

Does the community size distribution influence the diversity-stability relationship? Empirical evidence from fish communities across European seas.

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### **Abstract**

The relationship, if any, between diversity and stability has puzzled ecologists for decades. Most studies use taxonomic classifications to understand why and under what conditions the community is more stable than the sum of its parts. However, fish populations, for example, are known for their strong ontogenetic-trophic niche shift, suggesting a size-based classification of individuals that complement information on its functional role. We propose a size-based approach to study the Diversity-Stability Relationship in order to understand the influence of the size distribution on the stability of the community. Our empirical study is based on a data collection of more than 25.000 fisheries hauls covering most of the European marine ecosystems (Baltic Sea, North Sea, European Atlantic Shelf and the Mediterranean Sea). We compiled long term (>20 years) time series of fish abundances in 23 distinct areas and calculated stability indicators with both the taxonomic and size classification. Our size-based approach provides new insights into the dynamics of communities, complementary to the view offered by taxonomic diversity. Knowing the importance of size distribution in the stability of fish community could provide relevant advices for marine ecosystem based management.

**Key words:** Portfolio Effect, Synchrony, Size spectra, Traits