

Smart Ocean Technologies in the fight against IUU Fishing

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Reading time 6 mins

Key Points

- Overfishing is a more significant threat to marine ecosystems than climate change and plastic pollution
- Environmental, economic, and social costs of illegal fishing have global consequences
- Smart Ocean Technologies (boats, nets, tracking devices, satellite imagery, traceability apps) improve precision, reduce costs, and locate perpetrators
- Governments and NGOs can take direct action using computer technologies
- Using IoT to meet global sustainability has its challenges and limitations
- More consumer engagement, fishery compliance, and good governance are needed

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Overfishing is one of the biggest challenges to global sustainability goals. Some go as far as to argue that it's a more formidable threat to the oceans than climate change ^[1] and plastic pollution. [IUU Fishing](#) is an illegal, unreported and unregulated fishing activity with such wide-ranging costs (i.e. environmental, economic, and social), which is why looking at smart ocean technologies for solutions is imperative.

A key issue is that people's seafood consumption is increasing faster than the ocean's supply can replenish. The latest UN report on the State of World Fisheries and Aquaculture (SOPHIA Report ^[2]) puts this into perspective: We are consuming five times the quantity we did in 1961. Considering that consumption has increased by 3% while the population growth rate is at 1.6.%, **we cannot justify increased fish consumption** on population increase. Only factors such as ready availability, demand and our preference for it can.

The compound costs of overfishing on global sustainability

Environmental costs include more than the depletion of fish stocks. There's the cost of species extinction (63-273 million sharks and over 100,000 whales are killed every year ^[3], as well as hundreds of thousands of turtles, dolphins, seabirds, sea lions, and seals unintentionally caught in nets). Then there's the cost to marine ecosystems (e.g. coral reefs disappearing), the impact on the food chains that their presence supports, the cost of oxygen depletion.

The economic costs of overfishing are just as high. The global seafood industry is valued at an estimated \$362 billion: Millions of people in developing and coastal communities depend on it for their livelihoods, with half of the world's population relying on it as their primary source of protein ^[4]. Then there's the cost to related industries such as tourism, recreational sports (e.g. SCUBA diving), hospitality etc. What happens when IUU fishing goes to the point of no return?

Social costs have an impact that's more evident in developing countries. As fishing and fish as a food source become less viable, unemployment, migration, and poverty increase. [On the FRONTLINES: Illegal Fishing in Africa](#), ^[5] fishermen in the Ivory Coast interviewed by [Sea Shepherd](#) highlighted that they risk their lives both at sea – when attacked by illegal fishing vessels – and on land: When nets come up empty, they resort to hunting bushmeat and can contract Ebola as a result. Not to mention the human rights violations on the crew coerced into working on the IUU fishing vessels themselves.



How can smart ocean technologies cut these costs?

Unlike tackling illegal poaching on land, a country's sovereign waters have no physical borders, fish migrate across vast distances, and have populations that cannot be estimated and tracked as easily as animals on land. That said, IoT and smart ocean technologies can provide fishermen, businesses, consumers, and governments with the tools needed to combat IUU fishing.

- Smart Boat Initiative ^[6] launched by the [Environmental Defence Fund](#) equips vessels with low-cost camera sensors and broadband coverage connected to data analysis software. These help fishermen monitor their catch, reduce operating costs, and support sustainable fishing practices. By being able to see (in real-time) the fish species and population, they can determine the amount and size that they can catch to keep the stock healthy
- Smart-Nets consist of LED lights clipped to fishing gear. Developed by [SafetyNet Technologies](#), these lights can switch between colour range and intensity and use a behavioural response to light to target specific species – helping fishermen attract the fish they want and repel the ones they don't. An estimated 1 in 10 fish caught is bycatch (unwanted fish and other creatures such as dolphins and turtles), costing the oceans an estimated 9 million tonnes annually. Smart-Nets precision fishing reduces

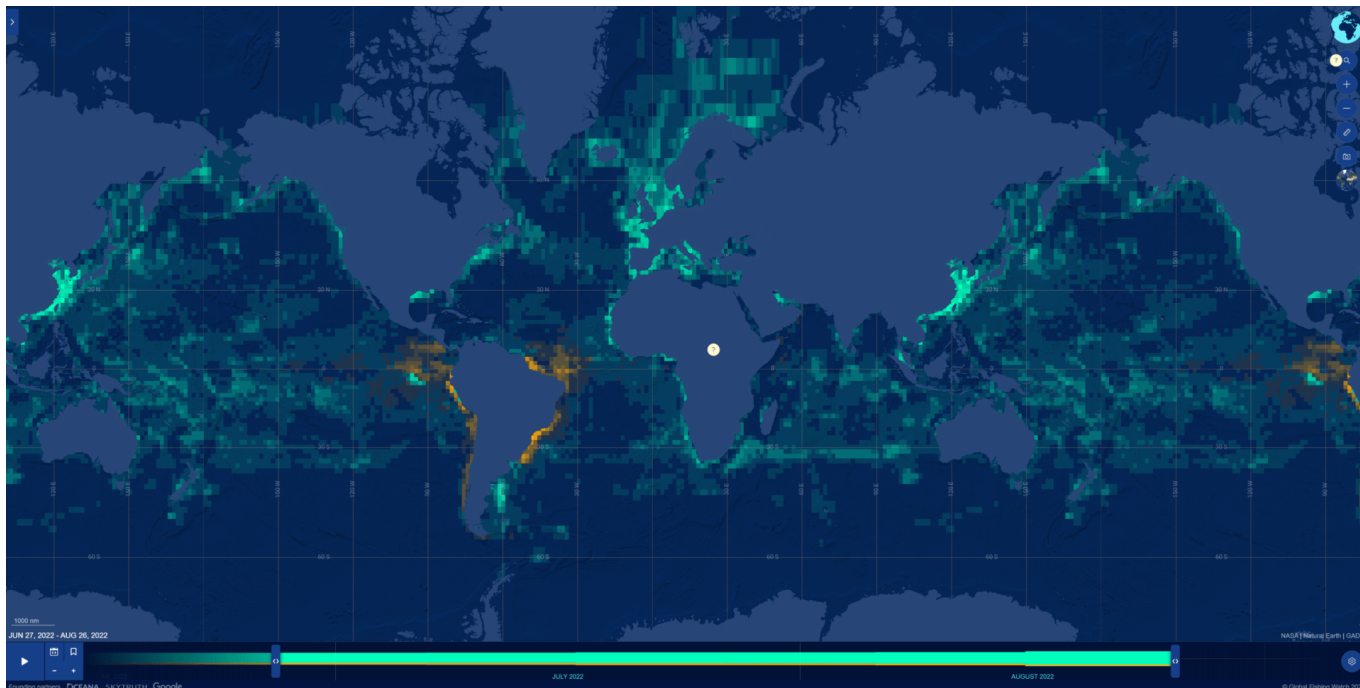
that

- Smart Tracking uses satellites, sensors, radar, AI and drone imagery to detect illegal fishing activity, catch perpetrators, and prosecute them. Organisations such as [OceanMind](#) and Sea Shepherd (who take direct action), as well as [Global Fishing Watch](#) (who provide free technology, open-access data visualisations, and share knowledge publicly), make this level of compliance possible
- Onboard or underwater IoT cameras and motion sensors to monitor catches and the location of vessels also enforce sustainable fishing practices: Fishing companies can use the same data to assist traceability and supply-chain transparency. Apps such as [ThisFish](#) were developed to help fishermen market their seafood better. It also enables retailers and consumers to trace their fish back to where it was caught and whom it was caught by.

IoT for sustainability challenges

Despite the solutions presented by IoT and smart ocean technologies, using them effectively to combat IUU fishing remains a challenging and daunting task. Without a management regime at a governmental level that uses catch-based limits and established quotas based on science, ^[7] fishermen using smart boats can't know how much they can catch.

Smart tracking devices are ineffective against vessels that use fake licences or can switch their Automatic Identification System (AIS) off, thereby 'going dark' ^[8] when engaging in illegal activities. Satellite imagery can show how many boats there are in any given area; one might have a licence to be there, and the other right next to it – not. Ocean conservation activist organisations like Sea Shepherd have had successes by accessing multiple sources of data (optical, AIS, Vessel Monitoring Systems, night imagery, and radar), getting the assistance of local law enforcement, and having considerable financial resources at their disposal.



Underwater cameras and sensors to video what a catch is reeling in also have their challenges: Someone still needs to watch the footage and document what was caught or recorded underwater. While machine learning and AI software that can identify and categorise fish exists, one that can do the full spectrum of marine life justice still needs to be developed. There are thousands – if not hundreds of thousands – of different fish species. Training AI algorithms to identify them would require just as many high-res and carefully curated images.

The good news for Smart Ocean Technologies

While the situation is dire, and smart ocean technologies aren't enough to solve sustainability challenges and the rising cost of IUU fishing, we haven't yet reached the point of no return. Success stories from the likes of OceanMind, Sea Shepherd, Global Fishing Watch and ThisFish are made possible because of passion and collaboration at all levels. Proving that apathy isn't the problem; we just need to do more.

The more consumers demand traceability as standard practice, the higher the penalties for illegal fishing. The bigger the incentives to fishermen to comply, the greater the pressure on governments to prioritise ocean management as part of good governance; the better our chances will be.

Do you have a smart technology solution for ocean conservation that we didn't mention? Reach out to us and share – we'd love to hear from you!

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