"GenImpact"

Investigating the genetic co-existence of fishing and aquaculture activities

Although it is generally assumed that fish farming relieves the pressure on wild fisheries, its effects – direct or indirect – on aquatic resources are not yet fully understood, and indeed have been the subject of intense debate.

Particular focus has been placed on the potentially negative genetic impacts of escaped farmed finfish/ shellfish and/or deliberate introductions of farmed and non-native organisms into wild stocks. The perceived risks are often associated with interbreeding with natural populations and the adverse effects of ecosystem interactions.

Public health issues are also a matter of concern. Due to the mass-scale application of biotechnology to increase production – a step which implies the use of transgenic, genomic and cellular technologies – the question of the safety of transgenic fish has become a visible part of the agenda in the discussion on genetically modified organisms (GMOs). It would therefore be in everybody's interest to drastically increase the knowledge necessary to assess the genetic effects of aquaculture on biodiversity, and to disseminate this information to a wider public.

GENIMPACT will **integrate current knowledge of the impact of aquaculture on the genetics of wild stocks and identify future research needs**. The project focuses on the 12 species that already are, or are on their way to become, important aquaculture species in Europe: Atlantic salmon, Atlantic cod, European sea bass, gilthead sea bream, turbot, carp, halibut, scallops, mussels, oysters (European flat oyster and Pacific cupped oyster) and European lobster.

To achieve its goal, GENIMPACT aims to fulfil the following objectives:

- To review and compare the genetic structure and biology of wild and cultured stocks of the selected species.
- To evaluate current methods for identifying the genetic origin of fish and monitoring their occurrence, as well as the fitness of aquaculture individuals, in the wild
- To review the state of the art on the use of modelling tools for assessing the risk of genetic impacts and for evaluating management and conservation strategies for wild populations

To achieve this, GENIMPACT has convened a series of expert workshops on risk assessment, interbreeding and aquaculture ecosystem interactions:

- *Genetics of domestication, breeding and enhancement of performance of fish and shellfish*, Viterbo, Italy, 12 - 17 June 2006
- *Monitoring tools for evaluation of genetic impact of aquaculture activities on wild populations*, Tenerife, Spain, 19-21 October 2006
- *The use of modelling to assess the risk of genetic impacts on wild populations from escapes of cultured fish*, Pitlochry, Scotland, UK, 15–17 February 2007

The gaps in our current knowledge, and the suggested research priorities identified

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during these expert workshops were discussed with stakeholder representatives during a fourth workshop, *Development of management options to reduce genetic impacts of aquaculture activities*, which took place in Thessaloniki, Greece, 19-22 April 2007. The results of this discussion will then be used to develop consensus statements on the "state of the art" as regards genetic impact of farming activities and its implications for aquaculture management, stock conservation and environment safety.

The outcomes of these workshops were made available on the Genimpact web site as a compendium, "Genetic impact of aquaculture activities on native populations", and publicly discussed in a final symposium on *Genetic Impacts from Aquaculture: Meeting the Challenge in Europe*, Bergen, 2-4 June 2007.

Rich biodiversity is important as it provides the raw materials that our society needs. It is essential for the long-term sustainability of agriculture and fisheries and it is the basis for many industrial processes and the production of new medicines. An EC Biodiversity Strategy was adopted in 1998 and related Action Plans in 2001. Most Member States have also developed, or are developing, such strategies and/or action plans.

In 2006, a new Biodiversity Action Plan has been adopted, which states the following:

"At the species level, 52% of Europe's freshwater fish are threatened with extinction and most major marine fish stocks are below safe biological limits. Moreover, many once common species show population declines. This loss of species and decline in species' abundance is accompanied by significant loss of genetic diversity."

EU fisheries and aquaculture have had damaging impacts both on commercially harvested fish stocks, and on non–target species and habitats.

By bringing together scientific information on the genetic impact of fish farming on wild fish stocks, GENIMPACT aims to develop consensus statements on the genetic impact of fish farming activities and its implications, and to establish preventive measures for important aquaculture species, so as to contribute to the conservation of genetic diversity in the long term.

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