Assessing natural capital and ecosystem services in marine ecosystems: the case study of the Strait of Sicily (central Mediterranean)

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The Strait of Sicily (central Mediterranean Sea) is identified as a biodiversity hotspot able to provide multiple ecosystem services, supporting human life at different scales. However, the Strait of Sicily is one of the most threatened areas in the Mediterranean basin. Anthropogenic pressures are degrading its natural capital and the ability to provide ecosystem services, negatively affecting human well-being. In this context, the present study aimed to implement a multimethodological assessment framework to assess natural capital and ecosystem services in the Strait of Sicily, tracking changes over time. Combining Environmental and Ecosystems Accounting and conventional ecological indicators, the ecological and economic value of natural capital and ecosystem services was assessed.

The Eco-exergy method, coupled with the Shannon diversity index, was implemented to account for the complexity and organizational level of demersal natural capital stocks, monitoring changes in the last fifteen years. In addition, spatial and hotspot analyses were applied to identify areas exhibiting high natural capital and diversity values. Moreover, a set of environmental variables was investigated to link the decline of natural capital to environmental stressors.

The outcomes showed a decline in demersal natural capital stock and diversity, which is closely linked and discussed in relation to the observed trends of environmental variables in the investigated period. In addition, two ecological areas valuable for conservation purposes were identified.

Subsequently, the "System of Environmental-Economic Accounting Ecosystem Accounting" framework was applied to assess a set of ecosystem services provided by the Strait of Sicily, both in biophysical and monetary terms. Extent, condition and ecosystem services flow & use were assessed. Among ecosystem services, food provisioning, carbon sequestration, and nursery function were assessed. The method of willingness to pay for habitat conservation was also applied. Results will be

useful to policymakers in charge of developing strategies to achieve impelling conservation actions and sustainability goals.