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White Paper

Ending Illegal Fishing: Data Policy and the Port State Measures Agreement

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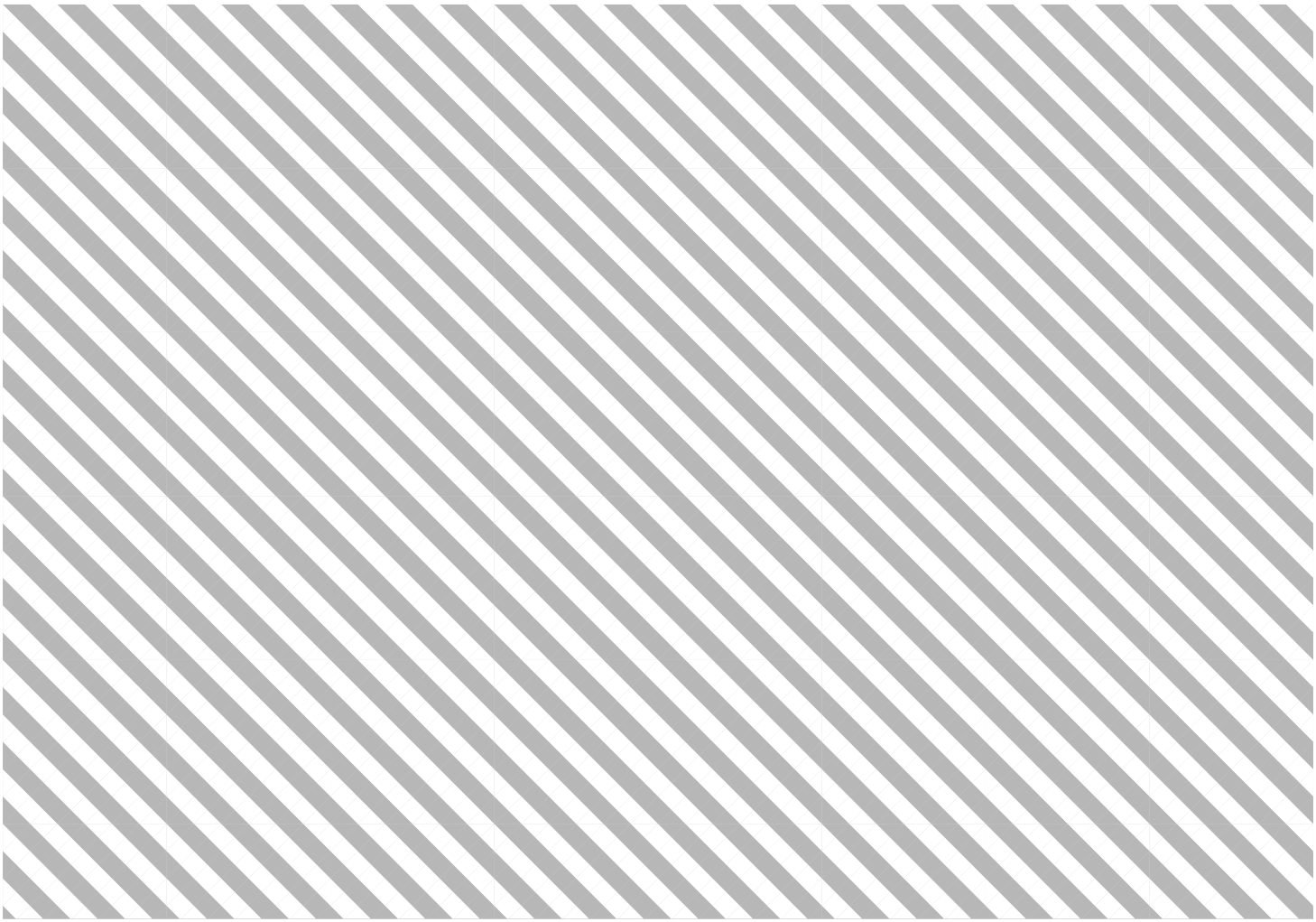

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Foreword

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Illegal, unreported and unregulated (IUU) fishing robs nations of up to $23.5 billion annually, undermining fisheries management and cheating legal fishers. Vessels engaged in IUU fishing often also traffic people and contraband, and violate human rights protections and environmental standards. In short, IUU fishing vessels pose a serious threat to the environment, security and economies of port states around the world. In Sustainable Development Goal 14, governments committed to end IUU fishing by 2020. That commitment has sparked new momentum and created the potential for a new value proposition for governments and for businesses.

IUU vessels have long defied law enforcement, protected by the vastness of the open ocean. But it has become clear that, with the power of new data technology, concerted action by businesses and governments can cut off the lifelines that sustain illegal fishing by ensuring that IUU vessels are unable to land their catch or sell their fish.

A United Nations Food and Agriculture Organization (FAO) agreement – the Port State Measures Agreement (PSMA) – provides the means for governments to do their part, requiring signatories to collect and share data on fishing vessels entering their ports and to deny entry to vessels that have been fishing illegally. The effectiveness of the PSMA will depend first, of course, on ratification of the agreement by important port and flag states around the world (86 have joined as of May 2019). Following that, the key to success will be robust cooperation among member states to develop the platforms and policies that will allow them to share data and coordinate action in real-time communication with each other.

This white paper looks at this second dimension – how cooperation between countries to share fisheries data can be achieved. Early successes in the Indian Ocean and the North-East Atlantic demonstrate the possibilities of such cooperation. This paper draws lessons from these examples and outlines a path forward to successful implementation of the PSMA in every ocean.

The data-policy framework, tailored here for the PSMA, illustrates principles that are widely applicable in realizing the benefits of Fourth Industrial Revolution technologies for the environment. Data policy and governance, including in areas where public-private cooperation is necessary, underpin the successful management of an increasingly digital world, and support the beneficial uses of new technologies that generate environmentally relevant data.

PSMA implementation is a path that offers multiple returns. It will help each state gain better control of its waters and ports. And as states adopt and harmonize technologies and share more data, it will also allow the data tools to become more powerful in the battle against IUU fishers. The combination of stronger port controls and more powerful data tools will reinforce private-sector initiatives to drive transparency and traceability across the sector. Bold action by governments can, in fact, turn the tide on illegal fishing.

Executive summary

In Sustainable Development Goal 14 (SDG 14), governments committed to end illegal, unregulated and unreported (IUU) fishing by 2020. That date is almost upon us and, while it remains challenging to apprehend vessels conducting illegal activity on the open ocean, the systematic prevention of vessels landing or trans-shipping their illegal catch at port can make a significant difference. Coordinated ratification and implementation of the UN Port State Measures Agreement (PSMA) – the first legally binding international instrument specifically targeting IUU fishing – is the single most immediate and comprehensive action by which the SDG 14 commitment can be achieved.

The success of the PSMA extends beyond just ratification, depending on cooperation among the port states in a region and the flag states whose vessels operate there. New and emerging technologies have the potential to provide robust information on each vessel's activities. As states adopt and harmonize technologies and share more data, these tools will become even more powerful in the battle against IUU fishers. However, for these systems to be effective, states must be able to share data in near real time with each other. This white paper looks at how this can be done, presenting a path forward to successful exchange of fisheries data under the PSMA.

This white paper is part of the World Economic Forum's Fourth Industrial Revolution for the Earth portfolio at the Centre for the Fourth Industrial Revolution, in collaboration with the Forum's Friends of Ocean Action initiative. The Fourth Industrial Revolution for the Earth portfolio aims to realize the benefits of technology to the environment and society in general while minimizing harm. Here, we illustrate how data policy can support action in regards to critical ocean issues – in particular, how data-sharing solutions can help drive an international commitment to ending illegal fishing through the PSMA.

Historically, the operational opacity of the ocean has made fisheries difficult to manage effectively, leading to widespread illegal behaviour and the global overfishing of fishery stocks. Current international efforts to end IUU fishing are focused on introducing transparency and traceability into the fisheries industry. The PSMA is one example of such measures; it provides a path to ending IUU fishing, allowing authorities to bar foreign-flagged vessels from port if they do not provide data to prove they have been operating legally.

Globally, progress is being made towards a universal ratification of the PSMA; however, beyond this, significant barriers to effective PSMA implementation remain. Several of these barriers stem from difficulties in streamlining the collection and sharing of fisheries operational data between countries. Transitioning historically secretive and paper-based systems to ones that support the near real-time data sharing that is central to the PSMA's effectiveness requires significant cooperation, attention to data policy and architecture, and investment in resources. In many cases, these barriers combine to make the path towards effective PSMA implementation unclear.

Despite these barriers, several regions have successfully established information-exchange systems that adhere to the PSMA, providing examples for how fisheries data can be shared effectively and the agreement implemented efficiently. The Indian Ocean Tuna Commission and the North East Atlantic Fisheries Commission have both adopted systems that fully comply with the PSMA, providing guidance for developing other systems globally. We identified the following main building blocks of successful PSMA implementation based on these case studies and consultations with fisheries experts.

Cross-jurisdictional cooperation: The PSMA will be most effective if there is cooperation between countries in sharing near real-time data, ensuring that IUU vessels are identified and prevented from offloading fish in ports. This data sharing should be built on top of existing regional organizations, including regional fisheries management organizations (RFMOs), and other international groups, such as Asia-Pacific Economic Cooperation (APEC). Regional cooperation should be coupled with national action plans on IUU that spur cooperation among different agencies within the same governments.

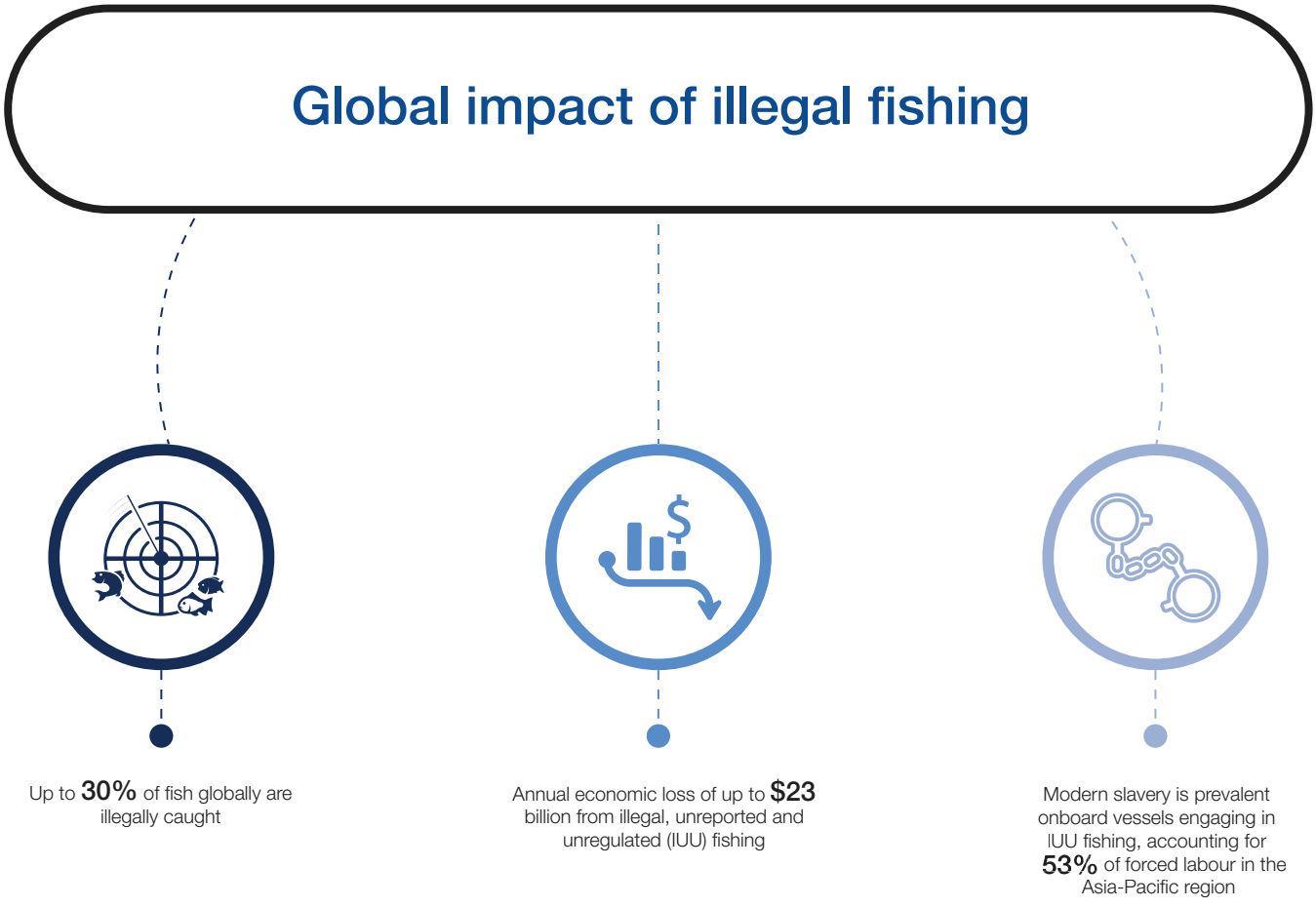
Data platforms and exchange mechanisms: Creating the digital infrastructure to support near real-time data sharing between countries helps to lay the foundations for successful PSMA implementation. Designing this infrastructure should begin with the mapping of current port inspection protocols and existing data-exchange mechanisms onto the PSMA's requirements, integrating with other private-sector supply-chain data needs and assessing relevant data-policy questions.

Resources and funding: Designing and implementing new data collection and exchange mechanisms that are compliant with the PSMA requires significant financial resources, particularly in developing countries. Mechanisms for allocating resources to fill implementation gaps are necessary to ensure that illegal fishing is stopped – not just from some ports, but from them all.

Part 1: Illegal fishing and the Port State Measures Agreement

Illegal, unreported and unregulated (IUU) fishing is a global problem that contributes to the overexploitation of fisheries and damage to marine ecosystems, threatening global food security and hindering fisheries management efforts.[1,2,3] Researchers estimate that up to 30% of global fish is illegally harvested,[4,5] resulting in an annual loss of $10 billion to $23.5 billion.[6]

IUU fishing is not just a problem for sustainable fisheries – it also has strong links to criminal activities:[7] There is increasing evidence of forced and unpaid labour on IUU fishing vessels. In the Asia-Pacific, fisheries were host to 53% of the forced labour in the region.[8] In one Thai fishery, researchers found that nearly 80% of fishers had been held in debt bondage from 2011 to 2016.[9] Fishing vessels have also been linked to the illegal trafficking of drugs and weapons, and to acts of terrorism.[10]



The environmental, economic and social impacts of IUU fishing are likely to worsen as global fisheries increasingly expand to international waters in search of unexploited fisheries to meet the global demand for seafood.[11] International waters – waters outside of a nation's exclusive economic zone (over 200 miles from shore) – provide an ideal environment for vessels to conduct IUU fishing and other illicit activities undetected.

Historically, a lack of transparency has made fishing a difficult industry to manage effectively. This is due in part to the logistical challenges of enforcing fisheries regulations in vast areas of the ocean: Most fishing activities happen far away from the reach of enforcement agencies. These operational constraints are heightened by analogue data-gathering and reporting systems, fragmented regulatory requirements and an expansive network of actors. Together, the lack of transparency throughout this complex landscape inhibits the ability of fishery managers to accurately estimate stocks and design effective management plans, threatening the sustainability of fisheries and health of the marine ecosystem.

In recent years, efforts to combat IUU fishing have focused on increasing the transparency and traceability of global fisheries (transparency refers to the ability to monitor the supply chain; traceability refers to the ability to track fish through the entire supply chain from the vessel where it was caught to the supermarket shelf). Recognizing that illegal behaviour will continue while IUU is easily hidden from fisheries inspectors, the international community is pushing to strengthen monitoring, control and surveillance requirements in order to furnish the authorities with the information needed to clamp down on IUU. New and emerging technologies are providing increasingly robust information on the activity of fishing vessels, wherever they are on the ocean and from the time they leave port to the time they return. There is increasing demand from the biggest buyers in the seafood sector – including retailers and processors – for full transparency in their supply chains, from boat to supermarket shelf. In all aspects, government action is essential.

The most effective of these regulatory efforts is the United Nations Fisheries and Agriculture Organization's (FAO) Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (Port State Measures Agreement, PSMA), which entered into force in June 2016.[12]

The PSMA is the culmination of a decade-long push by the international community to give greater authority to port states in their attempts to stop IUU vessels, and is the first legally binding global agreement that seeks to control IUU fishing. Among other things, the PSMA requires port states to:

- designate specific ports in which foreign-flagged vessels may land or trans-ship fish
- require and review standard vessel information before allowing a vessel's entrance into port
- carry out risk assessments to determine whether vessels may have participated in IUU fishing
- deny any of these vessels entry into their ports and otherwise prevent them from offloading fish in their ports, and
- exchange vessel information with other states and international entities.

These requirements, if properly implemented, will effectively limit the number of ports accessible to IUU fishing vessels. The goal is for all port states to adopt and implement the PSMA so that IUU fishing vessels are not able to land or trans-ship their catch in any port, thereby removing or reducing the economic profit that drives the activity.[13] As of May 2019, 86 states and one member organization (the EU) are party to the PSMA, with many more stated commitments to ratify in the near future.[14]

Despite the PSMA's increasing number of ratifications, there remain significant questions about how the agreement's mandates to collect fisheries data and facilitate data sharing between countries can be carried out. The PSMA represents a major step forward by creating standards for fisheries data collection and sharing, but it does not create a clear path in terms of how these steps towards transparency should be implemented. This is particularly important in the realm of data sharing: While the PSMA dictates a clear checklist of information that must be collected from vessels, the agreement itself does not set out systems or guidelines for communicating and sharing this information between countries. Current efforts to understand what this architecture should look like are being taken by individual countries and regional groups, such as regional fisheries management organizations (RFMOs), and the technical working group of the PSMA itself. All of these actors have come to slightly different conclusions about the mechanisms for data sharing under the PSMA, perpetuating the existing regulatory patchwork. Moreover, the cost of developing new the PSMA-compliant fisheries inspection procedures and platforms is significant. In many countries, capacity building is required in order to comply with the PSMA. Some of this is being supported by the capacity-building fund created as part of the PSMA, but further efforts must be made to overcome this major barrier to implementation.

These barriers have created a significant gap between PSMA ratifications and successful implementation of the agreement. While ratifications continue to increase, implementation lags behind. Even when countries are fully committed to the PSMA, restructuring fisheries management to achieve compliance remains elusive. In some cases, the perceived barriers to implementation are so great that countries choose not to ratify the PSMA to begin with.

This paper looks at several examples of successful implementation of the PSMA-related information exchange to understand which fundamental principles can guide ongoing efforts to implement the agreement, focusing on facilitating effective data collection and exchange.

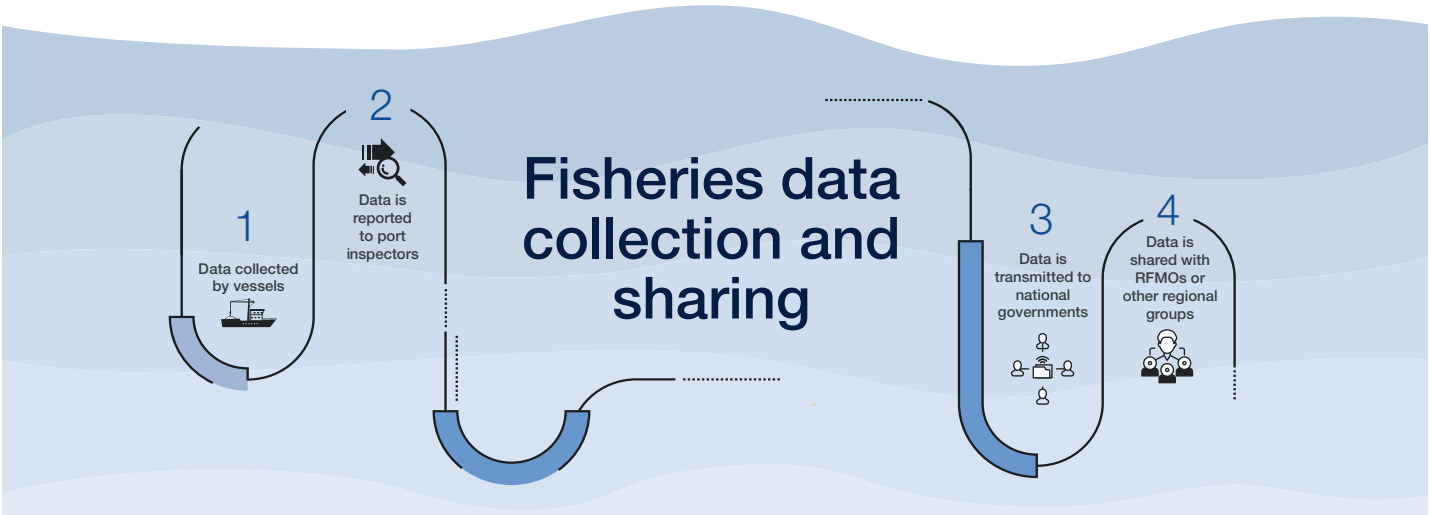
Part 2: Understanding fisheries data

In many ways, the PSMA is a fisheries data agreement. The foundation of the PSMA is a requirement that port inspectors collect standardized data from every vessel seeking to offload fish in their port. Ideally, countries then share this data with relevant international authorities to ensure that any vessels engaging in IUU fishing can be barred from all ports. The agreement also encourages RFMOs to share information regarding IUU fishing and their efforts to combat it with their members and other relevant states.

Implementation of the PSMA will be most effective if all states in a given region (and ultimately, all states globally) share information on a near real-time basis about vessels suspected of participating in IUU fishing. This will effectively prevent illegally harvested fish from being landed or trans-shipped in any port in that region. This approach solves the challenge of trying to enforce fisheries violations over thousands of square miles of ocean by concentrating efforts in the natural bottleneck created by ports.

However, collecting accurate information about fisheries has always been a challenge, especially in developing countries, where the technical capacity to collect and share such data does not exist or is rudimentary. Traditionally, data from fishing vessels has been collected on government-issued log sheets, with fishing vessel captains filling these sheets out each time they bring fish aboard. These sheets are then physically given to inspectors when the vessels reach port or faxed to the relevant authorities. This method, while better than nothing, has been deeply problematic. In the most innocent instances, handwriting can be hard to read or in unfamiliar languages, or pages can be missing, rendering the data difficult to extract for regulatory agencies.[15] In less innocent cases, vessel captains can easily falsify information to hide illegal activity.

In recent years, fisheries have begun to transition towards digital methods of information exchange, although they lag far behind many other industries. Currently, the most common method of electronic data gathering on fishing vessels is through vessel monitoring systems (VMS). These tamper-proof boxes sit on vessels and transmit their location in real time to monitoring agencies. VMS data is closely guarded by the countries that gather it, but it also lies at the core of efforts to drive transparency in fisheries; there are significant efforts to encourage countries to make their VMS data completely open to the public. Several countries, with Indonesia leading the charge, have agreed to release their VMS data to the Global Fishing Watch platform,[16] providing a new level of transparency for fishing activity, while also raising questions about the availability of fisheries data.



Barrier to data collection + sharing

1 Data collected on fishing vessels
- Analogue collection and recording methods
- Inaccurate or incomplete data provided by vessels
- Incentives to misreport

2 Data reported to port inspectors
- Insufficient resources to carry out effective inspections
- Lack of consistent standards and training between ports
- Vessel data and legality not easily verified

3 Data transmitted to national governments
- Poor communication pathways
- Lack of coordination between national agencies
- Incomplete information available on vessel identity

4 Data shared with RFMOs and other global and regional groups (as required)
- Lack of data architecture to facilitate information exchange
- Resistance to sharing sensitive data among countries
- Differences in data standards and interoperability

Data shared with supply-chain actors
- Inconsistency between data requirements (regulation, sustainability certifications, supply-chain needs etc.)
- Resistance to sharing sensitive data among actors
- Lack of data architecture to facilitate information exchange

This transition to electronic systems has raised serious concerns for many stakeholders about how this kind of data is collected and shared. Historically, information about where vessels are fishing has been a closely guarded secret.[17] Knowing where the best fishing grounds are is crucial for the economic success of operators and they have been hesitant to reveal this information, including (and sometimes especially) to regulators.[18] This ethos extends throughout the industry, with governments and retailers also hesitant to share information regarding their activities.

Fisheries data is still very much a system is transition, with the potential for new digital systems clashing with the realities of implementing change in centuries-old methods and cultures. The resulting system is a patchwork, with modern methods existing side by side with paper data collection. In some ways, this is ideal timing for the PSMA, as it ensures that the data systems designed to screen out IUU fishing will be adopted by fisheries naturally transitioning to electronic data collection. On the other hand, the fact that few clear digital mechanisms for implementing the PSMA exist means that adhering to the agreement presents a significant challenge to parties lacking such infrastructure.

However, the PSMA adds its own level of complication to the fisheries data landscape, as it allows countries the freedom to choose their own implementation methods and strategies. The PSMA mandates only certain end requirements – that a checklist of data is collected when vessels enter ports and that this data is shared. How this data is shared and with what restrictions is something ultimately left up to individual parties within the PSMA. While this gives countries the ability to tailor implementation to their individual requirements, the lack of mechanisms to carry out a data exchange has left many countries unable to successfully move the PSMA forward. However, the work of several early movers (including the PSMA's own Technical Working Group on Information Exchange) has begun to address the question of how data can be exchanged successfully under the agreement. Here, we look to several of these successful examples to illustrate the cornerstones of effective PSMA data sharing mechanisms.

Part 3: PSMA implementation case studies

1. Indian Ocean Tuna Commission

The Indian Ocean is an important region for fisheries management. The tuna fishery in the western part of the Indian Ocean alone is the second most valuable in the world.[19] The Indian Ocean Tuna Commission (IOTC) – the RFMO charged with managing tuna stocks in the Indian Ocean – was an early adopter of electronic port state controls[20] and thus provides a valuable insight into how the PSMA can be successfully implemented.

While the IOTC has long embraced the importance of port state measures as a tool in combatting IUU, the 2009 adoption of the PSMA led the IOTC to bring its measures into line with the PSMA, a commitment that was binding for the IOTC's 32 members.[21] In the IOTC's case, existing port state measures were close to the PSMA's requirements, which allowed for a relatively quick transition. The IOTC also tailored its port state measures to the needs and capabilities of its members, promoting acceptance and compliance.

In addition to this, the IOTC also moved to a digital platform for information exchange. This electronic Port State Measure system (e-PSM) moved previously analogue reporting systems to an electronic platform that allowed for real-time data sharing between port officials, member states and the IOTC. The IOTC invested significant resources in both creating and training for this platform. This training was undertaken in person throughout the region, with additional materials made available online.

The IOTC's approach has been touted by experts as one of the leading examples of successful PSMA implementation. Aligning existing fisheries controls with the PSMA in an integrated electronic platform with extensive training, capacity building and existing regional cooperation, the IOTC provides a concrete example of how barriers to the PSMA can be overcome. However, this example has its limitations. The IOTC manages tuna stocks alone, and these only in a small portion of the globe. These stocks are, however, economically important and thus provide the resource base needed to make successful PSMA implementation possible.

2. North East Atlantic Fisheries Commission

Like the IOTC, the North East Atlantic Fisheries Commission (NEAFC) is an RFMO that was an early adopter of port state measures, creating a Port State Control system in 2007.[22] Similarly, NEAFC revised its measures to bring them fully into line with the PSMA once the agreement entered into force. In parallel with this process, NEAFC members adjusted their respective national laws and regulations to bring them into line with the PSMA as they ratified.

NEAFC then developed a fully electronic system for the submission of port state control information. Vessels planning to enter ports in the NEAFC region must now submit a Notification of Entry through the NEAFC Electronic Port State Control (EPSC) up to 24 to 72 hours in advance of their arrival in port. As required by both NEAFC rules and the PSMA, only designated ports are open to foreign flagged vessels, allowing NEAFC party states to concentrate their inspection and control resources in a few critical areas. This Notification of Entry, which includes much of the information required by the PSMA, is sent to the relevant port. Furnished with this data, port inspectors now have time before the vessel arrives to carry out an IUU risk screening and prepare for the its arrival.

NEAFC has coupled the required Notification of Entry with mandatory flag state verification. This requires a vessel's flag state to confirm that the vessel complies with its regulations and permits and that the vessel has submitted VMS tracking information. This verification step is required by the PSMA and illustrates the importance of near real-time data sharing between countries. For this provision to be carried out effectively, flag states are required to respond quickly to port states with the requested information. NEAFC created a system where this step is undertaken digitally through the EPSC system, allowing the necessary information to be shared. NEAFC, like many RFMOs, also shares lists of vessels it has identified as engaging in IUU fishing with other RFMOs, such as the South East Atlantic Fisheries Commission and the Northwest Atlantic Fisheries Organization.

NEAFC has also recognized the importance of information security in its electronic systems, adopting an information security management system in 2014.[23] Under this system, NEAFC members, as well as the NEAFC organization itself, are required to protect confidential information in electronic databases through appropriate cybersecurity and confidentiality measures. This important step recognizes that the information collected by RFMOs, including as part of the PSMA, is potentially sensitive, and digital security measures need to be put into place to protect this data.

The NEAFC port state measures have proven very successful; indeed, NEAFC claims to have effectively eliminated IUU fishing in the North-East Atlantic.[24]

3. Other examples

In addition to NEAFC and the IOTC, other RFMOs have made significant progress on implementing port state measures. The South Pacific Regional Fisheries Management Organisation (SPRFMO) and the Forum Fisheries Agency have implemented versions of port state measures that, while not fully consistent with the PSMA, represent purposeful progress towards achieving PSMA compliance. This progress is notable given that these Pacific RFMOs are tasked with managing fisheries in some of the most complicated geographies in the world and have fewer resources than regions such as NEAFC.

Outside of RFMOs, other regional collaborations have shown the potential for coordinated regional action, particularly around information sharing, to make real progress in combatting IUU fishing. The FISH-i Africa project, for example, is a collaboration of eight East African coastal nations that have agreed to share intelligence on vessels operating illegally. The successful exchange of fisheries information under this project has helped to reduce IUU fishing in the region, as well as other criminal activities.[25]

Fisheries managers seeking to implement the PSMA face similar barriers: lack of capacity and financial resources to create new port control systems; hesitancy and lack of mechanisms to share data regionally; conflict with existing regulations and an unclear path forward. The IOTC and NEAFC illustrate ways in which these barriers can be overcome. States in other regions can draw useful lessons from their efforts.

Part 4: Key components of successful PSMA implementation

Cross-jurisdictional cooperation

Building on regional partnerships

A cornerstone of effective PSMA implementation requires states to share real-time information, but as discussed above, the PSMA provides no clear pathway for how to do so; furthermore, the innate resistance to sharing fisheries data is strong. This may be particularly true between neighbouring countries who are competing for the same fishery resources. In these cases, building on existing regional governance mechanisms is a crucial shortcut to effective PSMA implementation.

While there are systemic governance challenges for RFMOs,[26] current examples suggest that these bodies may provide avenues to effective PSMA implementation through preexisting pathways for data exchange. Even in cases where the RFMO itself is unlikely to adopt the necessary measures, countries may act separately to strengthen existing communication pathways and create data-exchange systems outside of RFMO frameworks.

Countries can also build on other existing regional cooperation mechanisms to facilitate fisheries data exchange and regional efforts. Combatting IUU is a stated priority of many regional groups, including Asia-Pacific Economic Cooperation (APEC) and the G20. These initial commitments provide the foundation for potential collaboration on PSMA implementation.

Working regionally to implement the PSMA can help to create a new value proposition for combatting IUU: Comprehensive regional action has the potential to make significant strides on IUU, ensuring universal coverage for all ports in the region. Action at the regional level can lower the costs to PSMA implementation by ensuring efforts are coordinated and interoperable.

National coordination to combat IUU

Creating national plans of action is another crucial step to effective PSMA implementation. Fisheries often fall under the watch of a number of different governmental agencies: Fishing, environment, trade, foreign affairs, information and digital affairs, and law enforcement organizations are often involved. Frequently these agencies do not communicate often enough to effectively combat IUU fishing. Initiating comprehensive plans for interagency cooperation can help to create effective mechanisms for information gathering and sharing, not just between countries but within them, too. These agreements are necessary to ensure that fisheries data is accessible to the many ministries that may need it, but also that relevant data governance and sharing questions are addressed comprehensively at the national level.

Several countries – Chile, for example – have created national action plans for IUU that successfully coordinate efforts between national actors. These plans have been important in spurring cooperation and information exchanges between relevant agencies, and are an important foundation of successful PSMA implementation. They ultimately help countries establish robust control over their ports white benefiting core national interests such as national security, economic development and fisheries management.

Data platforms and exchanges

Mapping with existing systems

The first step in implementing the PSMA will be to map its data-collection requirements against existing port inspection procedures. Current national and regional-level port inspections often use data that is very similar (or identical) to that required under the PSMA. The IOTC and NEAFC provide clear examples of how existing systems can be converted into PSMA-compliant systems with initial investment in planning and strategic alignment. By convening legal and enforcement experts to identify how to align existing structures with the PSMA, both of these RFMOs were able to adapt existing port inspection regimes to meet the agreement's requirements with relatively few changes. These alignment processes were driven at the regional level, helping the RFMO to bring its measures fully into line with the agreement's requirements, but they also generated recommendations for changes at the national level.

This alignment step ensures that new measures are more likely to be effectively implemented. Tweaking existing systems creates solutions that are familiar to stakeholders and regulations that are more likely to be followed correctly in such cases. Creating entirely new procedures for port inspection requires extensive training and a potentially lengthy acclimatization period. Alignment can also help to alleviate cost concerns about the PSMA, as small adaptations of existing systems are significantly less resource intensive than full regulatory overhauls.

Integration throughout the fisheries industry

In addition to building on existing inspection procedures, effective PSMA implementation should also be integrated with the larger fisheries industry. Data about how and where fish are caught is required not just by governing bodies, but by an equally complex network of commercial actors, too. The commercially driven data landscape is growing

rapidly as retailers, consumers and sustainability certification programmes increasingly seek data about the provenance of fish. Each of these actors and instruments requires slightly different, but largely overlapping, information.

Effective PSMA systems should integrate with existing data needs to create monitoring systems that satisfy crucial regulatory and supply-chain traceability data requirements. This means ensuring that a vessel's PSMA data can also be used as the foundation for commercial supply-chain traceability. In this ideal world, data at all points in the fishing supply chain, from the vessel to the supermarket shelf, is available to governmental and corporate actors.

However, efforts to share the PSMA data with private entities, or even between national governments, raise serious concerns. Fisheries data is commercially sensitive, as discussed earlier, and there are few systems in place that allow private actors access to data collected by governments. In the case of the IOTC and NEAFC, the PSMA data is accessible only by authorized government actors. While this is certainly the easiest solution to data-sharing concerns, it perpetuates the fragmentation of the fisheries industry that has made it so difficult to manage. Integration of public and private data is needed to create true transparency and traceability in the fisheries supply chain. The PSMA should be a foundational building block of this integrated fisheries data landscape.

Data policy

Answering important data policy questions can facilitate data sharing between countries, regional actors and the private sector. Sharing this type of commercially sensitive information raises questions about what restrictions should be placed on data, who can access it, and what overarching privacy, commercial and ethical considerations should govern it. The answers to these questions are not necessarily easy ones, with different countries and types of actors holding significantly divergent views on how protected fisheries data should be. However, addressing these questions is critical to allow data sharing to move forward.

Main fisheries data policy questions		
Data collection	**Data sharing**	**Data use**
Is the data needed to support commercial and regulatory needs being collected?	Is data legally shareable given applicable national and regional regulations? And given commercial protections?	Is data fit for use in regulation and enforcement?
Is that data being collected in legal ways that do not violate applicable commercial and privacy rights?	Is data logistically shareable given existing metadata and interoperability parameters?	Do policy-makers, enforcement agencies, private sector etc. have access to the necessary data?
Who bears the logistical and financial burden of data collection?	Do platforms exist to share this data? Which entities have access to these platforms?	Is data being used as the basis for policy action?
How can the accuracy of this data be verified?	Is shared data secure?	

The most relevant data policy questions can be classified into three main categories: how data is collected; how data is shared; and how data is ultimately used.

Effective PSMA implementation requires paying attention to these questions from the earliest stages of the planning process. While some of them are immediately apparent (Is the necessary data being collected?), others are often overlooked until later in the design process or ignored completely. Ensuring that the architecture of data-sharing systems and end uses of data are considered from the beginning is necessary to enable effective fisheries data sharing.

Digitalization

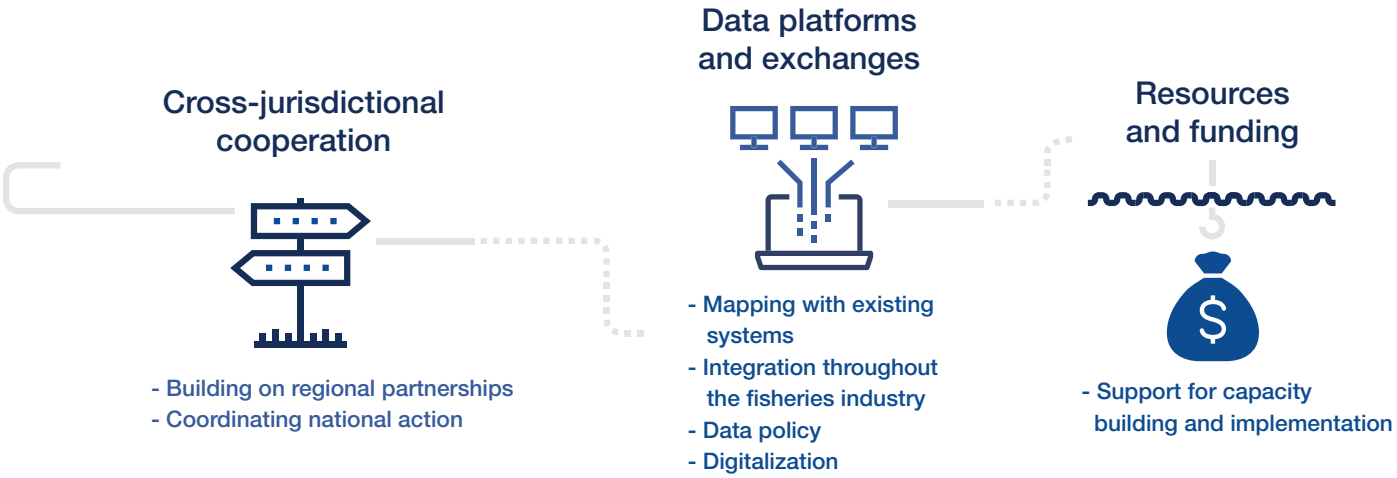
Digitalizing fisheries data systems is not an inherent requirement of successful PSMA implementation, though it is encouraged "where possible" by the agreement and makes the process significantly more effective through the ease of real-time data sharing and access by many relevant parties. Existing PSMA implementation examples in the IOTC and NEAFC have been partially effective because they create new digital platforms that allow for the PSMA data to be collected and shared across national boundaries. These platforms easily allow for real-time communication between party states, and – while not explicitly required by the PSMA – are the most efficient means to achieving the data-sharing mandates.

The move to electronic fisheries data collection and sharing is happening throughout the fisheries industry, not just in the context of the PSMA. As this shift begins to take place, the PSMA provides the opportunity to think holistically about how these electronic platforms are designed. Creating systems that are able to satisfy the requirements of international laws such as the PSMA, national regulations and private-sector needs will be critical in ensuring this shift to electronic fisheries data is successful.

Resources and funding

Lastly, PSMA implementation will not be successful without extensive resources devoted to developing effective systems. Training on new systems and the creation of new digital assets will be necessary to ensure the PSMA is successfully implemented on as wide a scale as possible. This is particularly important in developing countries, where additional outside funding and expertise may be needed to help transition to PSMA-compliant ports. Regional partnerships and funding can help to provide support, ensuring that PSMA implementation is coordinated and robust.

Cornerstones of effective PSMA implementation



Conclusion

Successful PSMA implementation has already been achieved within several regions around the world, setting the stage for others to follow. These examples of effective PSMA implementation showcase the building blocks of the path forward for the agreement, and for the successful exchange of fisheries data to effectively combat IUU.

Strengthening cross-jurisdictional cooperation

Building on regional partnerships and a national coordination to combat IUU are the first steps to ensuring fisheries data is exchanged effectively within and between countries. These cornerstones create the necessary foundation for successful PSMA implementation in the future. Building on these partnerships, including RFMOs and others such as the G20 and APEC, creates the potential to make real progress on ending IUU fishing.

Building data platforms and exchanges

Efforts to modernize fisheries data collection and exchange should begin by *mapping with existing systems, focusing both on how systems* can be created that are compliant with the PSMA and other agreements but that also include *integration throughout the fisheries industry* with commercial and other actors. As *digitalization* helps to create new data exchanges, answering *data policy* questions is critical to ensuring systems are robust and effective over time.

Investing in resources and funding

Sharing fisheries data in new ways and bringing overall fisheries management into compliance with the PSMA requires significant investments in capacity building and infrastructure. Regional cooperation can help to ensure that these resources receive appropriate investment so that coordinated action is taken on IUU.

Taken together, these building blocks provide a new, compelling value proposition for action on IUU through coordinated PSMA implementation. This value proposition is based on the opportunity for governments to ensure robust and universal implementation of the PSMA through new electronic tools that enable lower cost and more efficient fisheries monitoring and enforcement, and through integration with a growing number of private-sector initiatives demanding traceability and sustainability in their supply chains. Both of these streams have the potential to complement and reinforce each other to significantly restrict IUU while reducing costs to individual countries.

In SDG 14, governments committed to end IUU fishing by 2020. Coordinated implementation of the PSMA, built upon effective sharing of fisheries data, is a critical step in achieving this goal.

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