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frontiers in Marine Science

OPINION
published: 10 February 2016
doi: 10.3389/fmars.2016.00013

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Combatting Illegal, Unreported, and Unregulated Fishing with Information: A Case of Probable Illegal Fishing in the Tropical Eastern Pacific

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Keywords: IUU fishing, Costa Rica, purse seine, poaching, illegal fishing, RFMO

INTRODUCTION

Millions of people depend on marine fisheries for food and livelihoods. Unfortunately, global marine fisheries are severely degraded. The latest estimates from the Food and Agriculture Organization indicate that nearly 30% of assessed fish stocks are overfished (FAO, 2014). Overfishing threatens food security and livelihoods. Its negative effects go beyond the exploitation of fish stocks, and affect entire food webs and ecosystems (Scheffer et al., 2005).

Overfishing is exacerbated by illegal, unreported, and unregulated (IUU) fishing. For example, illegal fishing is estimated to represent approximately 20% of the world's reported catch (Agnew et al., 2009). IUU fishing endangers the productivity of ecosystems, and the socio-economic stability of fishing communities. Piracy off the Somali coast, for instance, is thought to have started when Somali fishermen began seizing boats that were fishing illegally in their waters (Bahadur, 2011). Fisheries overexploitation leads to vicious cycles that generate progressive environmental degradation and social conflict when people attempt to maintain or increase their catches as the yields of previous fishing methods decline (Brashares et al., 2014). It is therefore in the best interests of coastal states to prevent IUU fishing, but the capacity to do this is generally low, particularly in developing coastal states which are the most vulnerable to IUU fishing.

Regional fisheries management organizations (RFMOs) can play a decisive role in supporting coastal states to combat illegal fishing. RFMOs are institutions formed by countries with interests in fisheries within particular regions. RFMOs can play advisory or legally binding managerial roles. RFMOs integrate management across a number of countries, and are thus advantageous for managing highly mobile species, because their agreements and actions apply to all member states. Therefore, countries might be more likely to participate in multilateral agreements because there are shared costs and opportunities across countries, compared to implementing actions as single countries (FAO, 2002). Accordingly, RFMOs have a broad spectrum of tools for addressing IUU fishing, many of which are outlined in the International Plan of Action to Prevent, Deter and Eliminate IUU Fishing (FAO, 2001) and its implementation guidelines (FAO, 2002). An applicable and valuable tool for combatting IUU fishing is the collection, analysis, and sharing of information about fishing vessels and their operations, inside and outside economic exclusive zones. Examples of this are the use of satellite data by initiatives such Global Fishing Watch and Project Eyes on the Sea. We present a case where RFMO and government information was obtained and used by a nongovernment organization (NGO) to discover possibly serious instances of illegal fishing that had not been detected by the RFMO or the government themselves. The case

OPEN ACCESS

Edited by:
Sebastian Villasante, University Santiago de Compostela, Spain

Reviewed by:
Andrew Serdy, University of Southampton, UK
Katrine Soma, Wageningen University and Research Centre, Netherlands

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Specialty section:
This article was submitted to Marine Affairs and Policy, a section of the journal Frontiers in Marine Science

Received: *09 November 2015*
Accepted: *27 January 2016*
Published: *10 February 2016*

Citation:
Arias A and Pressey RL (2016) Combatting Illegal, Unreported, and Unregulated Fishing with Information: A Case of Probable Illegal Fishing in the Tropical Eastern Pacific. Front. Mar. Sci. 3:13. doi: 10.3389/fmars.2016.00013

highlights the importance of openly available information and the need for political will—thus far not apparent—to act on IUU fishing when it is detected.

THE CASE

The Costa Rican Fishing Federation, a NGO, published a report (Cubero-Pardo and Martínez-Cascante, 2013) that revealed probable noncompliance by foreign purse seiners within Costa Rica's exclusive economic zone. In this case, the apparent illegal fishing included: (1) the use of artificial fish aggregating devices (hereafter FADs), illegal in Costa Rica since 1999 (INCOPESCA, 1999), and (2) fishing without a license. More explicitly, the report stated that nearly 800 sets were on FADs between 2002 and 2011. Furthermore, the report estimated the extent of unlicensed fishing: 14 to 38 foreign purse seine vessels were recorded as fishing without a license each year between 2008 and 2011. Below we describe how the case unfolded.

The data used for these analyses came from the Inter-American Tropical Tuna Commission (IATTC), an RFMO of which Costa Rica is a member, and the Costa Rican government. The Costa Rican Fishing Federation wanted to analyze national and regional fisheries data and, given the lack of open access to regional fisheries data, the Federation petitioned these data from the Costa Rican Ministry of Agriculture and Livestock. In the absence of shared databases, the Ministry had to petition the regional fisheries data from the IATTC, and then handed it to the Federation (Cubero-Pardo and Martínez-Cascante, 2013). **Figure 1A** describes the flow of data and information.

The IATTC data contained information about purse seine sets, reported in geographic coordinates and stating the type of set (e.g., FAD, dolphin associated). The IATTC data did not include an identifier for each vessel, but it included the vessels' hold capacities. Cubero-Pardo and Martínez-Cascante (2013) estimated the number of vessels that fished in Costa Rica's exclusive economic zone using hold capacities, which are distinctive to individual vessels. Hence, the estimate of vessels that operated without a license was a comparison of the total number of vessels that had a fishing license (national data provided by the Costa Rican government) vs. the total number of vessels they estimated fished in Costa Rica (IATTC data).

The assertion by the Costa Rican Fishing Federation that FADs were used illegally seems well substantiated because the IATTC database explicitly mentioned their use, and sets were reported using geographic coordinates, not grids. There is less certainty regarding unlicensed fishing because the IATTC database did not identify vessels by name or number. However, the estimate of vessels that fished in Costa Rican waters without a license each year from 2008 to 2011 (i.e., 13 to 38) is large, and probably includes vessels that indeed fished without a license. Additionally, claims have been made that purse seiners in Costa Rica have used explosives during fishing activities (Staley, 2012), and harassed sport fishing boats to drive them off schools of tuna (McDonald, 2010).

Interestingly, the unlicensed tuna purse seining and the illegal use of FADs appear to have been reported indirectly to the IATTC in the form of fisheries data collected by scientific observers but, until recently, went undetected as possible noncompliance. Hence, mechanisms seem to be lacking to detect and report IUU fishing within national and regional fisheries databases. Costa Rican authorities are aware of the report by the Costa Rican Fishing Federation. However, numerous gaps still exist: (1) the results of the report are not widely known, (2) the report did not recommend broader implications for combatting IUU fishing, and (3) the results are still pending action on behalf of the authorities.

The possible cases of illegal fishing described above remain unverified by the Costa Rican government, and have not been reported to the IATTC by the government. If the information in the NGO report is correct, there are serious implications, including overexploitation, reduction of revenue to the state and legitimate fishers, and potential damage to the credibility of the Agreement on the International Dolphin Conservation Program ("dolphin safe" tuna certification) in the eyes of consumers. The suspects remain unidentified; however, the fishing and licensing data required to corroborate these alleged cases of illegal fishing, and identify suspect vessels, exist and could be analyzed easily.

POTENTIAL SOLUTIONS FOR COMBATTING IUU FISHING

If accurate, these suspected cases of illegal fishing imply a lack of mechanisms to detect, communicate, and act upon incursions. Had the data not been analyzed by the Costa Rican Fishing Federation, the cases presented above, although unconfirmed, would probably have gone undetected. The detection and enforcement of illegal fishing within an economic exclusive zone is the coastal state's responsibility, in this case Costa Rica's. However, RFMOs can also monitor IUU activities and report to member countries. Costa Rica does not yet have a national observer program for purse seiners, so the information was most likely reported by IATTC scientific observers, and it is not clear whether observers and captains were aware that the alleged actions were illegal. Regardless of where the data originated, it is clear that a simple system could detect this type of reported noncompliance. By combining state and RFMO data in a single database, it would be possible to alert authorities about noncompliance. For example, if countries provided licensing information to an RFMO database, a system alert could result from an unlicensed boat fishing in a particular country. Alternatively, if the RFMO database includes FAD regulations for each member country, the system alert would be triggered by illegal use of FADs when the data were entered. Having an effective database system in place to detect and communicate irregularities is essential for managing compliance. In this case the data were available but apparently went undetected in national and RFMO databases. Now, with potential evidence of large-scale illegal fishing, Costa Rica has yet to react: first, by verifying these cases, and second, by acting on noncompliance if the NGO report is accurate.

The case we present here shows how information is crucial to combat IUU fishing; however, mechanisms need to be in place to collect, monitor, analyze, and share these data. Simple

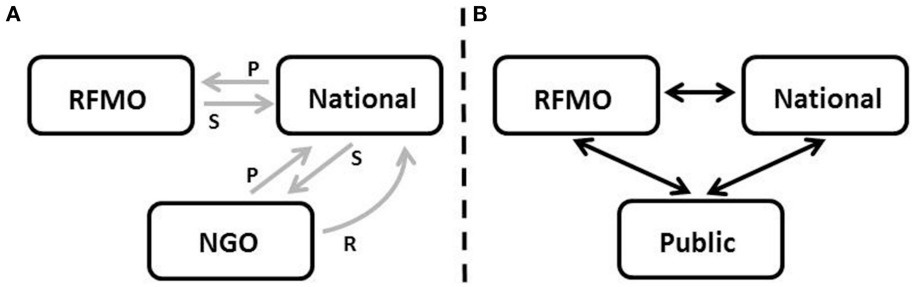

FIGURE 1 | Flows of data to detect and deter illegal, unreported and unregulated fishing. (A) The petitions for and supply of data described in the main text and summarized here. Given the lack of open access to fishery databases, the Costa Rican Fishing Federation, a non-government organization (NGO), petitioned regional fisheries data from the Costa Rican Ministry of Agriculture and Livestock, a national institution. Again, given the lack of shared databases, the Ministry asked the Inter-American Tropical Tuna Commission, a Regional Fisheries Management Organization (RFMO), for the regional data, received them, and then passed them to the NGO. The NGO analyzed the data and reported the potential cases of illegal fishing to the Ministry. However, the Ministry did not communicate the potential cases of illegal fishing back to the RFMO, and did not take action concerning the cases. **(B)** Preferable flow of data and information between RFMOs, national institutions, and the public (including NGOs, academia and civil society). Gray arrows in **(A)** represent deficient channels for sharing data (P indicates petition for data, S indicates supply of data, R indicates reporting on analyzed data). Solid arrows in **(B)** represent the idealized situation of formal and automatic channels for sharing data.

systems can be used in RFMO and country databases to allow the detection and communication of noncompliance. Importantly, public access to national and regional fisheries data, combined with formal and automated communication channels between RFMOs, national institutions, and the public (e.g., NGOs, academia, and civil society), would offer more transparency and ease the detection of noncompliance (**Figure 1B**).

A CALL FOR ACTION

We make a call for relevant authorities, particularly the Costa Rican government, to act upon this case. Such action would be timely; Costa Rica recently became party to the FAO Agreement on Port State Measures to Prevent, Deter and Eliminate IUU Fishing (Asamblea Legislativa., 2015), and other countries in the region are expected to do likewise (OSPESCA, 2015). This international agreement seeks to block IUU vessels and their catch from entering ports and markets through minimum inspection standards and information-sharing between countries. Implementation and compliance with this and other international agreements, such as the Straddling Fish Stocks Agreement (of which Costa Rica is party), requires cooperation and information-sharing between countries, RFMOs and the public (**Figure 1B**). Finally, we encourage others to analyze existing databases, national and regional, to look for signs of IUU fishing such as the ones we described here.

AUTHOR CONTRIBUTIONS

AA and RP wrote the manuscript. AA and RP approve the submitted version of this manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

ACKNOWLEDGMENTS

Many thanks to all the people who provided their valuable insights for this piece, including two reviewers. We acknowledge support from the Australian Research Council. AA thanks the Australian people for support through AusAID.

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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