

---

## Effects of biodiversity on the functioning and stability of marine ecosystems - European scale comparisons (BIOFUSE - RMP 4.4)

---

Tasman Crowe<sup>1</sup> and Lisandro Benedetti-Cecchi<sup>2</sup>

*1 University College Dublin – Ireland*

*2 University of Pisa, Italy*

Although documented global extinctions are rare in the marine environment, local extinctions and dramatic changes in abundance are widespread. The consequences of this loss for the functioning and stability of ecosystems are the current focus of intense research activity, partly because of the threat to the goods and services that ecosystems provide to society. Much of the research to date has been controversial, with disagreement over the role of diversity per se as opposed to the roles of individual species or functional groups. Marine environments are potentially very valuable in resolving this debate because they are diverse at higher taxonomic levels than terrestrial systems and have high levels of functional diversity.

The main aim of this project (BIOFUSE) is to quantify the relationship between biodiversity and the functioning and stability of ecosystems with variable regimes of diversity and disturbance.

There are five specific objectives:

1. Quantify stability at sites of naturally differing degrees of diversity under a range of levels of exposure to natural and anthropogenic disturbance
2. Discriminate between effects on ecosystem function and stability of numbers of taxa or functional groups and their identities (while controlling for changes in overall density/biomass)
3. Test effects of loss of diversity at one trophic level on the functioning of others
4. Quantify the main effects and interactions between intensity and temporal variance of disturbance on ecosystem function under different levels of biodiversity
5. Compare outcomes across systems and geographic regions to test the hypotheses that effects of loss of diversity/key species/functional groups vary depending on:
  - the initial diversity of the system
  - environmental conditions (salinity, substratum, nutrient levels, etc.)

Integrated research is required to achieve these objectives. Existing data sets will be compiled to search for general patterns using meta-analysis. Experiments will be used to test explicit hypotheses on the effects of loss of biodiversity on ecosystem functioning. Sampling and experiments will be replicated at the pan-European scale by the integrated activities of participating institutions, following common experimental designs and standardised methodologies. The details of these experiments and sampling programmes have been finalised at two successful workshops and three of the four main studies have been initiated.

