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TITLE: Landscape transformation alters functional diversity in coastal seascapes

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ABSTRACT:

The ecological impacts of landscape modification and urbanisation have transformed the composition of plant and animal assemblages, and altered the condition of ecosystems globally. Landscape transformation influences the spatial distribution of species and ecological functions by selecting for generalist species with wide ecological niches, which can adapt to opportunities in highly modified environments. These effects of landscape modification can shape functional diversity on land, but it is not clear whether they have similar functional consequences in the sea. We used estuaries as a model system to test how landscape transformation alters functional diversity in coastal seascapes, and measured how variation in level of urbanisation, catchment modification and habitat loss influenced fish diversity across thirty-nine estuaries in eastern Australia. Fish were surveyed with baited remote underwater video stations and functional diversity was indexed with three metrics that describe variation in the functional traits and niche space of assemblages. The extent of landscape transformation in the catchment of each estuary was associated with variation in the functional diversity of estuarine fish assemblages. These effects were, however, not what we expected as functional diversity was highest in modified estuaries that supported a large area of both urban and grazing land in their catchments, were bordered by a small area of natural terrestrial vegetation and that contained a moderate area of mangroves. Zoobenthivores and omnivores dominated assemblages in highly modified estuaries, and piscivorous fishes were common in natural waterways. Our results demonstrate, that the modification and urbanisation of ecosystems on land can alter functional diversity in the sea. Intense landscape transformation appears to select for abundant generalists with wide trophic niches, and against species with specialised diets, and we suggest that these changes might have fundamental consequences for ecosystem functioning in estuaries, and other highly modified seascapes.

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