

# THE IMPLICATIONS OF KEY INTERNATIONAL REGULATIONS TO THE MANAGEMENT OF AQUACULTURE

## 1. Introduction

The environmental management of aquaculture is based on many pieces of European legislation, as well as national legislation pertinent to each member state, and by international agreements, including Conventions, signed by member states. Many of the earlier European Commission (EC) Directives may be regarded as having a sectoral basis in that they were focussed on a single use of the environment. More recently, however, there has been a move towards adopting a more holistic approach and providing integrated legislation aimed at protecting all legitimate uses and users, as well as the integrity of the ecosystem.

Depending on the specific activities associated with the practice of aquaculture, it may be subject to one or more relevant pieces of EU legislation governing that activity. In this context, several pieces of primary EU legislation (Table 1) have controls over aquaculture (in some cases these have been over-ridden by the implementation of the Water Framework Directive) and there are also other secondary regulations, decisions and communications.

**Table 1 – Examples of EU legislation/regulations relevant to activities of aquaculture**

<b>Aquaculture Activity</b>	<b>Relevant EU Legislation</b>
<b>General</b>	Shellfish Waters Directive (79/923/EEC) Fish Water Directive (78/659/EEC) Shellfish Hygiene Directive (91/492/EEC) Environmental Impact Assessment Directive (97/11/EC) Dangerous Substances Directive and Daughter Directives (76/464/EEC) Urban Waste Water Treatment Directive (91/271/EEC) Nitrates Directive (91/676/EEC) Species and Habitats Directive (97/62/EC) Integrated Pollution Prevention and Control Directive (96/61/EEC) Birds Directive (79/409/EEC) Water Framework Directive ((COM 2000) 219 final)
<b>Impacts on water quality:</b> - release of organic matter - adding nutrients to the local system - potential for red-tides - reduction in dissolved oxygen	Urban Waste Water Treatment Directive (91/271/EEC) Dangerous Substances Directive (76/464/EEC) Nitrates Directive (91/676/EEC) IPPC Directive (96/61/EEC) Water Framework Directive ((COM 2000) 219 final)
<b>Impacts on the seabed:</b> - placing of structures <i>e.g.</i> cages on the bed	EIA (Annex II - dependant on size of fish farm and extended to intensive farming of all marine fin fish, not just salmon) (97/11/EC)
<b>Indigenous Community:</b> - introduction of non-native species - change in the prey/predator relationship - affect migrating species <i>e.g.</i> salmon - impacts on birds <i>e.g.</i> predation of fish, loss of habitat	Species and Habitats Directive (97/62/EC) Birds Directive (79/409/EEC)
<b>Diseases:</b> - new species may introduce new disease and parasites	Dangerous Substances Directive (76/464/EEC) Water Framework Directive (COM 2000) 219 final)
<b>Fish medicines and Antifouling agents</b>	Urban Waste Water Treatment Directive (91/271/EEC) Dangerous Substances Directive (76/464/EEC) Water Framework Directive (COM 2000) 219 final)

## **2. EC Framework Directive for Water Policy (aka Water Framework Directive; WFD)**

Prior to the ratification of the WFD EU legislation relating to the management of water was rather fragmentary in that it involved many Directives, Regulations, Decisions and Communications. Many of these were aimed at controlling point-source pollution or directed to specific sectors. With the realisation that environmental protection required a more holistic approach, in the 1990s, statutes were adopted such as the Urban Waste-Water Treatment Directive (1991), the Nitrates Directive (1991) and the Integrate Pollution Prevention and Control (IPPC) Directive (1996).

The WFD was designed with the intention of adopting a more integrated approach to water management. The overall purpose of the WFD is to protect surface fresh waters, transitional waters, coastal waters and groundwater in the European Union. This must be achieved through a framework that will produce a sustainable water policy to harmonise the existing piecemeal statutes, to provide drinking water and water for other economic requirements, protect the environment and alleviate the impacts of floods and droughts. Specifically the WFD aims to:

- bring together the management of water under a single piece of European legislation;
- identify all objectives for which water is protected (e.g. drinking, conservation, ecology, bathing) and find remedies to new water issues;
- establish a sound basis for the collection and analysis of data on the state of the aquatic environment on which competent authorities can then develop sensible and sustainable policies;
- increase public participation in the management of water to promote transparency and greater enforceability of the new legislation.

The WFD places an emphasis on ecological status which is defined as the "quality of the structure and functioning of aquatic ecosystems associated with surface waters". This takes into account "the physio-chemical nature of the water and sediment, the flow characteristics of the water and the physical structure of the water body, but it concentrates on the condition of the biological elements of the ecosystem" (COM(2000) 219 Final).

A key target of the WFD is that by 2010 all waters should achieve at least "good" status which is the second of five quality classes (high, good, moderate, poor and bad ecological status), no deterioration, and high status at protected areas. Three different types of criteria are envisaged by the Directive:

- Chemical status - which would be defined in terms of environmental quality standards (EQSs) already set at EC level for dangerous substances;
- Quantitative status of groundwaters dealing with the balance between the level of recharge and abstractions;
- Ecological status of surface waters, which in turn has three components, i.e. of physio-chemical parameters, biological quality and the physical structure of the watercourse.

### **2.1. WFD and the Management of Aquaculture Operations**

By its nature, once fully implemented the WFD will repeal many existing Directives within the water policy field and link with many more (Table 2). The operating requirements of the former group will be assimilated into the new WFD allowing them to be repealed.

**Table 2 – Examples of Statutes which the WFD Links to and Repeals**

Links	Repeals
Groundwater Action Programme (proposal) Drinking Water Directive (79/869/EEC) Bathing Water Directive (76/160/EEC) Integrated Pollution Prevention and Control Directive (96/61/EEC) Urban Waste-Water Treatment Directive (91/271/EEC) and the sewage-sludge provisions Nitrates Directive (91/676/EEC) Species and Habitats Directive (97/62/EC) Birds Directive (79/409/EEC) Environmental Impact Assessment Directive (97/11/EC)	Surface Water Directive (75/440/ECC) Dangerous Substances Directive and Daughters (76/464/EEC) Information Exchange Decision (77/795/EEC) Fish Water Directive (78/659/EEC) Abstraction of Drinking Water Directive (79/869/EEC) Shellfish Water Directive (79/923/EEC) Groundwater Directive (80/68/EEC)

In the context of aquaculture, the Freshwater Fish Water Directive, the Shellfish Water Directive and the Dangerous Substances Directive will be integrated into the WFD, and repealed by 31 December 2007 when all the obligations established under these existing Directives will be put into a more coherent framework covering all waters. In regulating marine cage fish farming, competent authorities in Member States will be required to ensure that areas comply with the Dangerous Substances Directive and the Shellfish Directive throughout coastal and territorial waters by ensuring that both Environmental Quality Standards (EQS) and a BATNEEC-based (Best Available Technology Not Entailing Excessive Cost) approach are utilised.

The setting of EQS (depending on the chemical) is required by the WFD. Monitoring programs shall assess water quantity and the ecological and chemical status (COM(2000) 219 final). This monitoring network will be required to provide a coherent and comprehensive overview of ecological and chemical status within each river basin and to permit classification of water bodies into the five classes i.e. high, good and moderate, poor and bad ecological status.

Annex II, section 1.4 of the WFD requires Member States to collect and maintain information on the type and magnitude of significant anthropogenic pressures on surface waters in each River Basin District. Member States should identify significant point source and diffuse source pollution, in particular substances listed in Annex VIII, from urban, industrial, agricultural and other installations and activities for the purposes of the initial River Basin Management Plan and in the Council Directives 78/659/EEC and 79/923/EEC. As such, any discharges from fish and shellfish farming will be regarded as point-source inputs and thus monitoring information is likely to be required as a precursor to management. Nevertheless, it is likely that any significant aquaculture operations will already be considered under member states' current national legislation. It is important, therefore, that there is consistency between the different management tiers.

Article 4 of the Directive requires Member States to 'prevent deterioration of ecological quality and pollution of surface waters and restore polluted surface waters, in order to achieve good water surface status in all surface waters by 31 December 2010'. Countries will have to assess the susceptibility of the surface waters to impacts resulting from anthropogenic activities and thus they will have to use any relevant information including existing or specially collected environmental monitoring data, to assess the likelihood that surface waters bodies within the River Basin District will fail to meet the environmental quality objectives set for the bodies under Article 4.

Within the context of aquaculture management, especially where there is the possibility of severe organic enrichment, the Directive can be used to limit such effects. However, it is likely that in most countries, enabling legislation will be used as the primary control on activities.

## **2. The Species and Habitats Directive**

In May 1992, the Council adopted a Directive on the Conservation of Natural Habitats and Wild Fauna and Flora, Council Directive 92/43/EEC (the 'Species and Habitats Directive') amended by Council Directive 97/62/EC. This Directive is widely regarded as constituting the most important instrument for European nature protection with an aim to preserve, protect and improve the quality of the environment, including the conservation of natural habitats and of wild fauna and flora. This has been established by Member States through the creation of a series of Special Areas of Conservation (SAC) around Europe, to conserve and protect important European habitats and species from potentially damaging activities. These SACs form part of the *Natura 2000* network, in which areas already classified as Special Protection Areas (SPAs) under the Birds Directive (79/409/EEC), are also included. Key to the success of the SHD is the establishment of good management schemes for SACs and monitoring protocols for habitats and species within these areas, as well as the means by which these can be considered within a Favourable Conservation Status.

### **2.1. SHD and the Management of Aquaculture Operations**

In fulfilling their statutory functions, the competent authorities must ensure that they secure compliance with the requirements of the Species and Habitats Directive, to protect the conservation interests for which any SAC or SPA was designated. Site designations do not result in the exclusion of aquaculture or any other activity as the sites have been designated with the general assumption that present activities have not adversely affected the features for which they were selected. The protection of SACs containing fish/shellfish farms should be achieved through greater and specifically focussed environmental assessment and monitoring with the assumption that aquaculture does not cause any deterioration in the Favourable Conservation Status of species or habitats (depending on the factor(s) underlying designation). As such, the farming production levels and methods employed should be managed through monitoring and any relevant strategies including biomass, feed, chemical use and operational conditions. New, tighter quality standards may be justified for designated waters if the activity is likely to affect the Favourable Conservation Status of an area or species for which the area has been designated (e.g. potential impacts of aquaculture operations on maerl or seagrass beds).

At present, in assessing an application for a new aquaculture operation, competent authorities must treat proposed SACs as though they were already designated. Article 6 (3) of the Directive states that 'any plan or project not directly connected with the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives'. Where any application has the potential to cause significant changes to any SAC, an "appropriate assessment" of the application must be undertaken by the competent authority. In the case of any marine aquaculture operation, the competent authority is charged with refusing consent of any discharge which would adversely affect the integrity of a European site. In addition, the SAC Management Committee will be charged with ensuring that cumulative effects from several activities do not reduce the conservation value and status of an area or species.

Although aquaculture is only an Annex II category scheme within the Environmental Impact Assessment Directive (97/11/EC), proposed schemes should be accompanied by a formal Environmental Assessment when the proposed areas concern sites which lie within, or in a location likely to impinge upon, coastal SACs or SPAs. In most, if not all European countries, it is likely that formal environmental impact assessments will be required as part of the planning acceptance process.

In implementing the provisions of the Directive, Article 22(b) recommends Member States should ensure that the deliberate introduction into the wild of any species, which is not native to their territory, is regulated so as not to prejudice natural habitats within their natural range or the wild native fauna and flora. If necessary, this introduction should be prohibited. There is general concern that the genetic diversity of wild fish stocks could be jeopardised by large numbers of escapee fish from farms which have different genetic characteristics.

### 3. Conventions

At a wider international level, rather than an EU level, there are currently three key International Conventions focussing on marine environmental quality, covering the coastal waters of the EU states. These are the OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic, formed by the amalgamation of the Oslo and Paris Conventions, the Helsinki Convention (HELCOM) for the Protection of the Marine Environment of the Baltic Sea, and the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution. There is also a multitude of other international agreements that have an indirect effect on the monitoring and regulation of marine aquaculture. As with EC Directives, International Conventions are ratified by the signatory States through the implementation of national legislation and regulations.

One of the earlier important outcomes, in this context, was the PARCOM Recommendation 94/6 on “Best Environmental Practice for the Reduction of Inputs of Potentially Toxic Chemicals from Aquaculture Use”. The formulation of this Recommendation was stimulated by the perception that chemicals used in marine aquaculture, such as antimicrobial agents, parasiticides (sea lice control chemicals) and antifoulants, posed a threat to the quality of the marine environment. The clauses were generally targeted at measures to maintain good fish health (thereby reducing the need for medicines), to reduce the use of toxic substances, to establish approval systems for fish medicines and monitoring of residues of chemicals in fish at market, and to limit the release of toxic antifoulants to the sea. The Recommendation proposed the implementation of the following: (i) national Codes of best environmental practice (BEP); (ii) national action programmes incorporating review, development and promotion of BEP; and (iii) the exchange of information between countries on research and development results and experiences with regulatory tools. It did not, however, specifically address the issue of harmonisation across different countries.

Specifically this Recommendation proposed that national bodies should draw up Codes of Best Environmental Practice for the reduction of potentially toxic chemicals from aquaculture use. It set out five elements specifying particular areas of monitoring and management procedures which should be included in BEP codes:

- means of ensuring good health conditions within the stock;
- measures to reduce impact on water quality/environmental quality;
- establishment of an approval system for drugs/chemicals to be used in aquaculture;
- reduction of the output of toxic or potentially hazardous chemicals to marine areas by using certain methods (eight of which are outlined);
- reduction of the output of toxic or potentially hazardous chemicals to fresh water areas by using certain methods (seven of which are outlined).

The Helsinki Convention for the Protection of the Marine Environment of the Baltic Sea Area also recommends a structure of Best Available Technology (BAT) and Best Environmental Practice (BEP) designed to limit the pollution from fish farms in the Baltic Sea and in adjacent coastal areas where discharges enter the Baltic Sea.

It is widely recognised now that the voluntary development of codes of practice, as used responsibly by Producers' Associations, can exercise restraints which lead to a significant quality control. This is a powerful motivational force linked to the necessity to gain competitive advantage, one form of which resides in product quality assurance.

Recent developments from OSPAR have focused on the potential contribution of aquaculture practices to an increase in nutrients concentrations in coastal waters. In this context, the *2003 Strategies of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic (Reference number: 2003-21)*, includes amongst others, the *Eutrophication Strategy*. This document focuses on inputs from activities that may affect nutrient increases, and potentially eutrophication, in coastal systems. The guiding principles of this Strategy are: (i) the precautionary principle; (ii) that preventive action should be taken; (iii) that environmental damage should, as a priority, be rectified at source; and (iv) that the polluter should pay. Key in this context is the identification of coastal areas which may be at danger of eutrophication. This must be done by the Common Procedure for the Identification of the Eutrophication Status of the Maritime Area (the "Common Procedure", Joint Assessment and Monitoring Programme), as described in the *Strategy*, which would lead to the assessment of status of coastal waters. As a function of the outcome of this assessment, measures must be taken to prevent, reduce or eliminate nutrients inputs into those areas, depending on their status (e.g. at risk or affected). Actions should comprise an integrated target-oriented approach, including the definition and use of ecological objectives and standards, and a source-oriented approach, including good housekeeping and husbandry, as well as the follow-up of relevant national and international regulations. Follow up reporting, monitoring and research work must be undertaken over a specific timespan.

In addition, the *Eutrophication Strategy* stipulates that certain supplementary measures must be applied in all areas affected by nutrient inputs potentially leading to eutrophication, which may arise from specific activities, such as aquaculture, specifically the implementation of BAT (best available technique) and/or BEP for these activities.

The key objective and schedule for implementation of the *Eutrophication Strategy* is to "achieve by 2010, a healthy marine environment where eutrophication does not occur".

An update on the implementation of this Strategy is provided in the document *Common Procedure for the Identification of the Eutrophication Status of the OSPAR Maritime Area (Reference number: 2005-3)*.

#### **4. Conclusions**

The approach highlighted above is directed towards the holistic management of coastal systems, and focus on the maintenance of the integrity of the ecosystem characteristics. Consideration of assimilation capacity of water bodies, i.e. the acknowledgement that receiving areas can accept activities without undue effects, is now key. For example, organic discharges, which do not contain persistent pollutants, may be assimilated by water systems without perceived deleterious effects. These aspects are implicit in many recent regulatory instruments, i.e. it is accepted that there should be tolerance towards existing legitimate activities, as long as there is no interference with other uses and users (including effects on favourable conservation status). Assimilative capacity will depend on the water/coast system type and local physical conditions, and should be determined in relation to specific inputs into the system, as well as taking in consideration other activities contributing to inputs of the same substances(s) to the system.