Information Sharing Is Key to Ending Illegal, Unreported, and Unregulated Fishing

New study uses modelling to show benefits occur even when sharing is not reciprocated

Overview

Overfishing is one of the greatest threats facing the ocean. In its 2020 biennial report on the status of the world's fisheries, the United Nations Food and Agriculture Organization (FAO) noted that a third of fish stocks are overfished and that nearly 60 percent of the remaining stocks are unable to sustain further increases in fishing. Illegal, unreported, and unregulated (IUU) fishing exacerbates this threat, preventing accurate stock assessments and harming small-scale fishers and coastal communities through destructive fishing practices. The economic and food security implications are substantial: In some developing nations, IUU fishing accounts for more than 30 percent of fish taken from their waters, often due to limited capacity to monitor activity within exclusive economic zones.

Addressing the complex challenges of IUU fishing requires understanding fishing activity on the water, where fishing vessels have been, and where they have been catching fish, along with knowing what permissions or authorizations those vessels had. This knowledge stems from a steady flow of information from the flag State of the fishing vessel, to the coastal State in whose waters it fished, all the way through to the port State where the fish is landed. Complicating matters: Critical information such as registration, fishing authorizations, or access to the vessel's track (or movement on the water) is rarely held in any one government department.

For several years, information sharing has been identified as an essential element in combating IUU fishing. The FAO's 2016 Port State Measures Agreement—the first international treaty dedicated to countering the threat of IUU fishing and seeking to prevent illegally caught fish from entering the supply chain ashore—requires information exchange among countries about vessels and where fish were caught. Although the treaty is now in force, implementation of it has been slow, particularly in respect to information exchange and access among countries.

Figure 1

The Need for Intent and Capacity to Fight IUU

Positive intentions and greater capacity are the ideal pair for successful information sharing

Lack of Intent

A government lacks the intent to combat IUU fishing and reaps no related benefits to its fishery.

Some Intent

A government takes initiative to invest in combating against IUU fishing and begins to better understand fishery activities.

Intent & Some Capacity

A government has both intention and some capacity to fight against IUU fishing and can start to detect and respond to illicit behavior.

Intent & Great Capacity

A government has intention and great capacity in combating IUU fishing and is communicating over multiple platforms across jurisdictions, which allows for intercepting more unlawful behavior.

In 2020, the UK Centre for Economics and Business Research (CEBR) published a study[1] commissioned by The Pew Charitable Trusts modelling the likely impacts of sharing fishing activity data among neighboring coastal States. The key findings were:

1. The fisheries of any country that openly shares data will benefit, even if there is no reciprocity from other States.
2. Increased information sharing, even if one of the countries had only limited capacity for reciprocity, will increase a State's ability to enforce fisheries laws and lead to improvement in fish stocks in both countries.
3. Improving the technological, operational, and institutional capacity for States to be able to collect, analyze, and share information is crucial to combating IUU fishing.

The information sharing model

Information sharing among States on a vessel's position, its fishing permissions, where it caught its fish, its ownership history, and any data on whether it has fished in an illegal or harmful way before is crucial in the fight against IUU fishing. Yet there are challenges in encouraging States to actively work together and share timely information, including financial burden and a lack of reciprocity. To demonstrate the likely real-world impacts of sharing data, CEBR developed an agent-based model that included five scenarios varying certain parameters, such as the amount of information shared, enforcement schemes, and technological, operational, or institutional capacity constraints.

Agent-based modelling is a computer simulation that combines advanced modelling algorithms with some core "rules" with which the agent, such as a fishing vessel or the enforcement authority, dynamically interacts.

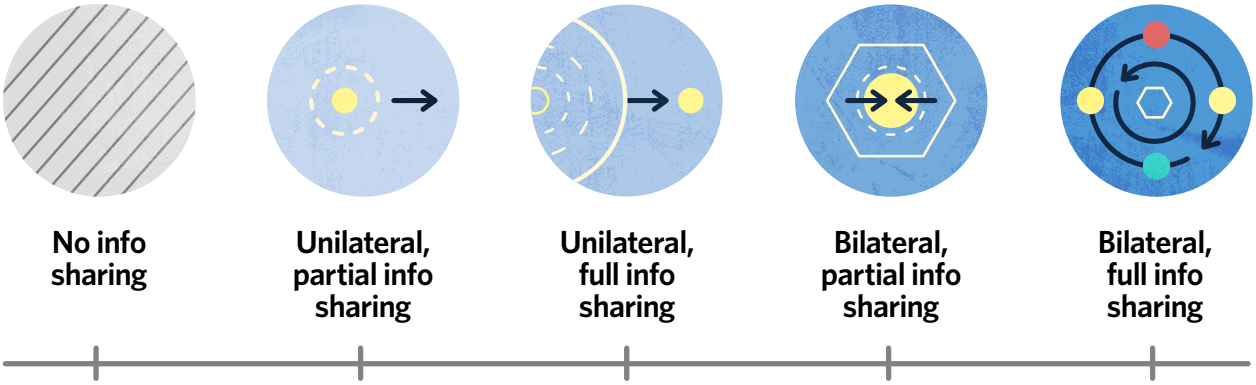
Because of the modelling approach used, projected behavioral change is random—and therefore more realistic to real-world outcomes. The CEBR model was built around sharing information specific to detections of IUU fishing through a combination of vessel positional, licensing, inspection, and prosecution data. This information flow was simulated both between the enforcement authorities and the fishers themselves. This approach allowed assessment of both the capability of the enforcement authorities to act and the changes in vessel activity patterns. For example, as the likelihood of detection and prosecution increased, the risks to IUU fishing started to outweigh the potential benefits, and so fewer vessels would choose to take the risk. The model was run 10,000 times for each scenario to identify trends.

Figure 2 depicts the five core scenarios explored. The spectrum of information sharing in these scenarios included: no information sharing, unilateral (one-way) sharing of partial and full information, and bilateral (two-way) sharing of partial and full information. Partial information sharing was defined as 50 percent of the detection information on individual IUU fishing activities, while full information sharing was 100 percent of detections.

Figure 2

Spectrum of Information Sharing

The agent-based model assessed impacts of sharing no information to sharing full information



One key finding from the modelling was that a country that shared any information with a neighboring country saw a clear benefit in terms of reducing the propensity for IUU fishing in its waters. In the study, IUU propensity was defined as the tendency for fishing vessels to operate illegally. The principle behind this propensity can be compared to driving offenses such as speeding: Although some drivers always obey the law and others seek to break or ignore it, most people would fall between those two extremes and would modify their behavior based on the likelihood of detection and legal enforcement. For all scenarios modelled, sharing information from one country to the other, even if getting no information in return, still provided demonstrable benefits to the sharing country. Essentially, the modelling shows that lack of reciprocity should not be viewed as a barrier to sharing information. Specifically, the results showed that even sharing partial information with no reciprocity increased the level of biomass, decreased the propensity of IUU fishing, increased revenue from fines, and decreased the amount of illegal catch in the fishery. This behavior change is likely due to the increased likelihood that IUU offenders will be caught when information is shared.

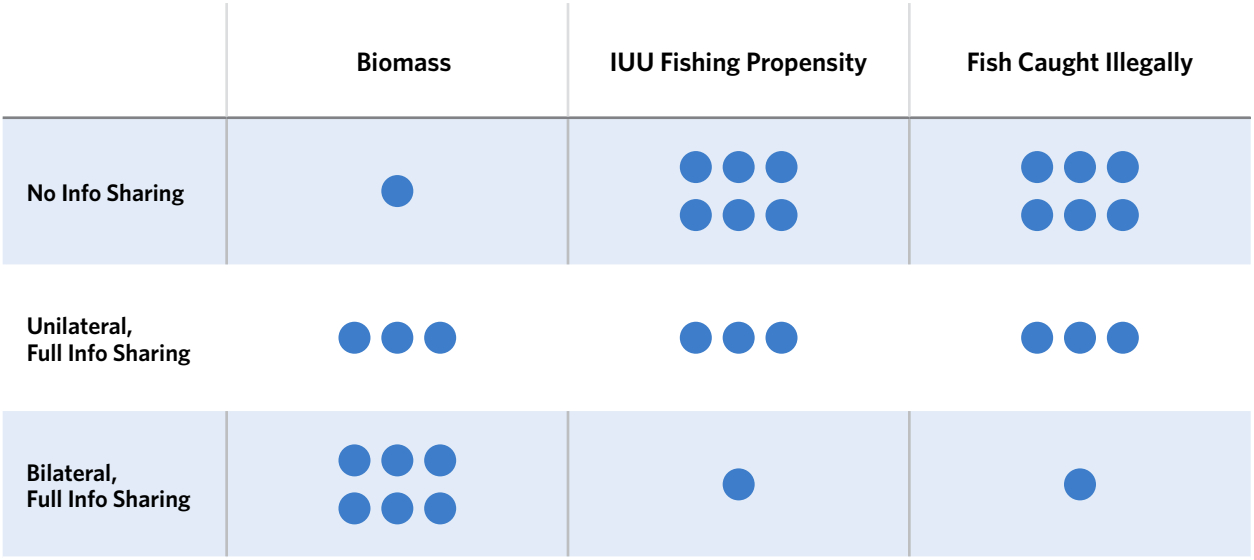
These remarkable findings identify a leadership opportunity for coastal and port States. Sharing information has the potential to positively change the behavior of fishers, improving the productivity of shared fisheries and demonstrating an intent to combat IUU fishing and improve ocean governance. According to the model, these benefits may increase exponentially when full information is shared by neighboring countries.

Figure 3 is a simplified diagram to show how information sharing affected three of the modelled fisheries elements examined in the study. As more information was shared, biomass (defined as a generic fish population in the study) increased, and there were decreases in both IUU fishing propensity and illegally caught fish.

Figure 3

Benefits of Information Sharing

Demonstrated trends in biomass, IUU fishing propensity, and illegal catch



Note: The modelling shows revenue from fines increasing with information sharing. However, once a State reduces IUU in its waters, eventually revenues from fines related to IUU activity would also decrease.

Impact on IUU fishing

Another key finding of the model is the relationship between a country's ability to act on the information it obtains and how that ability affects the behavior and quantity of those undertaking IUU fishing activity.

One of the assumptions in the CEBR model is that if no enforcement action is taken, more fishers will be prepared to fish in an IUU manner. That is to be expected: The model results show the propensity to fish in an illegal or unsustainable manner increases when the risk of detection or sanction is low. However, the model demonstrates that the ability to transfer information needs to be combined with the capacity to act upon that data to realize the full impact in combating IUU fishing.

Developing nations often have limited ability to comprehensively monitor the coastal waters for which they are responsible and to coordinate effective enforcement action ashore when the fish is landed and enters the supply chain. Capacity shortfalls tend to fall into three main categories:

- Technological: Port authorities need the tools and know-how to process and make risk assessments based on incoming data before the vessels enter port to land fish.
- Operational: Sufficient and suitably trained personnel are needed to inspect incoming fishing vessels and collect additional data, if required, for subsequent action.
- Institutional: Comprehensive legal frameworks on fisheries issues and the necessary expertise should be in place to apply appropriate sanctions/action through courts of law.

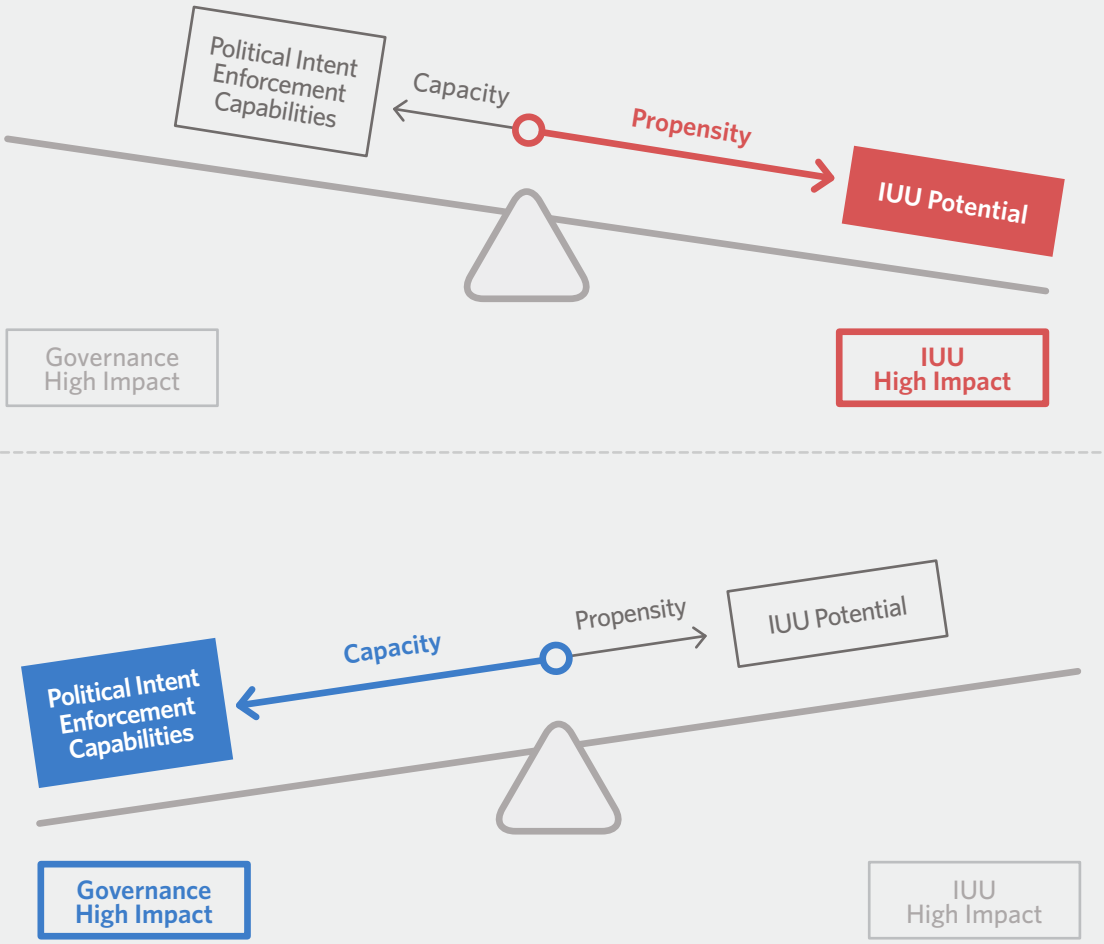
As presented in Figure 4, the model demonstrates the impact that improving capacity to act has on the propensity of fishers to engage in IUU fishing activity. If a country has sufficient capacity to act, the likelihood of IUU fishing decreases with commensurate benefits to fish stocks, ensuring a sustainable seafood supply chain.

Recognizing the need to build this capacity in developing countries, a number of treaties make provision for improving capacity. For example, parties to the Port State Measures Agreement are required to appropriate funds to assist developing States in implementing the agreement (Part 6, Article 21, Paragraph 4). These funds are to be used to develop port State measures; enhance capacity for monitoring, control, and surveillance; train port managers, inspectors, and enforcement personnel; and several other activities related to improving port controls. This model shows why such provisions are important and why efforts should continue to help developing States improve their technological, operational, and institutional capacity.

Figure 4

High-impact governance can limit IUU

Increased political intent and enforcement capabilities reduce the potential for illegal activities



IUU detection and fishery health

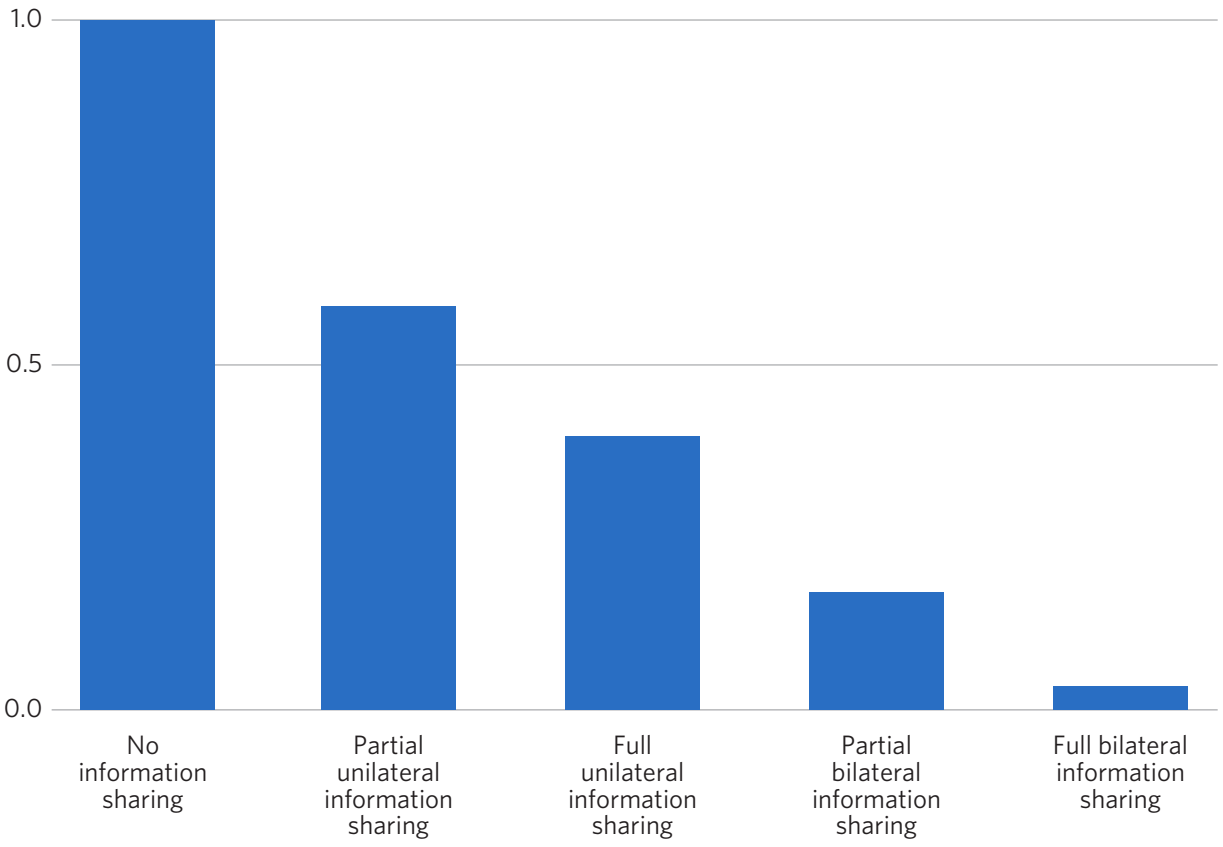
The study results demonstrate how information sharing may enable an increase in IUU fishing detection and a subsequent reduction of illegally caught fish landed at port. Information sharing has been shown to create a higher risk and less tolerant environment for fishing vessels that might be tempted to operate illegally. Results of the study show that when one State becomes aware of just half of the detections from another State, IUU fishing is more likely to be detected in either State.

Figure 5 shows that information can have an impact on landings at port. Even with one-way partial information sharing, there is an almost 50 percent decrease in the relative share of illegally caught fish landed at port. This trend continues as more information is shared unilaterally and bilaterally.

Figure 5

IUU-caught fish landed at port

Relative share of illegally caught fish landed at port with varying levels of information sharing



Note: This figure is scaled so that the "No information sharing" scenario is equal to 1 and all other scenarios are relative to that.

Source: Modified from CEBR study

In addition to showing the potential for increased IUU detection and decreased share of illegally caught fish landed at port, the model showed noteworthy trends related to IUU propensity and biomass (Figure 6). There is naturally a relationship between levels of IUU fishing and the health of a fishery: In each scenario modelled, where there is a decrease in potential illegal operations, there is an associated increase in biomass. This result is likely because information sharing helps authorities better manage fisheries by enabling them to establish and then enforce measures such as sustainable catch quotas. The strongest relationship occurred when full detection information was shared between both countries.

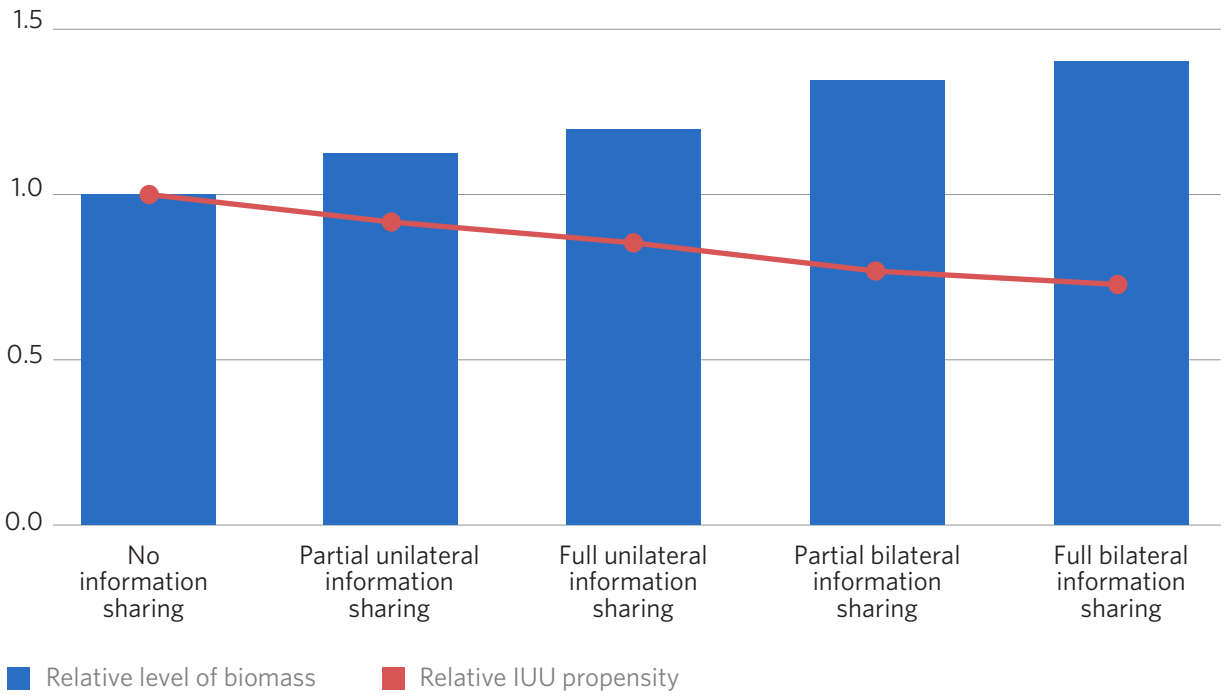
When interpreting the biomass results, it's important to note that the purpose of the agent-based model is to identify generalized patterns of behavior and likely outcomes that can result from changes to the regulatory framework. Although it is not a simulation of specific ecosystems or fisheries, there is clearly a positive relationship between information sharing and the health of the modelled fishery. This outcome is likely due to a decrease in fishing pressure and an increase in compliance with quotas and oversight, which allows for the health of the fishery to recover.

Through timely information sharing and subsequent action, coastal and port States have the opportunity to reduce IUU fishing and increase the health of their fisheries. Oversight and governance of fisheries will help remove bad actors that would otherwise be adding unnecessary pressure and stress to the fish stocks.

Figure 6

Impacts to IUU Propensity and Biomass

Relative IUU propensity and level of biomass with varying information-sharing scenarios



Note: This figure is scaled so that the "No information sharing" scenario is equal to 1 and all other scenarios are relative to that.

Source: Modified from CEBR study

Conclusion

The health of the ocean is being threatened by IUU fishing, exacerbating challenges for fisheries managers, skewing stock assessments, and harming the economies—particularly of developing nations—that rely upon fishing. For years, those responsible for sustainable management of fisheries globally have recognized the power of information sharing—including details of vessel position, identity, authorization, and catch records—as a powerful tool to combat overfishing and IUU fishing. Despite knowing that, there continues to be a reticence from those holding that information to share it with others. Using dynamic modelling, the CEBR study demonstrates the numerous benefits to countries of sharing such data, even when it is not reciprocated. It also highlights that ensuring that all countries have sufficient technological, operational, and institutional capacity allows them to act on that data. Information sharing can reduce IUU fishing and enable better stock management to help keep the ocean healthy and ensure sustainable fisheries, and food and economic security.

Endnotes

1 Centre for Economics and Business Research, "An Agent-Based Model of IUU Fishing in a Two State System With Information Sharing" (2020), https://cebr.com/reports/an-agent-based-model-of-iuu-fishing-in-a-two-state-system-with-information-sharing/.

The Pew Charitable Trusts' international fisheries project is working to ensure that these new approaches are adopted and implemented by governments and regional fisheries management bodies globally. By working toward effective rules and consequences, Pew seeks to increase cooperation and improve international fisheries governance and management.

For further information, please visit:
pewtrusts.org/internationalfisheries

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