Environmental Hotspots in the Aquaculture Industry

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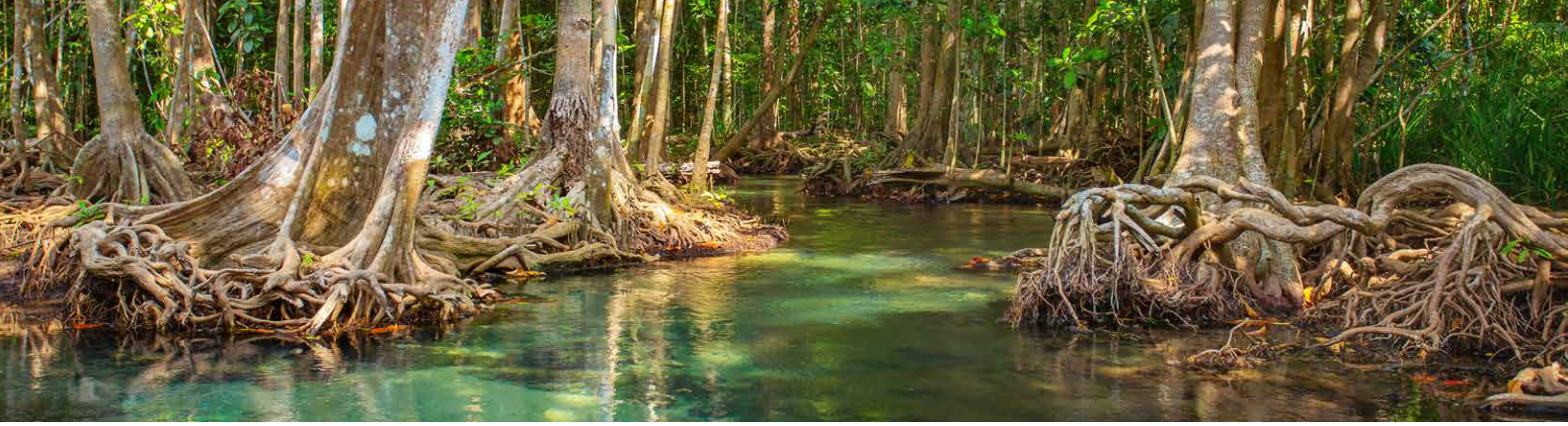


The Benefits of Aquaculture

Aquaculture has emerged as a popular and efficient way to rear aquatic life for consumption. Besides its contribution to feeding the planet's growing population, the industry can also support the restoration of depleted wild fish stocks and the generation of jobs and income for local communities, in both developing and developed countries.

However, along with the positive aspects of aquaculture come some potential risks that need to be monitored.

In this document, amfori will focus on the main environmental hotspots in the fish farming stage and then in the processing stage of the aquaculture supply chain.

Environmental Hotspots of Fish Farming

Over the past 20 years, the environmental impact of fish farming has been a popular topic of discussion – one that has not always been the most positive. Despite the efforts so far to minimize aquaculture's environment impact, the industry still has a few environmental challenges to address. The most pressing challenges include:

Habitat Destruction

The loss of mangroves for pond aquaculture is currently one of the major threats to mangrove forests worldwide. These ecosystems are generally the most threatened as they are often the first to be cleared for development of aquaculture, and especially shrimp farming. South East Asia, home to 33.8% of the world's mangroves, and 90% of the world's aquaculture, is the worst affected region with half of its mangrove areas suffering degradation. At a global level it has been estimated that between 1980 and 2012 around 20% of mangroves were lost, mainly due to unsustainable aquaculture practices.

Mangrove forests are incredibly important ecosystems. Due to the high abundance of food and shelter, mangroves form an ideal habitat for a wide range of species. Mangroves also provide coastal protection from major storms and hurricanes, absorb carbon monoxide and other greenhouse gasses, and improve water quality by acting as a filter.

Escapees – Unwelcome Visitors

Farmed species are often genetically different from their wild relatives. Reared species that escape from fish farms can breed with wild species frequently enough to dilute their genetic stock. The introduction of negative genetic traits to wild ecosystems can make juveniles more susceptible to diseases or even unable to survive in the wild.

Another downside of escapees is that they can establish themselves as invasive species and start competing with native species for food, habitat and spawning partners.

Escapees may also transfer diseases to wild fish populations. High-density fish cultivation makes it very easy for diseases to spread. Fish who survive infection can become carriers of the viruses and transmit them to native species.

Eutrophication

Eutrophication refers to an excess of nitrogen and phosphorus in an ecosystem. A high concentration of these elements is mainly caused by uneaten food (excess feed) and other organic waste that must be removed to maintain a healthy and productive stock. If not removed, this waste has the potential to build up and deplete the water oxygen, creating algal blooms and dead zones.

Dead zones are areas in which few aquatic species can survive. These zones have a negative impact in both capture fishery and aquaculture activities. Wild fish either die or leave the area, while aquaculture species will most likely suffocate from the lack of oxygen.

Environmental Hotspots of Fish Processing

Fish processing, if not executed properly and in a sustainable manner, may pose a risk to the environment. The main environmental hotspots from fish processing include:

Waste Production

The fish processing industry around the world generates a significant quantity of waste. Due to its high organic content, fish waste is often classified as a hazardous or dangerous waste which is costly to dispose of. The amount of waste generated during processing is usually between 20% and 80%. The level of processing and the type of fish processed are the main factors which determine the amount of waste produced.

Although all processing steps are responsible for producing waste, the operations which generate the largest amount are usually de-scaling, de-heading, gutting, fin cutting and meat bone separation. Besides the generation of organic waste, fish processing facilities also produce inorganic unwanted materials from the packaging process. Inorganic waste typically includes excess packaging items such as plastic, glass and metal. Releasing this back into the environment, without prior treatment, could cause soil pollution and surface and groundwater contamination.

Emissions to Air

Odour is often the most significant form of air pollution in fish processing facilities. The most important sources of malodours include storage sites for processing waste, cooking by-products during fish drying processes, and odour emitted during filling and emptying of bulk tanks and silos. The presence of anaerobic conditions in onboard storage on finishing vessels and in the raw material silos can contribute to the faster deterioration of fish quality. Typical odorous compounds encountered due to this deterioration include alcohols, carbonyls, sulphur compounds and ammonia.

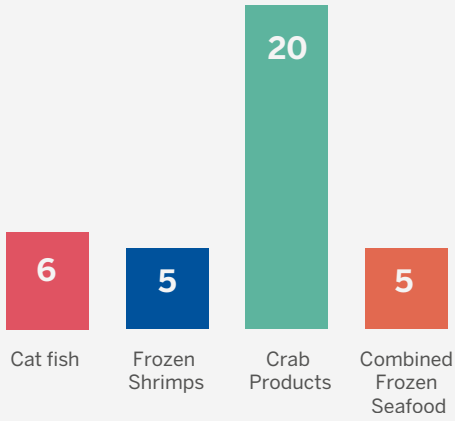
Amongst the chemical compounds that are released from fish processing facilities, ammonia needs attention. The uncontrolled release of ammonium compounds into the atmosphere could pose a great risk to human health. Exposure to high concentrations of ammonia in air may cause nose, eye and throat irritation, headaches and respiratory problems, among others. Besides the negative effects on human health, high ammonia emissions can negatively affect biodiversity as certain species and habitats are particularly susceptible to ammonia pollution.

Wastewater Production

Water consumption in the fish processing industry and the production of wastewater are major concerns. Processing fish requires a large amount of water, primarily for washing, processing, finishing and cleaning purposes (factory and equipment cleaning). The concentration and volume of wastewater from fish processing activities depends mainly on the type of fish, the additives used and the sources of the water.

Figure 1

Average Wastewater (m^3) per tonne



This chart shows the amount of wastewater generated in the processing of different types of seafood.

Due to the presence of blood, tissue and dissolved protein, the wastewater from seafood-processing operations can be very high in biochemical oxygen demand due to the fat, oil, grease, nitrogen and phosphorus content. Hence, the removal of solid waste prior to entering the wastewater stream is necessary to avoid environmental pollution. Detergents and disinfectants used in cleaning activities may also be present in the wastewater stream. The wastewater produced by the above operations needs to be treated and disposed of efficiently to avoid any type of environmental pollution.

Energy Consumption - Low but Increasing

The processing of fish products only contributes to about 10% of the total energy consumption in the fish industry. The most significant use of energy in fish processing plants comes from the production of hot water, steam and the use of electrical equipment (e.g. air conditioning, cooling, freezing and ice production). Although energy consumption is not considered a major environmental hotspot in fish processing facilities at the moment, we can expect this to change in the future as the demand for seafood is forecasted to significantly increase.

What Companies Can do to Tackle these Issues

Retailers who want to improve these issues might face challenges that depend on the structure of their supply chain. The three different supply chain models identified by amfori are integrated, partially fragmented and fully fragmented supply chains, with the latter being the most challenging to manage from an environmental viewpoint. This is a common problem within globalized and fragmented supply chains. To manage risk companies can:

- map their supply chains to the farm level to gain greater visibility over operations
- identify the most important environmental risks and implement a risk management plan to mitigate these risks
- identify strategic partners to tackle environmental issues that cannot be resolved by the business alone and require collaboration

Strong Signs of Effort and Improvement

Aquaculture has vastly improved over the years and should not be dismissed as unsustainable. Over time the amount of land, energy, water and labour needed to raise a kilogram of product has significantly reduced. This shows that the industry is becoming more efficient, cost-effective and sustainable.

Multi-stakeholder initiatives are actively focusing on environmental issues associated with fish farming and are looking to improve the environmental performance of fish processing facilities.

Business can play a significant role in driving improvements. amfori members who participate in amfori BEPI have a range of tools at hand to identify and tackle environmental risks in fish processing industries.

amfori BEPI

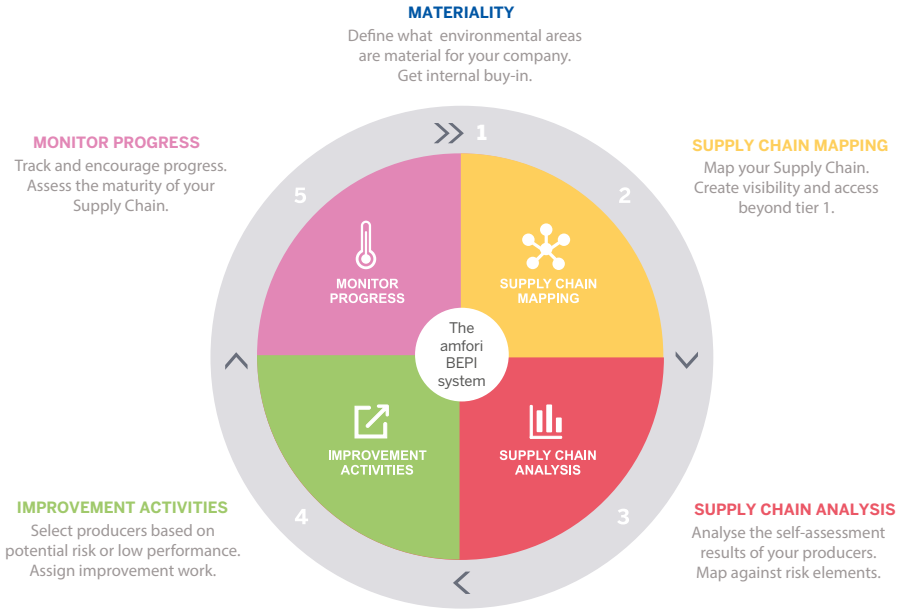
amfori BEPI offers a single system that enables all companies sourcing all product types, **including canned food products**, to address the environmental performance of their supply chains.

The BEPI system focuses on the production site, letting the producer take ownership of the knowledge acquired and pass it down the tiers of the supply chain. BEPI offers producers a tailored system with on-site support to help identify and address high priority environmental areas where progress is needed most.

The result is a comprehensive overview of producers' performance in fields such as water usage, pollution, waste management and nuisances. Based on these results BEPI can provide individual support and capacity building activities to assist progress.

Assigning on-site BEPI Environmental Assessment or collective workshops on Energy Management, Water Management and Wastewater Management are examples of BEPI solutions which can be implemented to reduce the environmental footprint in the aquaculture industry.

The whole BEPI journey includes the following steps:



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