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TITLE: Shading impacts by coastal infrastructure on biological communities from subtropical rocky shores

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ABSTRACT:

Summary Artificial shading has been highlighted as an important human disturbance, affecting both productivity and community organization. However, studies of shading have been poorly explored from an environmental impact perspective. We compared community structure on subtropical rocky shores in areas shaded by human constructions with those in unshaded areas. We then implemented a manipulative field experiment to determine the effects of shading on the macrobenthic community, biofilm biomass and larval recruitment. Shading consistently affected the biological community of rocky shores. The biomass and cover of macroalgae and the size of most sedentary grazers were smaller in shaded habitat. In the infralittoral fringe, we recorded a shift in dominance from macroalgae in unshaded habitats to invertebrate filter feeders in shaded ones. In a similar way, the community from the mesolittoral was also affected by shading but not at all locations. Experimental manipulation of shading led to a total loss of macroalgae from the infralittoral fringe and no community replacement over a period of 220 days. In the mesolittoral, oysters became more abundant in shaded conditions, while barnacles decreased in abundance. Larval recruitment was also affected, with oysters and barnacles recruiting more in shaded habitats. Synthesis and applications . We demonstrate a clear impact of shading by artificial human-made structures on patterns and processes regulating biodiversity on rocky shores and thus consequences for coastal ecosystem functioning. We argue that shading by artificial coastal structures, such as those proposed in the port expansion in our study site in south-eastern Brazil, is potentially underestimated. Our work emphasizes the importance of careful evaluations of artificial structures in order to promote sustainable coastal development. As a result, we do not recommend the proposed expansion by suspended structures of the port of São Sebastião, as the consequent shading will negatively affect the biodiversity and ecosystem functioning of the Araçá Bay and surrounding areas.

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