and deforestation.

Impacts on marine ecosystems

Ocean acidification poses a severe threat to coral reefs, which are already under pressure from rising sea temperatures. The reduced availability of carbonate ions hinders the ability of corals to build and maintain their calcium carbonate skeletons. Weakening coral structures make them more vulnerable to physical damage, disease, and the impacts of extreme weather events.

Shellfish and mollusks: Many marine organisms, including shellfish and mollusks like oysters, clams, and mussels, rely on calcium carbonate to form their shells. Ocean acidification can impede shell formation and weaken existing shells, making these species more susceptible to predation and environmental stressors. This has significant implications for both commercial and subsistence fisheries.

Plankton and food chains: Ocean acidification can disrupt the physiology and reproductive success of plankton, the foundation of marine food webs. Since many marine species, from small fish to large predators, depend on plankton as a primary food source, disruptions in plankton populations can cascade through the entire marine ecosystem, affecting biodiversity and fisheries.

Implications for human communities

Coastal communities heavily reliant on fisheries for livelihoods and sustenance face direct and indirect consequences of ocean acidification. Disruptions in marine food chains can lead to decreases in fish populations, affecting the productivity of fisheries and threatening the economic well-being of communities dependent on seafood.

Cultural and recreational activities: Coastal areas often involve the cultural significance for communities, and ocean acidification's impact on marine ecosystems can undermine traditional practices and cultural identity.

Food security: As ocean acidification disrupts marine food webs, the stability and availability of seafood resources diminish.

Adaptation strategies

Addressing the root cause of ocean acidification involves reducing global CO₂ emissions. Transitioning to renewable energy sources, improving energy efficiency, and implementing carbon capture and storage technologies are essential steps in mitigating the impacts of ocean acidification.

Sustainable fisheries management: Implementing sustainable fisheries management practices, including the establishment of marine protected areas, regulating fishing practices, and promoting ecosystem-based approaches, can enhance the resilience of coastal ecosystems to acidification and other stressors.

Coastal restoration and conservation: Protecting and restoring coastal habitats, such as mangroves, sea grasses, and salt marshes,

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can contribute to ecosystem resilience and provide natural buffers against the impacts of ocean acidification. These habitats also lead a role in sequestering carbon and improving water quality.

Ocean acidification in coastal waters presents multifaceted challenges with far-reaching implications for marine ecosystems and the communities intertwined with them. Recognizing the

interconnectedness of ecological and human well-being is paramount in developing strategies to mitigate the impacts of acidification. By addressing the root causes, implementing sustainable practices, and fostering community engagement, there is a preserving the health and resilience of coastal ecosystems in the ongoing environmental changes.