

Keynote Lecture 3 (Theme 1: The role of meiobenthos in ecosystem function)

Meiofauna matters: The roles of meiofauna in benthic ecosystems

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Sedimentary habitats cover most of the ocean bottom and therefore constitute the largest single ecosystem on earth in spatial coverage. The benthic ecosystem contributes to human well-being by providing essential services such as food production and nutrient cycling. Although meiofauna are well-recognised as an abundant and ubiquitous component of benthic communities, empirical evidence of their wider role in marine ecosystems is scattered across the literature. Some ecologists and decision-makers thus remain sceptical about what meiofauna can tell us about the provision of ecosystem services. We investigated empirical evidence on the roles of meiofauna in benthic ecosystems using a conceptual model that links the supply of an ecosystem service, the ecosystem processes that contribute to that service (e.g. production, consumption and decomposition of organic matter, nutrient regeneration, energy transfer to higher trophic levels etc.) and the meiofaunal activities (e.g. movement, feeding etc.) that regulate those processes. Meiofauna activities modify a series of physical, chemical and biological sediment properties. They do so often simultaneously by, for example, displacing sediment grains during burrow construction and, at the same time, displacing organic matter and microorganisms within the sediment matrix during feeding. We show that these modifications affect various ecosystem services including sediment stability, biochemical cycling, waste removal and food web dynamics directly and indirectly, positively and negatively, and at various spatial and temporal scales. Meiofauna can mediate ecosystem processes in sediments with little or no macrofauna, thereby increasing the resilience of those benthic ecosystem processes that are essential for the continued delivery of ecosystem services desired by society. This is of growing importance since benthic ecosystems are under increasing anthropogenic pressure. Whilst studies over the past five decades have emphasised the important roles meiofauna play in benthic ecosystems, future studies will need to determine how consistent and widespread these roles are.