Recommendation on Aquatic Debris from European Aquaculture

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Background

Marine litter is defined as 'any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment as a result of human activity', and is also commonly referred to as 'marine debris'. Marine litter has been recognized as a threat to ocean health since our understanding of the environmental aspects of human actions in the world's oceans started to expand in the 1970s, prompting international regulations to prevent inputs of marine litter, most notably the London Convention, London Protocol and the International Convention for the Prevention of Pollution from Ships, and serving as the focus of several international scientific conferences held since the mid-1980s. The United Nations 2030 Agenda for Sustainable Development includes Sustainable Development Goal 14.1 to significantly reduce marine pollution of all kinds, including marine debris, by 2025.

Until recently the focus of marine litter production has been from the perspective of capture fisheries, and the contribution of abandoned, lost or discarded fishing gear. With the increasing awareness of the impact of plastics on aquatic environments, attention is also being focused on aquaculture. Plastics are used extensively in marine fish farming; for example in cages (e.g. in the pen rings and nets themselves, as well as in feeding systems) in coastal fishponds (e.g. in pond liners) and in shellfish farming (e.g. mussel socks, oyster spat collectors, mussel pegs). These plastics are susceptible to loss through mismanagement, deliberate discharge or from extreme weather events. Whilst global losses of plastics from aquaculture to the aquatic environment are probably lower in volume than from fishing, aquaculture continues to grow worldwide, being the fastest growing food producing sector with an expected growth of 37% by 2030 over 2016 rates.

In the European Union this issue has recently received close attention from a Horizon 2020 project to prevent aquatic debris from aquaculture, 'AQUA-LIT'. AQUA-LIT developed a 'toolkit' that provides more than 400 ideas and solutions to tackle aquatic litter in the aquaculture sector from prevention to recycling. These solutions were co-developed with aquaculture stakeholders in Europe based on the barriers they found in having a good aquatic litter management plan. The toolbox also includes information on which ports have the facilities to receive waste, a database of funding opportunities for aquatic litter projects, an aquatic litter inventory that provides an overview of the available knowledge on aquatic litter originating from the aquaculture sector, a set of policy recommendations for the EU Member States and lastly, specific action plans for outermost regions.

The project has also produced a number of useful reports, including one on policy recommendations to reduce aquaculture litter, a selection of best practices applied to different sea basins, an overview of the global, regional, European, and national action plans and documents that contain measures to reduce or avoid aquatic litter from the aquaculture sector, and an evaluation of the potential impacts that the aquaculture sector might face by 2025 regarding non-organic aquatic litter.

Aquatic debris from aquaculture

In 2018 the EU aquaculture sector generated some 74,000 jobs (c. 40,000 FTE) and 1.2 million metric tonnes (mt) of seafood with a sales value of around EUR 4.1 billion in 2018. EU aquaculture production is mainly concentrated in four countries: Spain (27%), France (18%), Italy (12%), and Greece (11%). It is estimated that there are circa 15,000 aquaculture enterprises in the EU-27.

The EU aquaculture sector essentially consists of three major subsectors, with different history and characteristics: (i) marine finfish (22% by volume); (ii) marine shellfish (54% by volume); and (iii) freshwater finfish farming (24% by volume). Crustaceans and seaweed are also farmed in the EU, but these activities have been developed on a smaller scale.

Unlike fishing gear, there is no internationally agreed classification of aquaculture gear. Compared to aquaculture in the tropics, the temperate aquaculture carried out in the EU takes place in relatively few culture system types. An analysis of aquaculture production data suggests that the majority of EU aquaculture is produced in the following main systems:

1. Cages (also called pens) produce around a third (32%) of EU aquaculture production, mainly in marine waters. Now mainly made of plastic (mainly HDPE), these facilities are by far the biggest user of plastic in terms of volume in the aquaculture sector.
2. The bottom culture of shellfish is the second largest form of aquaculture (24%) and can be sub-divided into two main forms, off-bottom culture where the shellfish is elevated away from the bottom substrate by either plastic bags on steel trestle or on wooden 'bouchot' pole or is directly laid on the bottom substrate and is essentially grown without any in situ infrastructure and is harvested using traditional fishing gear (e.g. dredges).
3. Shellfish are also reared on suspended ropes hanging below rafts and floating longlines. Rafts and floating longlines are two important shellfish production types, both depending upon suspending plastic-based ropes that collect and grow-on bivalves in coastal waters. Like cages / pens, they also rely on an extensive network of mooring ropes and buoys that use high levels of plastics.
4. Most land-based aquaculture uses tanks and raceways at some point in their production cycle, especially during the hatchery / nursery stages, but also for grow-out. Most tanks are plastic or fibreglass, as is the extensive supporting supply / effluent pipe network. Tanks and raceways are developed in a land-based controlled environment with chances of losing anything in the marine environment being very low.

A more traditional approach to land-based farming takes place in earthen ponds. These have relatively little plastic components, although farms in sandier soils may have plastic or synthetic rubber liners to reduced seepage, as well as using predator nets to protect against piscivorous birds and animals. There are few examples of artificial earthen ponds used to rear marine species in the EU. However, marine plastic pollution from ponds has been reported by Finland.

Causes of debris and litter from EU aquaculture

The AQUA-LIT project, whilst acknowledging the exposed nature of much of EU marine aquaculture, does not investigate the causes of debris and litter being abandoned, lost or discarded by aquaculture. The following is a categorisation of aquaculture litter:

a) Low-level losses through routine farming operations.

b) Extreme weather.

c) Inadequate planning and management, including:

    1. Poor siting, modelling, layout, installation and maintenance.
    2. Poor waste management.

3. Limited recycling.
4. Farm decommissioning.
5. Lack of awareness and training.

d) Deliberate discharge

These drivers for plastic loss from aquaculture can be linked in terms of risk to different aquaculture systems. This suggests that open water aquaculture systems such as finfish pens and shellfish rope systems are particularly vulnerable to both extreme weather, as well as routine loss. Coastal ponds and to some extent inland ponds, are less vulnerable, but are still at risk of inundation through flooding. In contrast, entirely terrestrial farms using tanks and recirculating aquaculture systems (RAS) are less vulnerable to the risks listed above.

Recommendations

A number of advice points are provided by the AAC to ensure that EU aquaculture, regarding aquatic debris, is sustainable, responsible and competitive compared to other food production systems. These are aimed at a variety of levels within the hierarchy of the aquaculture sector and are separated into a number of different areas.

1. EU-level policy and planning

1.1. Develop technical guidelines for EU aquaculture, including minimum standards for installing, operating and decommissioning aquaculture installations. These standards should be multi-purpose (e.g. address issues such as preventing stock escapes, facility marking and lighting, as well as reducing the risk of aquatic debris production) and suitable for national and potential third-party certification.

1.2. Possibly as part of the aforementioned technical guidelines, develop advice on the scope, content and rigour of risk assessment methodologies for aquatic debris loss and impact as part of the wider environmental and social impact assessment requirements. Encourage these to be seen as a practical risk reduction strategy, rather than just a regulatory necessity.

1.3. Ensure aquaculture is fully represented in EU Member State maritime spatial plans to minimise spatial conflict with other maritime users and therefore reduce the risk of collisions and other unintended damage.

1.4. Develop systems to link aquaculture component traceability systems with licensing and other permitting / operator identification data.

1.5. Work with EU aquaculture producer organisations to identify common issues and management needs across the membership (and with other similar organizations where appropriate) to determine whether a Code of Practice might provide a set of standards and best practices to address these and agree how these might be implemented e.g. voluntary, self-certification by the fisheries organization, or third party certified.

2. Research and development

2.1. Develop aquaculture equipment that is easy to decommission and recycle at end of use. This will include using plastics that have a high recyclability / re-use value and ensuring that different plastic and non-plastic components are easy to disassemble, store and transport.

2.2. Support a transfer from coastal to offshore aquaculture through the development of large-scale, semi-contained open water systems that are resilient and adaptable to varied and often extreme weather conditions.

2.3. Research remote site surveillance and environmental monitoring that reduces the risk of damage to aquaculture facilities and the consequent production of aquatic debris.

2.4. Conduct further research into the impact of aquatic debris, especially microplastics, on the aquatic ecosystem and its trophic structures. Use the findings to prioritize waste management or minimize impacts in the case of loss.

3. Corporate and farm-level management

3.1. Encourage businesses to develop pre-emptive contingency plans to (i) reduce the risk of equipment failure from forecast extreme weather events and (ii) establish the means and methodologies for recovering debris and equipment lost from such events, such as the development of Standard Operating Procedures (SOPs) for high risk events.

3.2. Aquaculture businesses should develop and maintain inventories of plastics and plastic products used on installations, with records of both procurement and disposal.

3.3. Where possible high quality or where appropriate biodegradable plastic components to both minimize the risk of loss as well as to mitigate the impact after loss has occurred.

3.4. Staff should be made aware of the pathways, risk and impact of aquatic debris from aquaculture and provided training in methods to prevent or respond to such events.

3.5. Organise and fund local clean-up aquatic debris programmes as part of a Corporate Social Responsibility strategy. Work with local communities to demonstrate that every effort is made to both reduce the incidence of aquatic debris loss and to recover lost material at appropriate intervals.

3.6. Work with third-party ecolabel standard holders to develop and apply performance metrics for the management and prevention of aquatic debris from aquaculture.

4. Reporting lost debris from aquaculture

4.1. Ensure that policy, management and regulatory authorities implement a practical and robust aquatic debris reporting system that is consistent with the context of different aquaculture operations under their jurisdiction. Where appropriate, integrate with other marine debris reporting.

4.2. Develop and implement reporting protocols and pathways in cooperation with aquaculture equipment manufacturers, farm operators, producer and supply chain associations, as well as with maritime and other relevant administrations.

5. End-of-life disposal

5.1. Consider the likely needs of the fast-growing coastal and offshore aquaculture sector in vessel traffic forecasts and landside needs analyses as part of recurrent planning and development processes. This should cover, but not be limited to: (i) the transfer and possible temporary storage need of large aquaculture infrastructure components, bulk feed and other supplies through port facilities, (ii) the landing, temporary storage (including space for sorting and disassembly) and responsible disposal of non-reusable / recyclable end of life aquaculture equipment and (iii) the inclusion of end-of-life aquaculture equipment into Port Waste Management Plans where appropriate.

6. Circular economy

6.1. Encourage and facilitate the development of a circular economy for aquaculture equipment, including development of extended producer responsibility (EPR), building in the responsibility and costs for the recovery, recycling or otherwise responsible disposal of end-of-life aquaculture equipment. EPR may take the form of reuse, buyback, or recycling programmes.

6.2. Consider the use of financial bonds or withholding taxes to ensure that the costs of responsible disposal (either through re-purposing, recycling or approved disposal methods) are built into the cost of operation, either through licensing or equipment purchases.

6.3. Institute a co-management approach between local stakeholders and aquaculture operations with their stewardship area to monitor, manage and where appropriate, recover debris and litter from aquaculture.

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