

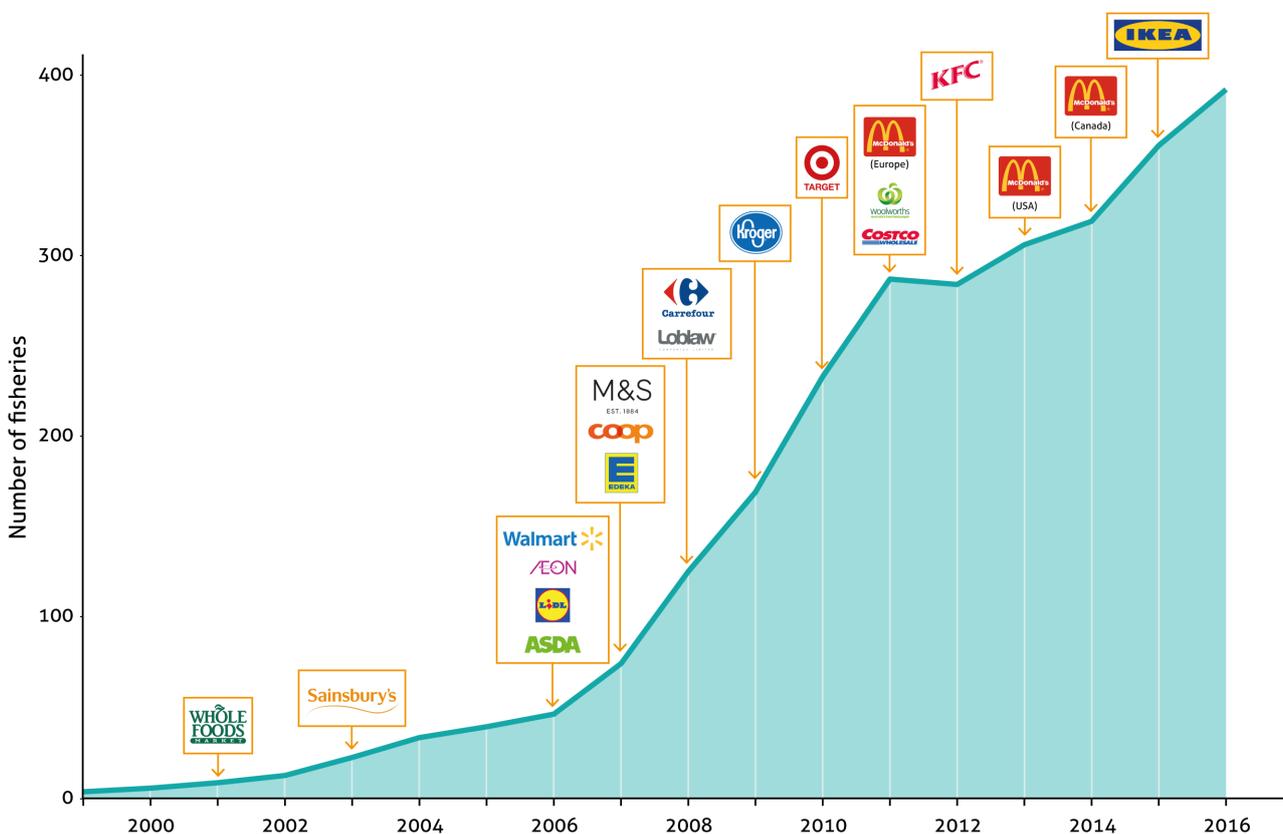
# Innovations and Market Dynamics

*While the practice of catching and farming fish dates back millennia, its industrialisation is only a few decades old. Recent developments suggest that we are now standing on the threshold of the next generation of seafood production, where new actors and technologies are changing the rules of the game.*

## Overview

Seafood production has grown dramatically in the most recent decades and demand keeps on increasing. However, sustainability challenges associated with wild capture fisheries and aquaculture continue to generate growing pressure for change. Supporting stock recovery, improving aquaculture standards and practices, strengthening enforcement, reducing harmful subsidies, expanding marine protected areas, using market-based

mechanisms such as certification schemes and supply chain traceability, and investing in capacity-building in developing countries, are all becoming mainstream approaches towards improving the governance of fisheries. In addition to all these efforts, new actors and technologies are moving to centre stage in the seafood sector. These could radically transform fisheries and aquaculture production systems, and the way the sector is managed.



Number of Marine Stewardship Council (MSC) certified fisheries (or in assessment) over time, together with examples of public commitments by large retailers to sell MSC certified seafood. Announcement by Walmart, the world's largest retailer, in 2006, is thought to have catalysed other retailers.



King crab with QR-code photographed at a fish market in Busan, South Korea. The code enables the buyer to track the crab back to the individual fisherman catching it a few weeks earlier outside Norway. Photo: J Lokrantz/Azote

### The role of the financial sector

Environmental organisations, consumers, retailers and policy-makers have a growing understanding of the critical need to improve seafood sustainability. Shareholders in seafood companies, the financial sector, credit rating agencies and insurance companies are also increasingly aware of the challenges and opportunities associated with the seafood business. Investors are more active; they are starting to demand additional information from companies in order to assess risks associated with their investments. In judging critical risks, they consider not only the financial stability of the companies in which they invest, but also where those companies operate, the fish species they target, and the reputational risks associated with seafood production.

### Market dynamics

Consumers and retailers increasingly demand transparency throughout value chains. Walmart, AEON, Carrefour, IKEA and many other retailers have made ambitious commitments to the sustainability of the seafood they sell<sup>1</sup>. Such commitments are stimulating numerous sustainability initiatives throughout the seafood production system. Certification of capture fisheries (e.g. by the Marine Stewardship Council (MSC)) and aquaculture (e.g. by the Global Good Aquaculture Practice (GlobalG.A.P.) or the Aquaculture Stewardship Council (ASC)) is growing rapidly: close to 12% of global landings are currently certified (or in the process

of becoming certified) by MSC while 6% of global aquaculture production is certified (e.g. by GlobalG.A.P. and ASC, among others).

Multiple additional initiatives aimed at improving seafood production are also in development to meet a growing market demand for sustainable products. Fisheries Improvement Projects (FIPs), which operate through an alliance of seafood buyers, suppliers and producers, are developing as an important and legitimate approach towards achieving more sustainable fishing practices. Other initiatives, such as the Best Aquaculture Practices (GAA) and the Code of Conduct for the Marine Ingredients Organisation (IFFO) are examples of similar initiatives within aquaculture and feeds production.

### Transparency and digital traceability

Government regulations, including in the EU and the USA, increasingly require a high level of transparency and traceability before allowing access to their markets. Satellite-based information, combined with crowd-sourcing of observer data and on-board video surveillance, is being implemented to monitor activities at sea. But seafood fraud in subsequent steps of the value chain also requires innovative approaches. Illegal and unreported catches have been estimated to account for up to one third by weight of wild-caught seafood imported into the USA<sup>2</sup>. Globally, around 20% of seafood has been estimated to be mislabelled<sup>3</sup>.

Technological innovations now offer opportunities to trace products throughout the value chain, and to further reduce the costs of catch documentation schemes and certification processes. For instance, mislabelling of seafood can be substantially reduced by using hand-held species-level identification tools, combining DNA barcoding technologies with a globally accessible DNA database<sup>4</sup>.

### Applying military technologies

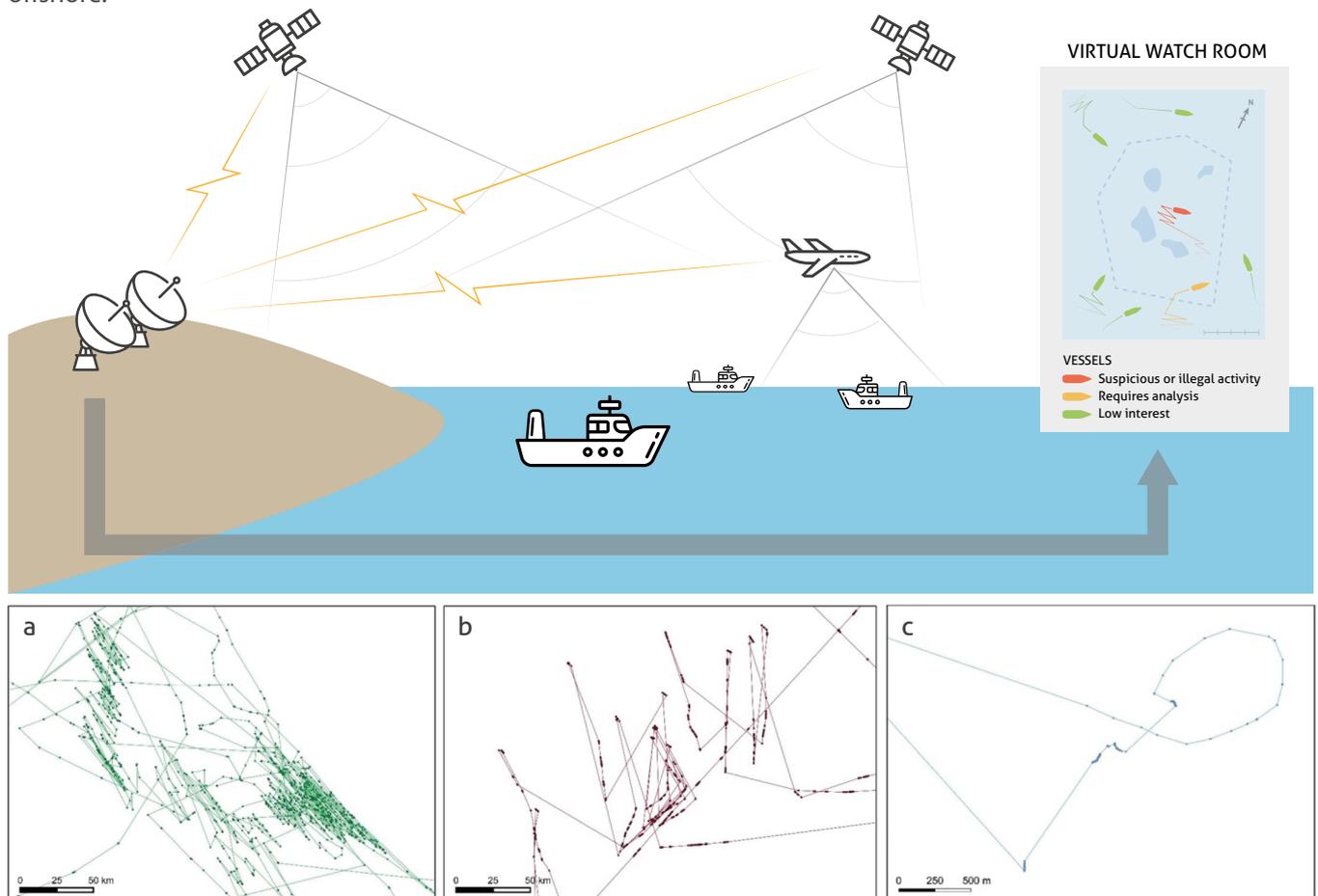
In recent years, technology costs have reduced, technologies have become more accessible, and the computing power of satellite technology has increased. Innovations in these areas mean that seafood production can now be monitored in real time<sup>5,6</sup>.

Global Fishing Watch<sup>7</sup>, developed by Oceana, Skytruth and Google, is a public access database that displays individual vessels equipped with AIS (Automatic Identification Systems) around the world. Taking this a step further, the Ending Illegal Fishing campaign<sup>8</sup>, funded by the Pew Charitable Trusts, expands on such data with their “Eyes on the Seas” project<sup>9</sup>: global AIS information is combined with VMS (Vessel Monitoring System) data, SAR (Synthetic Aperture Radar) information, and imagery taken by drones operating offshore.

The location of individual vessels and their activities (e.g. fishing, in transit or engaged in transshipment) can then be cross-checked with their respective fishing licences. When suspected violations are detected, such information will (in the near future) be used by individual nation states, regional fisheries management organisations or flag states to determine possible enforcement actions.

### Pioneers of biosphere stewardship

It is still too early to speculate on the consequences of the emerging technologies and market trends raised here. Some of these developments would have been difficult to predict a decade ago – and the next generation of technologies may well be beyond our imagination. What is a novel and clear challenge, though, is to make use of such innovations to transform human actions and economic development towards stewardship of our oceans and the life they sustain. It is a quest in which fishing and aquaculture companies could become pioneers.



**Upper panel:** The “virtual watch room” is a groundbreaking technology platform that should help authorities improve monitoring and enforcement of fisheries compliance. Modified from The Pew Charitable Trusts 2015 [10]. **Lower panels:** Raw Satellite-based Automatic Information Systems (S-AIS) for three individual vessels using different fishing behaviour associated to different gear types: trawler (green, a), longliner (red, b) and purse seiner (blue, c). Adapted from de Souza *et al.* 2016 [6].

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