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TITLE: Eco?engineering urban infrastructure for marine and coastal biodiversity: Which interventions have the greatest ecological benefit?

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ABSTRACT:

Abstract Along urbanised coastlines, urban infrastructure is increasingly becoming the dominant habitat. These structures are often poor surrogates for natural habitats, and a diversity of eco?engineering approaches have been trialled to enhance their biodiversity, with varying success. We undertook a quantitative meta?analysis and qualitative review of 109 studies to compare the efficacy of common eco?engineering approaches (e.g. increasing texture, crevices, pits, holes, elevations and habitat?forming taxa) in enhancing the biodiversity of key functional groups of organisms, across a variety of habitat settings and spatial scales. All interventions, with one exception, increased the abundance or number of species of one or more of the functional groups considered. Nevertheless, the magnitude of effect varied markedly among groups and habitat settings. In the intertidal, interventions that provided moisture and shade had the greatest effect on the richness of sessile and mobile organisms, while water?retaining features had the greatest effect on the richness of fish. In contrast, in the subtidal, small?scale depressions which provide refuge to new recruits from predators and other environmental stressors such as waves, had higher abundances of sessile organisms while elevated structures had higher numbers and abundances of fish. The taxa that responded most positively to eco?engineering in the intertidal were those whose body size most closely matched the dimensions of the resulting intervention. Synthesis and applications . The efficacy of eco?engineering interventions varies among habitat settings and functional groups. This indicates the importance of developing site?specific approaches that match the target taxa and dominant stressors. Furthermore, because different types of intervention are effective at enhancing different groups of organisms, ideally a range of approaches should be applied simultaneously to maximise niche diversity.

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