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Ecological consequences of coastal and offshore marine urban developments: the jellyfish aspect

Martin Vodopivec (1), Álvaro Peliz (2), and Alenka Malej (1)

(1) National Institute of Biology, Marine Biology Station, Slovenia (vodopivec.martin@gmail.com), (2) Instituto Dom Luiz, Faculdade de Ciencias da Universidade de Lisboa, Portugal

Marine urbanization is increasingly altering the global seascape. Shoreline hardening to protect people and property from coastal hazards, development of touristic, transportation and aquaculture infrastructure resulted in more than 50 % of modified shoreline in several areas of developed countries. Worldwide demand for energy and for renewable energy in particular, has resulted in a growing number of offshore installations expanding previously local ecological consequences to larger scale effects. Even though the concrete and steel structures have proved to offer considerable amounts of substrate suitable for attachment of Scyphozoan polyps, the influence of marine urbanization on jellyfish populations is often overlooked. We have set up a high resolution circulation model and coupled it with an individual based model to form a biophysical computer model of moon jellyfish. We used it to analyze the impact of moon jellyfish polyp populations that have established themselves in some ports and offshore gas-drilling platforms in the Adriatic sea. The model has been qualitatively verified using citizen science campaign observations. Our results show that man-made structures have significant impact on moon jellyfish presence in many coastal areas. This clearly indicates that the jellyfish aspect of marine urbanization should be considered in future ocean governance plans and that biophysical modeling could be the right tool for that.