

These will be used to analyse how ecological resilience relates to the ecological condition of the coast, and thereby construct an indicator (adapted from Carpenter *et al.*, 2001).

The total resilience of the system will be assessed based on the individual values of the communities, through the condition indicator. In most areas, fish are a well-known biodiversity group and thus it is expected that the resulting spatial indicators and framework could be used to promote more sustainable coastal strategies and actions at a global scale. ●

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Additional reading

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Completion of Cost-Impact

By Chris Emblow



COST-IMPACT (COSTING THE impact of demersal fishing on marine ecosystem processes and biodiversity), a Fifth Framework R&D project lead by Melanie Austen from Plymouth Marine Laboratory, was completed at the end of November 2004.

Involving eleven partner institutes in six European countries, Cost-Impact aimed to address potentially conflicting objectives of maintaining sustainable fisheries in European waters while avoiding negative effects on the environment and conserving marine biodiversity.

Specifically, the project set out to provide advice to decision-makers on the impacts of demersal fishing on marine benthic biodiversity and its associated goods and services; how these impacts influence other marine ecosystems processes; and how likely values of goods and services provided by the marine environment are affected by fishing. This balance between science, socio-economics and policy was achieved through a series of well-balanced work packages.

Cost-Impact had three main scientific components:-

- Experimental field and mesocosm studies in Crete, Norway and Poland, examining sediment, water chemistry and macro- and meiofaunal biodiversity;
- Ecosystem modelling of the effects of fishing;
- Environmental economics modelling.

In addition, effort was focused on dissemination and communication of the project aims and results through a reference user group, which was established early on in the project. Through this group, representatives from the fishing and aquaculture industries, environmental managers and policy makers provided external input into the project direction and communication.

Field experimental studies carried out under Cost-Impact brought to light the complexity of the relationship between demersal fishing effects and changes in biodiversity and



Sampling at sea.

environment. In all studies there was a high degree of variability in the impacts of fishing, depending on sediment type, seasonality, trawling effort and biodiversity present. The mesocosm studies showed that removal of large bioturbating taxa through trawling may have important long-term effects on the ecosystem, which may prove to be more important than short-term direct effects such as habitat disturbance. Interactions between bioturbators, biodiversity and organic enrichment highlighted the need to take a holistic approach to managing anthropogenic impacts on the environment. Mesocosm nutrient experiments showed that the effect and role of bioturbating taxa in nutrient cycling patterns was important, and that some significant and complex patterns could be attributed to trawling effects.

In September 2004, the final workshop of the Cost-Impact project was held in Dublin, Ireland. The workshop was the culmination of three years' collaboration between fisheries scientists, benthic ecologists, ecosystem modellers, socio-economists, data managers and marine environmental policy and decision makers. Cost-Impact has been a commendable example of early user involvement through establishing a reference user group, and of the importance of integrating the natural sciences with the socio-economic. The final project report will be available on the project website shortly at www.cost-impact.org, which also gives further details of the Cost-Impact project. ●

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