



How can the aquaculture sector contribute to reducing marine litter in the North Sea?

Aquaculture is the fastest growing food-producing sector in Europe, with an annual expansion rate of 8% in the last three decades. With this growth rate, there is **an opportunity for such a booming industry to act as a precursor on fighting marine litter** by reflecting on preventive measures and innovative solutions on how to manage the non-organic waste, which could become exemplary and point out the path for other sectors.

Therefore, the AQUA-LIT project is developing a toolbox of solutions for preventing, reducing, removing and recycling non-organic waste that the aquaculture industry would be able to implement.



NORTH SEA CONTEXT

In the North Sea fed aquaculture (fish), facilities are clustered in favourable areas in the outer regions of the Greater North Sea. Atlantic salmon (*Salmo salar*) is the most important aquaculture species in Europe that benefits from natural conditions with good sea temperatures, salinity and currents in sheltered fjords. Most of the farmed Atlantic salmon are produced in floating cages in sea, while there are a few land-based farms. Norway, followed by the UK, are the most important producing countries in Europe. Rainbow trout (*Oncorhynchus mykiss*) is the second most important aquaculture species in this region. This freshwater species is grown in floating cages in the protected waters of the Scandinavian fjords. Today, nearly all rainbow trout on the EU market comes from aquaculture.

The extractive aquaculture (shellfish and seaweed) sector is gaining traction across the EU, with a wide range of commercial applications going beyond human consumption (e.g. poultry and fish feed, biofuel, chemistry, pharmaceuticals, etc.). In the North Sea, **mussel cultivation** (predominantly blue mussel, *Mytilus edulis*) is dominated by France and the Netherlands. Other smaller producers of the blue mussel are Denmark, Norway, Sweden and the UK. There are three different culture techniques - using poles ("bouchot"), suspended ropes or bottom culture. **Oyster farming** has a long history. After several years of decreasing production caused by the 2008 disease outbreak in French oyster farming areas, production has increased again since 2014 (European Commission, 2019). In Europe, commonly farmed oysters include the European flat oyster, *Ostrea edulis*, and the Pacific cupped oyster, *Crassostrea gigas*. In the North Sea, oyster culture is dominated by France, while the Netherlands and the UK have limited production capacity. **Marine macroalgae**, or seaweeds, are traditionally harvested for the extraction of hydrocolloid for industrial purposes. EU macroalgae production is limited but the



demand for edible algae is increasing in EU markets, and new production models and new market stream are emerging. In the North Sea, seaweed aquaculture is predominant in France and Norway (brown seaweeds). The majority of the production in France is wild seaweed that is harvested. Other countries (The Netherlands, Belgium) are investing in pilot studies.

The intra-European exchange of information and collaboration among institutions has been strong in the region. There is an emerging importance of producer organisations to provide members with information, as well as to act as fora to develop common policies on a wide range of issues. On the local level, there are several Mirror Platforms (MIPs) organised by the **local authorities, such as for example *het Vlaams Aquacultuurplatform* in Belgium.**

THE THREE MAIN COMPONENTS TO TACKLE MARINE LITTERING



PREVENTION
& REDUCTION
OF MARINE LITTER

Each country in the North Sea has strict rules to be followed to make sure that there is no litter ending up in the environment. Currently, there are multiple solution and mechanisms available, several legally binding measures in force, and various action plans published to prevent and reduce marine littering from aquaculture in Europe. In this way, an environmentally sustainable development of the aquaculture sector can be ensured.

EXAMPLE:

The North Sea Commission's Marine Resources Group (MRG) drafted a resolution on marine litter, which was supported and adopted during the Annual Business meeting of the North Sea Commission (Conference of Peripheral Maritime Regions, CPMR) ([CPMR, 2018](#)). This resolution aims at expressing concern and raise awareness about the impact of marine litter in the North Sea. One of the recommendations that is of interest to the aquaculture sector is the following; 'Encourage green procurement: offer alternatives to plastics and produce/use plastics, which are designed to allow for greater durability, reuse and high-quality recycling'.



MONITORING & QUANTIFICATION
OF NON-ORGANIC LITTER

In general, as in other EU coastal Member States, monitoring needs to be done in regard to WFD chemical (12 nm from baseline) and ecological (1 nm from baseline) status of coastal waters.

In the Greater North Sea, OSPAR is responsible for the monitoring and quantification of non-organic litter. OSPAR currently assesses beach litter and seabed litter as part of its monitoring and assessment programme. The OSPAR beach litter database contains fishing and aquaculture litter items, which are used in the AQUA-LIT project to produce the Marine Litter Inventory and several regional maps.





REMOVAL & RECYCLING OF NON-ORGANIC LITTER

Commonly farmers have their own disposal/waste collection procedures on their property and – from time to time – this will have to be disposed of in an approved manner, which follows the common regulations to be adhered to by most other industry. The recycling regulation also applies for specific materials such as paper, glass, cloth, and several other materials (depends on the region).

Developers usually have to think of the waste management and dismantling process, already at the project application stage - before they get the permission. In multiple North Sea countries, there are very clear obligations stated in the aquaculture farming permission. All the installations and equipment needs to be removed completely - everything that was brought in the water, build or put in place, has to be removed to leave the area in the same state as it was before the farm. If there are doubts that you do not adhere to the permissions obligations you will not get a permission.

EXAMPLE:

One of the suggestions is that aquaculture should not be singled out as an industry that needs special regulations when it comes to waste material (non-biological, construction, equipment, etc). There are many other small-scale industries with similar materials appearing from time to time or regularly as wastes, so disposal and recycling should be linked up, not to be costly only for the aquaculture (i.e. economies of scale). This would make the logistics for handling wastes more attractive for specialized companies.

Certainly, with the growth of the industry it would be advisable to have the aquaculture specific non-biological waste disposal and material recycling systems in place (i.e. standards, solutions and procedures). Thus, a viable solution might be in coupling together different small-scale industries which use the same type of materials; e.g. aquaculture combined with fishing or agriculture – so that a larger amount of waste (i.e. same material) may be collected. This way a critical mass of such material may be reached to then be collected and processed by recycling companies, thereby gaining an incentive to develop procedures. This would create a win-win situation as very small amounts occurring in irregular intervals require costly logistics and individual farmers may – despite tight regulations – be unable to afford the costly disposal and seek quietly illegal routes of disposal. Standards for material and equipment (including for some the lifetime limit or no-use conditions) in other industries are there already.



WHAT ARE THE KEY ISSUES / CHALLENGES?

POLITICAL

The North Sea has seen a variety of changes in aquaculture regulation across the countries, which to a certain extent reflects the high-level political support for the sector, or the lack of it. The status widely differs across the countries. In addition, Norway has his own legislation and is not part of the EU.

ECONOMIC

The commercial readiness of the North Sea aquaculture sector differs strongly across countries and types of aquaculture. In the Northern Greater North Sea there is a strong network of international players and a high density of large-scale fed and extractive aquaculture farms, while in the Southern Greater North Sea a smaller number extractive aquaculture facilities are located.

SOCIAL/CULTURAL

While some countries have aquaculture as a traditional activity ('Bouchot', France) some others are just initiating pilot projects (Belgium).

TECHNOLOGICAL

The North Sea has seen many projects and initiatives focusing on innovative technologies, such as Integrated Multi Trophic Aquaculture (IMTA) and Recirculating Aquaculture Systems (RAS) (on land).

LEGAL

The regulation differs widely across the countries depending among other on the number of authorities involved in the licensing process and proximity to the shore.

ENVIRONMENTAL

The North Sea, in general, is characterised by its strong currents and frequent storms. Hence, the meteorological and environmental conditions are not always optimal for aquaculture activities. Frequent gear loss, and distant offshore farm locations, can therefore in some cases make aquaculture economically difficult.





WHO ARE THE STAKEHOLDERS INVOLVED?

1. Aquaculture farmers (fish, shellfish, seaweed)
2. Equipment manufacturers (e.g. of aquaculture material & gear)
3. Engineering, system design and construction companies
4. Academic research groups
5. Professional clusters, associations and platform representatives
6. NGOs
7. Governance (including policy makers & implementers, and port staff)
8. Classification and certification bodies
9. Companies processing waste (including waste recycling and incineration)
10. Communicators (media, press, science communicators)





TRIGGERING QUESTIONS

1 – How can the aquaculture industry be more effective in preventing and reducing its non-organic waste?

- What are the barriers to preventing and reducing the loss, damage or discard of gear and other equipment in the aquaculture sector?
- What are the (technical) innovative solutions, business models and (policy) measures to prevent or reduce the loss, damage or discard of gear and other equipment in the aquaculture sector?

2 - How can the aquaculture sector be more effective in monitoring and quantifying its non-organic waste?

- What are the monitoring systems for non-organic waste quantification that you have applied in your activity or that you know of?
- What monitoring measures and schemes should be introduced, improved or enforced to encourage and empower every stakeholder to tackle the issue efficiently?

3 - How can the aquaculture sector be more effective in removing and recycling its non-organic waste?

- What are the barriers to removal and recycling of gear and other equipment that is damaged, discarded or lost?
- What are innovative solutions and business models that can be used to remove or recycle the gear and other equipment that is damaged, discarded or lost?

