

Title:

Cross-scale connectivity of macrobenthic communities in a patchy network of habitats: the mesophotic biogenic habitats of the Northern Adriatic Sea

Authors & affiliations:

Vinko Bandelj*¹, Cosimo Solidoro¹, Célia Laurent¹, Sara Kaleb², Fabrizio Gianni¹ and Annalisa Falace²

1 National Institute of Oceanography and Experimental Geophysics-OGS, Trieste, Italia,

2 Department of Life Sciences, University of Trieste, Trieste, Italia

Abstract:

Connectivity is an important factor affecting stability, resilience and recovery of marine populations, in particular in networks of patchy habitats as the Mesophotic Biogenic Habitats (MBH) of the Northern Adriatic Sea. Specific information on the dispersal behaviour of many species inhabiting these habitats is lacking, thus we performed connectivity simulations over different pelagic propagules duration (PPD) and different reproductive seasons, trying to cover the majority of the possible dispersal behaviour variability. Significant negative correlations between connectivity and beta diversity among the studied sites, and a significant, albeit small, contribution of connectivity in a regression model of beta diversity, revealed that hydrodynamic connectivity can explain a share of beta diversity that cannot be accounted for by geographic proximity of the sites. We further analysed connectivity simulations with graph analysis methods by characterizing each connectivity graph and identifying sites with greatest individual and group centrality. Results showed that species with different PPDs follow greatly different dispersal dynamics, and that the network of studied MBHs does not rely on coastal benthic populations for replenishment. Our results also made possible a critical appraisal of the current network of protected areas, evidencing gaps and suggesting possible improvements for an efficient preservation strategy of these unique biodiversity hotspots.

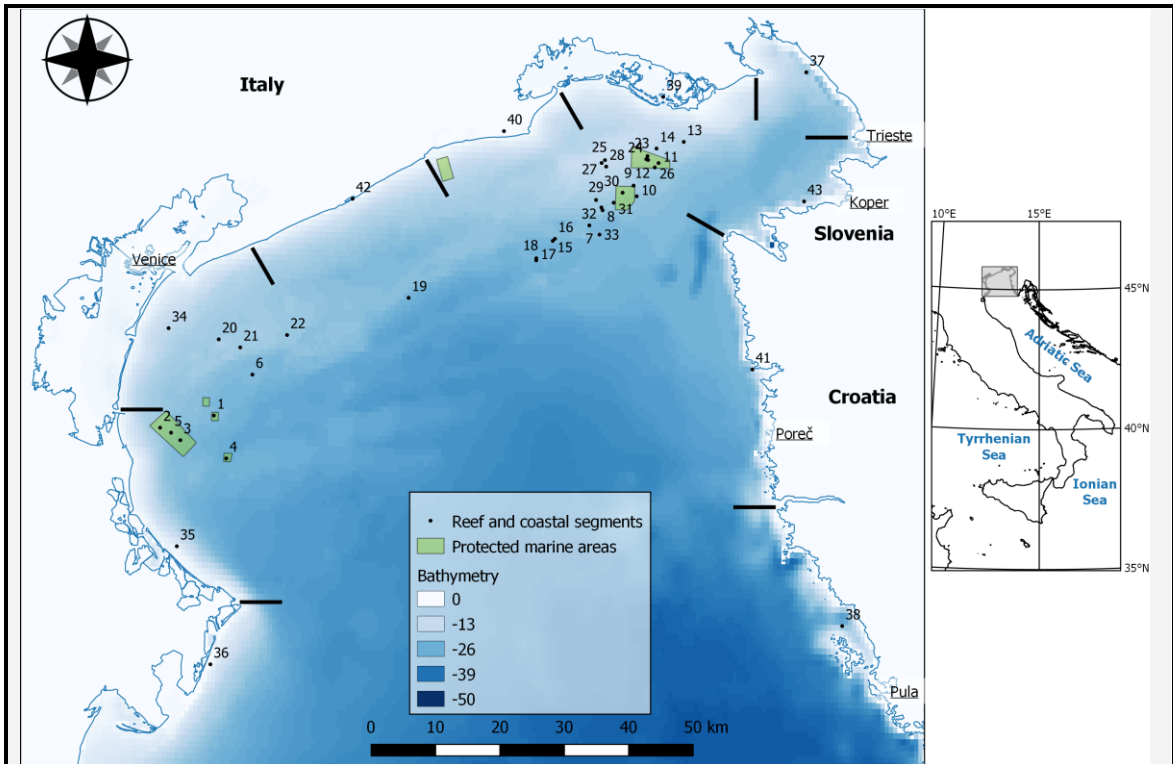


Figure 1: Study area. Black lines show approximate boundaries of coastal segments used for connectivity simulations. Green polygons show the position of protected marine areas.

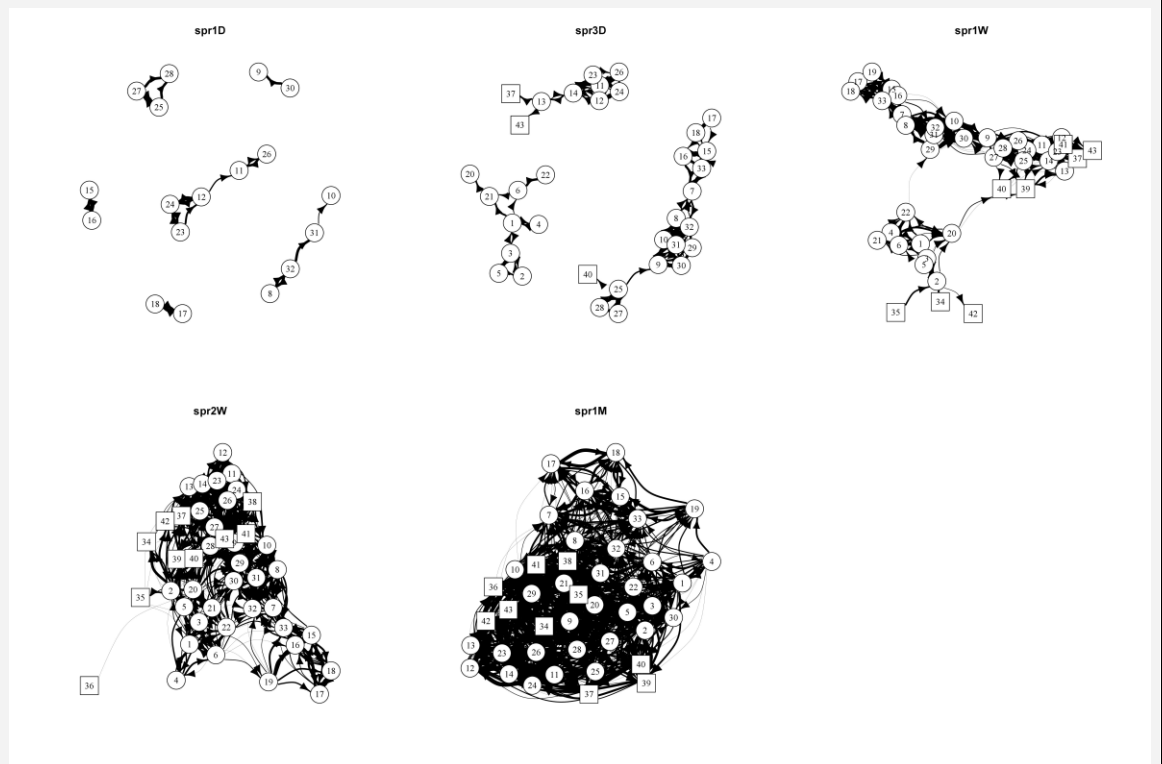


Figure 2: Connectivity graphs for spring at different PPDs. Circles = biogenic reefs, squares = coastal segments.