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Short Communication

Implications of the Coastal Ecosystem and Marine Biodiversity

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DESCRIPTION

The biodiversity of marine and coastal settings can be very rich. However, human activities, pollution, land use, and development along coastlines can place stress on these habitats, which may impede the growth and reproduction rates of coastal flora and wildlife. In consequence, this can result in less biodiversity overall.

Even more diverse than tropical rainforests, marine areas are home to some of the planet's most diversified ecosystems. Nevertheless, they are exposed to a variety of stresses that may harm their sustainability and biodiversity. The IAEA studies marine ecosystems using nuclear and isotopic methods and provides advice on how to stop biodiversity loss [1].

The effects of human activity on maritime habitats are significant. Groundwater, surface water, and precipitation are all ways that pollutants from industrial, agricultural, and other human-made activities reach the ocean. Rapid urbanisation and infrastructure growth along coastlines encroach on natural habitats and alter ecosystem function, for instance by altering currents and nutrient distribution [2].

Industrial processes create pollutants that may hinder the growth and reproduction of animals and plants. Sea surface temperatures and ocean acidity may rise as a result of climate change. Additionally, while certain species are overfished, others are threatened with extinction but nonetheless unwittingly get up in the nets of commercial fishermen, becoming what are known as "incidental takes."

Considering that water covers more than 70% of Earth's surface, including more than 97% of it in the marine environment (i.e., our oceans and seas), the marine ecosystem is the second-largest ecosystem after that of the entire planet.

Due to the specific combination of physical variables that make up marine ecosystems, they feature distinctive creatures and characteristics. The numerous physical, chemical, and geological differences that can be found in the water constitute the complex of habitats known as marine ecosystems. The habitats range from very productive near-shore areas to the deep sea floor where only highly specialised species live [3].

The entire effects of climate change and ocean acidification on specific species and ecosystems, as well as on industries like fishing and tourism and the populations who depend on them, are still unknown. Coral reefs have been demonstrated in studies to be highly sensitive to changes in temperature and chemical composition.

Impacts of ecosystems

Wildfires are becoming more frequent and more severe as a result of climate change. In Australia, Brazil, Portugal, Russia, and along the Pacific coast of North America, there have been fires of previously unheard-of size and length since 2017. In addition to endangering human life and releasing carbon stored in the atmosphere, wildfires also emit aerosols, particles, and significant amounts of materials containing soluble nutrients like nitrogen, phosphorus, and trace metals like copper, lead, and iron. To get to coastal and marine habitats, these materials can be transported over great distances by winds and rain. For instance, large-scale phytoplankton blooms and fish and invertebrate mortality in estuaries were brought on by wildfires in Australia [4].

The size and duration of wildfires, the type of burning vegetation, rainfall patterns, riparian vegetation buffers, dispersal by aerosols and currents, seasonal timing, and nutrient limitation in the recipient ecosystem all affect the magnitude and effects of these acute inputs, making their prediction difficult. Therefore, wildfires could have a positive, albeit transient, effect on primary productivity, have no effect, or have negative effects including the death of benthic animals, including corals, due to sedimentation, coastal darkening, eutrophication, or algal blooms [5].

CONCLUSION

The primary production of planktonic, attached, and seagrass depends on the penetration of light into coastal environments.

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However, changes in dissolved elements that alter the colour of the water and the amount of suspended particles enhance light attenuation due to climate change and human activity. Freshwater habitats have been "browned" as a result of increased precipitation, storms, permafrost thawing, and coastal erosion due to elevated levels of organic carbon, iron, and particles, all of which are eventually released into the ocean. This darkening is made worse by a further reduction in light penetration caused by coastal eutrophication and algae blooms. Additionally, dredging, bottom fishing, and changes in land use all contribute to more seafloor disturbance, which resuscitates sediments and raises turbidity.

These modifications might have an impact on the chemistry of the ocean, including the photochemical breakdown of dissolved organic carbon and the production of hazardous compounds. Coastal darkening may have some benefits, such as preventing coral bleaching on shallow reefs, at moderate intensities, small spatial scales, and during heatwaves. However, at high intensities and extended spatial and temporal extents, lower light-regimes may contribute to cumulative stressor effects, drastically altering ecosystems.

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