

# Ocean-scale footprint of a highly mobile fishing fleet: social-ecological drivers of fleet behaviour and evidence of illegal fishing

## Abstract

1. Managing the footprint of highly mobile fishing fleets is increasingly important due to continuing declines of fish populations. However, social-ecological drivers for fisher behaviour remain poorly understood for many fleets globally.
2. Using the Sri Lankan fleet as a case study, we explored the role of social, environmental and policy drivers of effort distribution and illegal fishing. We used semi-structured interviews and participatory mapping with 95 fishers, combined with explanatory modelling (Generalized Linear Models, GLM) and multivariate statistics, including Principal Component Analysis (PCA).
3. Our findings highlight broad footprint (~3,800,000 km<sup>2</sup>) of this fleet, with fishing effort expended in high seas (53.9%), domestic (40.9%) and, illegally, in foreign waters (5.2%). 26% of fishers directly admitted to fishing illegally in foreign waters during interviews, whereas 62% of fishers indicated doing so during participatory mapping.
4. GLMs explained underlying decisions of where to fish (36% of the total deviance in effort distribution) as a function of social variables (14%), notably distance from landing sites (13%), and environmental variables (11%), notably Sea Surface Temperature (10%).
5. Multivariate analysis revealed that individual fisher characteristics associated with illegal fishing, such as a level of reliance on sharks, vary across the fleet. Analysis of qualitative data suggested that the influence of interpersonal and community social networks and perceptions of higher catch value, particularly of sharks, may be important.
6. Our approach demonstrates the utility of mixed methods research, including collection of qualitative data, for creating a detailed understanding of spatial behaviour, including decisions of whether to fish illegally.
7. Results highlight the importance of adopting a social-ecological lens to investigate drivers for human behaviour, and non-compliance with rules. We advocate for a nuanced approach to monitoring and managing of fleets, including investigating localised social drivers for illegal fishing and enhancing regional transparency in fleet monitoring.

## **Citation**

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