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Monitoring and Assessment of Microplastic Pollution in Coastal Zones: Sampling Methods and Spatial Distribution Characteristics

With the widespread use and disposal of plastic products, microplastics have emerged as a significant environmental pollutant garnering global concern. Coastal zones, as key interfaces where terrestrial pollutants accumulate, serve as major sinks and dispersal areas for microplastics. Due to their small particle size, wide distribution, and persistence, microplastics pose potential threats to marine ecosystems and human health.

Accurate and scientific monitoring forms the basis for assessing microplastic pollution. Various sampling methods have been developed for coastal microplastic studies, including flotation techniques, density separation, net trawling, and sediment sampling. Each method has specific advantages and limitations depending on the particle size and morphology of microplastics targeted. Selecting and optimizing sampling strategies to improve data representativeness and comparability remains a research focus in this field.

This study aims to systematically evaluate sampling techniques for coastal microplastics, comparing their applicability and efficiency. Combining chemical analyses and morphological identification, the study will characterize microplastic particle types, size distributions, and pollution intensity. Using spatial statistics and Geographic Information System (GIS) tools, the spatial distribution patterns and potential migration pathways of microplastics in coastal zones will be analyzed, along with key environmental factors influencing their distribution.

The results will provide scientific support for marine environmental management and pollution control, promoting accurate monitoring and assessment of microplastic pollution, and contributing to the protection and restoration of marine ecosystems.