



It's time to take another look at seafood waste. In the face of stagnant wild catches, improved usage of so-called waste and other byproducts could help meet increasing demand for seafood without further stress to the ecosystem. More efficient use of resources will benefit society, the environment, and, crucially, the industry's bottom line. Seafood is a tight-margin industry, reducing discards and up-cycling byproducts will likely increase profitability.

Waste is a big issue that occurs in all stages of the supply chain, albeit at different rates around the world¹ (see graphic). Worldwide, the average is 35%.¹ In the U.S. alone, however, 40%–47% of seafood destined for market goes to waste or to low-value byproducts, an amount that could satisfy the annual protein needs of 10 to 12 million people.² In the U.S., about 25% of this value loss occurs during harvesting, 14% during processing and distribution, and 56% at the consumer level.²

There are many, often complex, reasons why waste occurs. Seafood varies seasonally, is geographically dispersed, and is highly perishable, making it a difficult product to manage precisely. Fishermen may create waste by using fishing methods that are not discriminating enough or that damage the animals, or by targeting only part of the fish (e.g., roe, fins) and discarding the rest. In the post-harvest stage, handling is often poor, processing imprecise, and cold storage inadequate, resulting in spoilage. Retailers may discard seafood due to arbitrary market standards or errors in demand forecasting.

Much of this waste could create value in secondary uses, but it can often seem more economical to discard it. Fishermen and at-sea processors are incentivized to discard low-value species or trimmings to help maximize the value of their load. Processors may lack the equipment to process all parts of an animal or the great variety of non-targeted species, which makes fishmeal the default end use. Moreover, waste is typically unsorted and geographically dispersed, which makes it costly to collect and process. Effective waste usage would require not just greater economies of scale but also greater "economies of density" in the industry. Thus, identifying high-value uses for seafood byproducts is essential to making collection and upcycling more feasible and attractive.

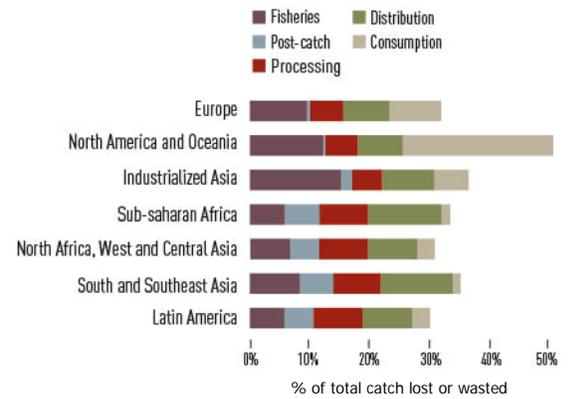


35%

FISH & SEAFOOD FOOD LOSSES

8% of fish caught globally is thrown back into the sea. In most cases they are dead, dying or badly damaged.

This is equal to almost 3 billion Atlantic salmon.



Source: FAO, 2012

Opportunity Areas for Investors

"Waste plastics" instead of plastic wastes

Some of the most interesting seafood byproduct uses have been developed for shellfish shells. Traditionally these have been pulverized for animal feed or fertilizer and valued at a mere \$100–\$120/metric ton.³ Innovators have now developed environmentally friendly methods for extracting chitin (worth \$200/kg)³ from shellfish shells, as well as a process for turning this chitin into a flexible, compostable bioplastic with natural antimicrobial properties that reduce spoilage of foods such as fresh fish. More solutions like this are needed.

There's more than one way to skin a fish

Fish skin recently hit the news as a potential treatment for skin burns and is currently in clinical trials in Brazil. Sterilized tilapia skin provides necessary collagen to human skin, keeping a burn sealed yet moist and speeding the recovery time, compared with conventional cream-and-gauze treatments. Alternatively, fish skins can be made into leather, much like any other animal hide, and used in wallets, bags, and shoes. The process is low-tech and requires little capital, which makes it ideal for small businesses or for setup in developing countries.

Maximizing the other half of the fish

To make the use of trimmings more economically viable, the sector needs to look beyond low-value end uses such as animal feed and fertilizer and instead develop products for human consumption and specialized industrial applications, which typically have higher \$/kg. To make trimmings more suitable for use in sports nutrition, soups, and baby food, new methods are being developed to extract high-value proteins while reducing undesirable flavor components. Other innovations focus on improving extraction of high-value, collagen-based ingredients for applications in functional nutrition, pharmaceuticals, biomedicine, biomaterials, and cosmetics.

Reducing waste at the source

Reducing the incidental catch of non-target species, aka bycatch, is one of the most vital focuses of seafood waste reduction, and increasingly the subject of regulatory oversight. Innovators are developing new gear types and technologies to help fishermen reduce bycatch and comply with regulations. These include more-selective nets and hooks, onboard surveillance cameras, and underwater camera systems for trawl nets that give fishermen real-time views of their gear and surrounding habitats or species.

Sources:

1. FAO. *Global Food Losses and Food Waste*. 2012.
2. Love DC et al. *Wasted seafood in the United States: Quantifying loss from production to consumption and moving toward solutions*. *Global Environmental Change*. 2015;35.
3. Yan N, Chen X. *Sustainability: Don't waste seafood waste*. *Nature*. 2015;524:155-157.

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