Guidance document on Aquaculture and Natura 2000

A summary
Most fisheries in the world are currently near or above sustainable exploitation limits. In parallel, global consumption of fish as food has doubled in the last decades, with a corresponding growth of aquaculture, which is becoming increasingly important in providing fish and sea food.

One of the challenges of the ongoing and expected further expansion of aquaculture activities in inland and marine waters is access to space and environmental sustainability, especially in relation to conservation areas and related permitting procedures. This is particularly true for Natura 2000, a network of sites designed to safeguard Europe’s rarest and most endangered species and habitat types in accordance with two directives, the EU Habitats and Birds Directives, which represent the cornerstones of the Europe’s biodiversity policy.

The aim of the “Aquaculture and Natura 2000” Guidance document, summarized in this leaflet, is to facilitate the knowledge and implementation of EU legislation underpinning Natura 2000 in relation to aquaculture activities, in order to contribute to a better understanding of the conservation objectives of the sites, promoting best practices which illustrate how nature protection provisions can be compatible with sustainable aquaculture development.
Aquaculture in the EU

Aquaculture should be understood as the rearing or cultivation of aquatic organisms using techniques designed to increase the production of the organisms in question beyond the natural capacity of the environment. The organisms remain the property of a natural or legal person throughout the rearing or cultivation stage, up to and including harvesting. It can be characterised in a number of different ways, including the organism farmed, the culture environment, the production intensity and the type of production system used. An understanding of these is key to determining the interactions of aquaculture operations on the environment.

Aquaculture in the EU is made up of three major sub-sectors, which have different histories and characteristics. These are shellfish farming (57% of total production in 2009), freshwater fish farming (18%) and sea fish farming (25%). Shellfish aquaculture produces around the same volume as finfish aquaculture but only represents around 34% of the total value.

Aquaculture in the sea and coastal areas
- **Shellfish farming**: primarily based on specimens born in the wild and on nutrients provided by the environment, the majority of European shellfish are mussels. Oyster farming is also an important activity in the EU. Other shellfish species farmed in quantity in the EU include clams.
- **Marine finfish farming**: the culture of finfish species in the sea can be divided according to the location of the fish farm, which can be placed on the coastal area, or offshore. In the coastal area aquaculture systems can take place in coastal lagoons or in land-based ponds and tanks.

Freshwater aquaculture
Different freshwater fish production systems can be distinguished in the EU mainly based on the intensity of the activity, on the system used to manage water resources and on the species used.
- **Pond fish farming** is the oldest aquaculture activity in Europe, dating back to medieval times.
- **Flow-through systems**: in traditional systems, water passes through the culture system only once and is then discharged back to the aquatic environment.
- **Recirculation aquaculture systems (RAS)** are land-based systems in which water is reused after mechanical, chemical and biological treatment.
- **Cage cultures in freshwater lakes and rivers** also provide limited but important possibilities for freshwater aquaculture in certain water bodies.

Integrated aquaculture
Integrated aquaculture includes polyculture, multi-trophic aquaculture and the integration of aquaculture with other activities, such as agriculture, etc. Integrated multi-trophic aquaculture (IMTA) includes organisms from different trophic levels of an ecosystem (e.g. fish, shellfish, algae), so that the byproducts of one become the inputs of another. Such systems can be used to recycle waste nutrients from higher trophic-level species into the production of lower trophic-level crops of commercial value. Some countries have already launched integrated aquaculture pilot projects.
The EU nature directives

The Habitats Directive (92/43/EEC) is based on the recognition that within the European Union natural habitats are continuing to deteriorate and an increasing number of wild species, part of the EU natural heritage, are seriously threatened. The Directive aims at ensuring their restoration or maintenance at a favourable conservation status through the designation of Special Areas of Conservation (SACs) in order to create a coherent European ecological network, Natura 2000. The network includes also the areas designated as Special Protection Areas (SPAs) pursuant to the Birds Directive (2009/147/EC) on the conservation of wild birds.

The two Directives protect around 1,500 rare and endangered species and around 230 habitat types (including marine and coastal habitats, freshwater habitats, wetlands etc.) so that they can keep or reach a favorable conservation status, especially through the designation and management of sites under the Natura 2000 network.

The Natura 2000 network supports the principle of sustainable development. Its aim is not to ban human activities but rather to ensure that these are undertaken in a way that still allows to reach the conservation objectives, which have been set for the Natura 2000 site (in function of the species and habitat types of European interest present). This principle is underpinned by Article 6 of the Habitats Directive which states that within each Natura 2000 site Member States must:

- take appropriate conservation measures which correspond to the ecological requirements of the protected habitat types and species present on the sites (Art. 6.1),
- avoid damaging activities that could significantly disturb these species or deteriorate the habitats of the protected species or habitat types (Art. 6.2),
- follow the procedure laid down in Art. 6.3 and 6.4 when planning new developments that might affect a Natura 2000 site.
Impacts on nature and wildlife and mitigation measures

Different aquaculture systems may exert different impacts and cause diverse effects on the natural environment, which may include habitat loss or deterioration, species disturbance and the displacement of species as well as changes in local communities.

The effects of different aquaculture systems depend on a number of factors, including the hydrographic conditions of the farm’s location, the type of cultured organisms and the production method, management practices, etc. These factors must all be taken into account when assessing possible risks, together with the sensitivity or vulnerability of the ecosystem to possible pressures from aquaculture activities.

The table illustrates the kind of issues to be considered when assessing different types of aquaculture systems. It must be stressed that these potential impacts do not always appear or might not be relevant for the conservation objectives of a particular site. A case-by-case approach is needed to identify the actual potential impacts, which depend on the environmental and rearing conditions and on the mitigation measures and appropriate management practices that must be applied to avoid or minimize such effects.

The guidelines provide a number of specific suggestions on mitigation measures to be adopted for all aquaculture systems. To furnish some examples:

- for marine cage culture, control and limitation of the stock density can reduce the possible impacts caused by particulate organic waste, while the improvement of feed digestibility, as well as systems to reduce food waste, can also mitigate these impacts;
- the appropriate location of shellfish rafts and longlines in areas with good water exchange, and the adequate dimensioning of the farm using predictive models that allow estimating footprints of benthic loading can minimise the main possible effects of these systems;
- for land-based tank systems for marine species one potential mitigation measure is relative to the outflow water, that before being discharged into the communication canal between the lagoon and the sea, can be microfiltered and settled and purified through a circuit of settling basins in order to allow the absorption of nourishing substances by the microalgae.

By properly implementing relevant EU and national legislation most of the potential pressures and impacts from aquaculture can be prevented or minimized. In addition, the aquaculture operators are voluntarily making significant efforts to apply good management practices (e.g. codes of conduct, monitoring, certification) and organic aquaculture is promoted by the EU.

### Table: Checklist of issues to be considered in different aquaculture systems.

<table>
<thead>
<tr>
<th>Aquaculture system potential impacts</th>
<th>Coastal and marine</th>
<th>Freshwater</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Cage culture</td>
<td>Flow-through system</td>
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<tr>
<td></td>
<td>Shellfish rafts and longlines</td>
<td>Land based ponds</td>
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<td></td>
<td>Intertidal shellfish culture</td>
<td>Lagoon culture</td>
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<td></td>
<td>Bottom shelfish culture</td>
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<tr>
<td>Sedimentation</td>
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<td>Biogeochemical change in water</td>
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<td>X</td>
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<tr>
<td>Chemical input</td>
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<tr>
<td>Infrastructure impact</td>
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<td>Disturbance</td>
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<tr>
<td>Predator control</td>
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<td>X</td>
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<tr>
<td>Interbreeding</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Pathogen transmission</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alien species*</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

* the introduction of alien species for their use in aquaculture is regulated by Regulation 708/2007
Aquaculture can however have also a **beneficial impact** on Natura 2000 sites, providing environmental benefits and services and maintaining suitable habitats (e.g. ponds) for species of EU interest, for instance habitats for water birds.

**Adopting best practices that contribute to biodiversity conservation:**

- The Natural Park of La Brenne in France is made up of near 4,000 ponds created by man from the High Middle Ages. Aquacultural and environmental measures are applied in the park to recreate or maintain favourable conditions for insects, amphibians, birds and fish (creation of open water behind the reeds, creation of shallow, reed beds or planting nymphaea, remove willows invading reed, etc.) to maintain vegetation belts, to avoid fertilization, to manage alien species like coypu, muskrat and crayfish (shooting, trapping, use of filters), etc.

- In some fishponds in Slovakia, a common practice is to prevent the removal of aquatic vegetation, which has led to patches of *Typha* and *Phragmites*. These serve as breeding site for heron-like birds (Purple Heron, Spoonbill, Night Heron), for the Marsh Harrier, for the Bittern, Little Bittern, Red-necked Grebe, Black-necked Grebe (now rare) and the Ferruginous Duck.

- In Czech Republic, the Nesyt Fishpond which is part of the Natura 2000 site “Lednice fishponds” and which hosts fish farming activities has integrated summer drainage as a management measure to create suitable environmental conditions for halophilous plants of exposed pond substrates and for some threatened wetland birds.

**Supporting the systems that provide environmental benefits and services**

- Shellfish culture can provide ecosystem services through the removal of inorganic nutrients from eutrophied ecosystems (bioextraction). Mussels are cultured and harvested as a method of water quality management in areas with diffuse nutrient inputs, e.g. in Sweden.

- Shellfish and seaweed can also be cultured in combination with fish farming, in integrated multitrophic aquaculture (IMTA), where shellfish and seaweed are harvested to compensate for nutrient enrichment due to the metabolism of fish feed. This is under development in Norway and the Mediterranean.
The benefits of strategic planning

A strategic approach to the objectives of different sectoral policies allows them to be examined in an integrated way across a broad geographical area so that a more coherent regional development framework can be drawn up that maximises win-wins and minimises conflicts wherever possible.

Spatial or sectoral planning, along with the associated strategic environmental assessment, has a key role to play in providing guidance and reliable data for the location of aquaculture activities, giving certainty to investors, avoiding conflicts at local level and finding synergies between activities and conservation objectives.

The development and application of maritime spatial planning together with integrated coastal zone management can, for instance, facilitate the allocation of appropriate sites - with the correct water quality - for aquaculture applications, while protecting biodiversity sensitive areas and anticipating risks from, among others, climate change effects, floods or coastal erosion.

Finnish aquaculture site selection plan

The Southwest Finland and Satakunta aquaculture site selection plan is an example of regional planning. The selection plan was prepared by a representative regional expert working group, with delegates from the aquaculture industry, environmental and fishery administration, regional planning organisations and research. Suitable areas were identified and unsuitable areas were excluded. A wide safety zone during the nesting time was modeled around the bird islands in Natura 2000 areas. This makes it unlikely that fish farms have a significant effect to the nature values protected with Natura 2000 sites.
The procedure for aquaculture projects within a Natura 2000 site

Articles 6.3 and 6.4 of the Habitats Directive lay down the procedure to be followed when planning new developments that might affect a Natura 2000 site. The procedure involves three stages: screening, Appropriate Assessment (AA) and, in exceptional circumstances, derogations. Every stage determines whether a further step in the process is required.

The screening stage is to determine whether a plan or project is ‘...likely to have a significant effect...’ on the Natura 2000 site, implying that the Appropriate Assessment will be required. It applies to plans or projects either individually or in combination with other plans or projects. It may be that one aquaculture project alone might not have a significant effect but, if taken in combination with other plans or projects (other fish farms or other developments) within the area, the cumulative effects may turn out to be significant.

The Appropriate Assessment (AA) should address the potential effects on the conservation objectives of the Natura 2000 site from all the aspects of the plan or project, and cover all the stages of the aquaculture project, for instance: site preparation, building or installation of infrastructure and facilities, operation and maintenance activities, decommissioning, etc.. All the potential pressures from the planned aquaculture activities, either through direct overlap (e.g. sedimentation on seabed areas) or induced at a larger scale (e.g. nutrient enrichment), that might have significant effects on the conservation objectives of the Natura 2000 site should be identified and the sensitivity and vulnerability of the relevant species and habitats to those pressures should be considered to assess the risk of significant effects.

Mitigation measures are an integral part of the specifications of a plan or project and should be considered during the AA. In the aquaculture context, they should be understood as technically feasible solutions that are the least damaging for habitats and species and the integrity of the Natura 2000 site as a whole, especially if alternative locations are not feasible.

Once the potential effects of the plan or project have been assessed, it needs to be determined whether it will adversely affect the integrity of the Natura 2000 site, either alone or in combination with other plans or projects.

This decision-making process is underpinned by the precautionary principle. The emphasis should be on objectively demonstrating, with reliable supporting evidence, that there will be no adverse effects on the integrity of Natura 2000 sites. For this reason, the lack of scientific data or information on the potential risk or significance of impacts cannot be a reason to proceed with the plan or project.

The third stage of the process applies in case the lack of adverse effects on the integrity of the Natura 2000 site concerned cannot be ascertained. Article 6.4 of the Habitats Directive establishes a set of conditions which must be met for the competent authority to authorise such a plan or project in exceptional circumstances. These conditions relate to the absence of alternatives, the presence of imperative reasons of overriding public interest and the adoption of all necessary compensatory measures. The latter constitute the “last resort” and are used only when the decision has been taken to proceed with a plan or project that could have an adverse effect on the integrity of the Natura 2000 site.
Example of conservation objectives considered in the Appropriate Assessment

AA of aquaculture developments in Castlemaine Harbour SAC and SPA (Ireland)

A full appropriate assessment process was conducted for multiple aquaculture and supporting projects in Castlemaine Harbour SAC and SPA. The site-specific conservation objectives set by the nature conservation authorities (National Parks and Wildlife Service, NPWS) for the site were considered in the AA:

- To maintain the favourable conservation condition of the following species: sea lamprey, river lamprey, salmon, otter, petalwort, red throated diver, cormorant, light bellied brent geese, wigeon, mallard, pintail, scap, common scoter, oystercatcher, ringed plover, sanderling, bar tailed godwit, redshank, greenshank, turnstone and chough.
- To maintain the favourable conservation condition of the following habitats: estuaries, mudflat and sandflats not covered by seawater at low tide, annual vegetation of driftlines, perennial vegetation of stony banks, salicornia and other annuals colonising mud and sand, Atlantic salt meadows, Mediterranean salt meadows, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria*, fixed coastal dunes with herbaceous vegetation (grey dunes), dunes with *Salix repens* ssp. *argentea* (*Salix arenariae*) and humid dune slacks.
- To restore the favourable conservation condition of alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*.

An example of specific conservation objectives and targets for a marine habitat included in Annex I of the Habitats Directive to facilitate the appropriate assessment process is presented below.

**Objective:** to maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Castlemaine Harbour, which is defined by the following list of attributes and targets:

- **Target 1:** The permanent habitat area is stable or increasing, subject to natural processes
- **Target 2:** The extent of the *Zostera* dominated community is conserved, subject to natural processes.
- **Target 3:** The following community types should be conserved in a natural condition: Intertidal muddy fine sand community complex; Fine to muddy fine sand with polychaetes community complex; Intertidal sand with *Nephtys cirrosa*.
For further reading

This publication represents a summary of the EC Guidance Document on “Aquaculture and Natura 2000”. You can find the complete guidance at:
management/docs/Aqua-N2000%20guide.pdf

http://ec.europa.eu/environment/nature/natura2000/
management/guidance_en.htm