

## 23. Bridging the Gap Between Ecological Modelling and the Human Dimension – Towards Effective Ecosystem-Based Fisheries Management (EBFM)

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Anthropogenic disturbances, encompassing overexploitation of fish stocks, destructive fishing methods, and global warming have led to changes in fish community compositions and distributions. Understanding how these stressors influence the relationship between human exploitation and marine ecological systems is one of the main challenges facing sustainable and effective fisheries management. Traditional single-species management methods are being surpassed by Ecosystem-Based Fisheries Management (EBFM), which account for interactions between multiple species using holistic approaches, as well as considering the economic and social factors of fisheries. However, the true potential of EBFM has not yet been realised due to a lack of unification and implementation of management strategies.

This project aims to study the interaction between fleet dynamics (representing social and economic indicators) and the North Sea ecosystem, using a novel food web and individual-based model approach. This will be achieved with the following sub-objectives:

- 1) Utilising a food web dynamic model (OSMOSE), the resilience of sensitive species will be investigated under different scenarios of fishing pressure in an ecosystem context.
- 2) Expanding OSMOSE to explicitly incorporate fishers behaviour, with the development of a novel fleet dynamic model, to study the relationship between ecology and the human dimension.
- 3) Analysing the trade-offs between ecological, economic, and social objectives, via simulations of various management scenarios, contributing to effective EBFM.

The outcomes of this research will assist in creating an operational EBFM framework which intends on increasing fisheries benefits whilst simultaneously reducing ecosystem impacts for future conditions of environmental change and use of marine space.