Bioaccumulation and ecological aspects in tropical marine food.

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Abstract

Multiple environmental pressures caused by global warming and human activities have heightened public concern about PAH pollution in tropical marine coral reef regions (CRRs). However, the trophodynamics of PAHs in CRR food webs and the influencing factors have not been reported. This study investigated the occurrence, trophic amplification, and transmission of PAHs in various organisms in CRRs of the South China Sea (SCS); revealed their driving mechanisms; and investigated the trophodynamics of PAHs in the coral reef ecosystem's food web.

Key words: PAHs, Coral reef organisms, Trophic amplification, Trophodynamics, Driving mechanisms.

Introduction

As human populations expand adjacent to these communities, the negative effects of chemical contaminants on tropical marine ecosystems are becoming increasingly concerning. Streams and ground water in watersheds carry a variety of chemicals from agricultural, industrial, and domestic activities, while winds and currents transport pollutants from atmospheric and oceanic sources to these coastal ecosystems [1]. In the context of ecosystem management and ecological risk assessment, the implications of the limited information available on the effects of chemical stressors on mangrove forests, seagrass meadows, and coral reefs are discussed.

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Heavy metals, petroleum, and synthetic organics such as herbicides and pesticides have all received attention. Heavy metals have been found in all three ecosystems, causing physiological stress, decreased reproductive success, and even death in associated invertebrates and fishes. Oil spills have caused the devastation of entire coastal shallow-water communities, with recovery having taken years. Herbicides are especially harmful to mangroves and seagrasses, and they disrupt coral animal-algal symbioses [4]. Pesticides disrupt chemical cues that are responsible for key biological processes such as reproduction and recruitment in a variety of organisms. Long-term recovery, indicator species, and biomarkers for tropical communities are all underexplored.

However, as natural resource exploitation spread from temperate regions to the tropics in the late 1960s and early 1970s, environmental concerns led to numerous reports documenting the decline of these ecosystems. Scientists now agree that exposure to sedimentation, nutrient loading, and chemical contaminants, as well as physical habitat destruction associated with human harvesting of wood and food, mining of coral block and limestone, and dredging and filling for construction, has degraded, if not destroyed, shallow-water tropical marine ecosystems in many areas. Destruction of these important ecosystems, which form and protect land masses from the open ocean, has serious ramifications in areas prone to tropical storms, hurricanes, and typhoons. Disruptions in these ecosystems' ecological processes affect not only the resident organisms, but also the humans who rely on them for food and recreation [5].

Corals are extremely sensitive to changes in environmental conditions such as light levels, nutrients, and temperature that are outside of their normal range. Such changes have an impact on the coral-algal symbiosis and, as a result, calcification and the entire reef community. The death of key organisms on the reef, or the transition from an autotrophic (suspension/detritus-feeding) community to a heterotrophic (suspension/detritus-feeding) community, shifts the dominant ecological process from calcium carbonate deposition to erosion. Many organisms (for example, urchins, sponges, and fish) contribute to the destruction of the reef and the formation of sand.

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Conclusion

As a result, considering chemical contamination can be useful in assessing the state of a tropical marine ecosystem and predicting the likelihood of its demise or recovery under various management scenarios. Researchers must conduct research that is relevant to managers and includes quantification of various effects and interactions, such as physical and biological stressors and overfishing. The ecological risk assessment process can help to sort out the relative risks at specific sites in order to strengthen management. The goal of scientists and managers concerned with the protection of these vulnerable ecosystems should be prevention through early detection and appropriate action. With a better understanding of how tropical marine ecosystems function, management practises can be developed to both reduce and mitigate the negative effects of controllable human activities on these biological communities.

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