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TECHNICAL CONSULTATION

TECHNICAL CONSULTATION ON THE MARKING OF FISHING GEAR

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Project summary of:

Case Study for Gear Marking in Indonesian small-scale Gillnet fisheries

Executive Summary

This document provides a summarised Case study for gear marking and retrieval in Indonesian small-scale gillnet fisheries. It provides an overview of a pilot project conducted to test means and methods of gear marking in a developing country, small-scale fisheries context. In particular, it provides recommendations that may be of relevance to consider for the further development of FAO's Draft

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Abstract

In 2016 the Food and Agriculture Organization of the United Nations (FAO) convened an Expert Consultation on the Marking of Fishing Gear, resulting in the development of *Draft Guidelines for the Application of a System on the Marking of Fishing Gear*. At their 32nd Session in 2016 the Committee on Fisheries (COFI 32) welcomed FAO's work on abandoned, lost or otherwise discarded fishing gear, supported a Technical Consultation to continue developing the FAO *Draft Guidelines* and encouraged FAO to conduct pilot projects to mitigate ghost fishing, including by retrieving ALDFG and marking fishing gear, particularly in developing countries. To implement COFI's recommendations and support the Technical Consultation, a pilot project was implemented in Indonesia focussed on small-scale gillnet fisheries. Gillnets are prevalent as ALDFG and are one of the most damaging fishing gear types when lost or abandoned, due to their high potential to 'ghost fish' and high entanglement properties. The purpose of this project was to test means and methods of marking and retrieving gillnets as proposed in FAO's *Draft Guidelines on the Marking of Fishing Gear ('the Draft Guidelines')*. This document contains a summary of the first phase of the pilot study which was conducted during the second half of 2017 and recommendations considered relevant to the further development of the *Draft Guidelines* that were proposed via a project review workshop that took place 9-10 January 2018.

Background

1. Abandoned, lost or otherwise discarded fishing gear (ALDFG), also known as 'ghost gear' accounts for approximately 10% of marine debris and has serious impacts on marine wildlife, habitats and fish stocks. ALDFG may result in reduced profits when it continues to fish ('ghost fishing') and increased operational costs for vessel owners/operators and authorities through the replacement of lost gear and retrieval efforts. ALDFG also represents a navigational and safety at sea issue.
2. Fishing gear has been abandoned, lost or otherwise discarded since the earliest time when fishing began, but extensive use of low-cost, durable and non-degradable synthetic materials in fisheries worldwide since the 1960s has dramatically accelerated and intensified the problem. The overall increase in fishing capacity and the targeting of more distant and deepwater grounds has further escalated the issue.
3. Research shows that gillnets, traps, pots and fish aggregating devices (FADs) are some of the most likely gear types to become ghost gear, and can have the most severe impact on mortality and welfare of marine species.
4. Gear marking has been identified as a tool which can assist in the effective management of fisheries, be a preventative measure against ALDFG and support efforts to prevent and identify illegal, unreported and unregulated (IUU) fishing. Gear marking is already referenced in FAO's Code of Conduct for Responsible Fisheries.
5. ALDFG remains a growing issue of concern globally and in response to a request by the Thirty-first Session of the Committee on Fisheries (COFI 31), FAO convened an Expert Consultation on the Marking of Fishing Gear in April 2016. This Expert Consultation produced *Draft Guidelines on the Marking of Fishing Gear ('the Draft Guidelines')* taking into account new and emerging technologies for the marking of fishing gear and issues relating to cost, feasibility and administration of a marking system.
6. During the Thirty-second Session of COFI in July 2016 (COFI 32), the Committee supported further development of the Guidelines via Technical Consultation and also encouraged FAO to conduct pilot projects to avoid ghost fishing by retrieving ALDFG and gear marking, particularly in developing countries, to facilitate the implementation of the guidelines.

Pilot project in Indonesia

7. Indonesia was proposed as region for the project due to the severe issues of marine debris, including ALDFG, known to originate there, coupled with increased threat of IUU and the stated recognition and willingness of the Indonesian government to take steps towards addressing it.

8. Gillnets were proposed as a primary focus of the project due to both their prevalence and impact as ALDFG. Gillnets, designed to catch fish by entangling them around their gills, have been found to be one of the most damaging types of fishing gear, along with trammel nets, if not managed properly and make up a significant proportion of global marine fisheries landings. Gillnets and other entangling nets are able to maintain high ghost fishing catch rates for long periods, years in some cases.

9. Two pilot sites were selected in Java, Indonesia, to test marking methods outlined in FAO's *Draft Guidelines*. Both sites were selected due to their distinct characteristics. In Pekalongan, low rates of gear loss were reported due to favourable weather conditions and a sandy, muddy substrate which reduces the possibility of snagging. In the second pilot site in Sadeng where the fishers operate in deeper waters in the Indian Ocean in less favourable weather conditions, higher rates of gear loss were reported, with one study estimating 35,000 pieces of gillnet being lost in the spiny lobster fishery each year

10. Due to the low value of gillnets and a government subsidy programme providing nets to fishers there is limited incentive to retrieve lost nets in either project site, although repair and reuse of damaged nets is commonly reported.

11. In the two pilot sites, and in similar small-scale fisheries in Indonesia, fishermen are already using flashlights and flags for visibility of fishing gear to enable location by the fishers themselves and to avoid conflict with other fishing vessels. Gillnets are usually marked with the flag at the beginning and end of the set of nets. The methods are not sufficient to meet requirements of what is outlined by the FAO *Draft Guidelines*, particularly with regards to marking for identification of ownership purposes. There is a stated desire amongst stakeholders in the fisheries to improve the current practices.

12. Survey information in the pilot sites determined the requirements for the marking study, which took place in the latter half of 2017.

13. An overarching aim of Phase 1 of the pilot project was to test means and methods of marking gillnets as proposed in FAO's *Draft Guidelines* and to provide preliminary findings and recommendations for the consideration of the FAO's Technical Consultation on the Marking of Fishing Gear in February 2018.

14. Another key objective of the pilot project was to obtain outputs and learnings that may be applicable to other comparable locations and fisheries.

Project Partners

15. World Animal Protection collaborated, as a main partner, with FAO to facilitate this pilot project in Indonesia. The work was undertaken in the country by a team led by Dr Fayakun Satria from the Ministry of Marine Affairs and Fisheries. The other key partners were:

- Center for Fisheries Research (CFR) (Indonesia) – Ministry of Marine Affairs and Fisheries (MMAF- Indonesia)
- Research Institute for Marine Fisheries (RIMF) – Ministry of Marine Affairs and Fisheries (MMAF- Indonesia)
- Directorate of Fishing Vessels and Gears (DGCF) Ministry of Marine Affairs and Fisheries (MMAF- Indonesia) Fishing Technology Development Center (Indonesia)
- Bogor Agricultural University (IPB) (Indonesia)

- WWF Indonesia
- Commonwealth Scientific and Industrial Research Organisation (Australia)
- Other experts on an ad hoc, in-kind basis

Methodology

16. An initial workshop was held in early 2017 to provide information to local participants in the trial on gear marking techniques and the context of the project.
17. Prior to field testing, interviews/focus groups were conducted in the pilot sites to collect information related to attitudes, behaviours and current marking practices.
18. Participants were registered and profiled and distribution of marking materials took place.
19. The project team from the Centre for Fisheries Research, Indonesia, tested the marking of gillnets in two pilot sites in Java, Pekalongan (Java Sea) and Sadeng (Indian Ocean). Methods tested were simple low-cost markers that were considered to be readily available. Different materials were tested with six types of marker used in the trials; plastic, wood, coconut, bamboo, metal and a tag utilizing Septillion FibreCode technology, similar to a barcode that provides user level identification upon scanning with a mobile phone device. The plastic, wood, coconut, bamboo and metal tags were produced by RIMF and distributed to fishers. The FibreCode tags were obtained by World Animal Protection from Septillion.
20. The plastic, wood, coconut, bamboo and metal tag trials were conducted in Pekalongan for two months and in Sadeng, also including the Septillion FibreCode tags, for one month.
21. The marking methods were evaluated using a multi-criteria analysis:
 - Potential pollution from the marks
 - Safety for fishermen when operating marked gear
 - Cost
 - Ease of installation
 - Lifespan / durability
 - Ease of monitoring
 - Material availability
22. **Recommendations**
23. A project review workshop was held in Bogor, Java, Indonesia 9-10 January 2018 with the participation of all major project partners. The purpose of the workshop was to review the progress that had been made in the project, to present and discuss preliminary findings and collectively agree upon recommendations that could be of relevance to FAO's upcoming Technical Consultation on the Marking of Fishing Gear.

24. Implementation of a Gear Marking System

- For successful implementation of gear marking there needs to be a clear implementation plan which takes into consideration the need for capacity building and education to build understanding and acceptance of the objectives for marking fishing gear and the process for enforcement;
- Consensus is required from fisheries stakeholders to develop and implement a successful gear marking system. Regulation alone will not be effective as consensus is necessary between different stakeholders within the fishery before it will be voluntarily adopted;
- Marking methods must be appropriate to small-scale fishers and consider all elements of the criteria outlined during this trial (pollution risk, fisher safety, cost, ease of installation, lifespan/durability, ease of monitoring and availability of material);
- Some marking methods may score highly against most of the criteria but low against something else which is critical. For example, in this trial plastic tags were found to be a successful way of marking fishing gear but they present environmental challenges that make them inappropriate as a choice of marker. Metal tags were not as damaging to the environment but were found to be a hazard to fishermen when hauling in nets;
- It is indicated from the trial and the workshop that bamboo and wood markers were preferable for Pekalongan fishers and Septillion FibreCode technology tags were favourable for Sadeng fishers. However the plastic material used in the Septillion tags was suggested to be replaced with a biodegradable material on which the same code could be printed;
- Further consideration should be given to the methods that are used to attach markers to fishing gear. Within the trial, the fishers found plastic cable ties to be the most readily available form of attachment device. However such cable ties did not always keep the marker in place and presented a significant pollutant risk to the marine environment if lost. While other methods of marking, including colour cording and the use of an embossing tool to mark floats on the lines, were considered, it was not possible to arrange these methods for the trial due to material availability and logistical challenges. The durability of these favourable non-plastic materials remains an issue. These aspects could be considered in future trials and when further developing FAO's Draft Guidelines;
- Colour coding of nets at manufacture to denote fishing area would be viable if fisheries-area level identification is desirable, however this would need to be implemented via manufacturers and was not possible for this trial;
- It should be noted that requirements for marks to correspond with licences and International Maritime Organisation (IMO) numbers would not be applicable to all small-scale fisheries;
- In this trial inshore high-risk gillnet fisheries (e.g. lobster fishery in rocky inshore habitat) – gear were often lost or damaged in 1-3 days. Marking gear alone, will not resolve this issue where both gear type and the environment present such a high risk of loss. Consideration should therefore be given to prioritising other approaches to mitigate the risk of the lost gear on marine habitats, e.g. using degradable materials for the fishing gear, safe retrieval methods, reporting of lost gear, as well as preventative measures that address the specific challenges reported in such areas;
- Clear guidance is necessary to inform whether the marks should be on the head rope or lead line due to the fact that this component is normally retained and re-used;
- Timing of instalment of marks is also critical. In one project site gear was marked prior to deployment, whereas in the other gear was marked during operation which was not effective;

25. **Control and Monitoring**

- Rigid legislative control and enforcement may not be appropriate in small-scale fisheries. The benefits of gear marking need to be communicated so that fishers feel incentivised and are voluntarily willing to apply gear marking. Regulation could lead to reduced income for fishers and this must be considered;
- Gear marking could be considered an eco-friendly fishing practice that in the future could create market-driven incentives for responsible gear management. Further investigation of this approach is recommended;
- Co-management with fishing communities (e.g. through cooperatives / fisher groups) is recommended to effectively implement gear marking systems;

26. **Reporting of Lost Gear**

- Lost fishing gear is currently not reported in Indonesia small-scale fisheries. Fishermen search for lost gear themselves if lost but there is no centralised system for reporting and retrieving lost gear;
- It is recommended that reporting systems could be implemented that would enable data collection and increase the potential for retrieval of lost gear. Such a reporting system would need to incorporate incentives and benefits for reporting lost gear and detail clear lines of responsibility so that fishers know who to report to and what information they need to report;

27. **Location, Recovery and Retrieval**

- It is a recognised concern that in some areas the fishing conditions are high-risk (for example depth, weather conditions), making retrieval operations unlikely. Small-scale fishermen in the pilot sites were already using flash lights and flags to locate fishing gear. The small vessels in most cases do not use GPS and their main / only communications device on board is a mobile telephone. The accessibility that most fishers have to a mobile phone could be considered when developing best practices for locating and recovering lost gear;
- Fishers often use a drag to recover lost gear which can be effective but may be damaging to sensitive marine habitats, e.g. coral. It may be necessary to carry out cost-benefit analysis to determine whether removal of gear may be more harmful than it remaining in the environment in some cases. In the pilot sites the preferred drag type was a device used for octopus fishing that is manually hauled using a line. It is recommended that all vessels carry suitable equipment for retrieving gear;
- The pilot study highlighted the high frequency of gear loss in some areas of the project sites due to high risk environmental conditions. There was a stated willingness for fishermen to be supported either by incentives or subsidies to undertake retrieval operations in 'hotspot' areas for gear loss when it is safe to do so, or to work with divers to survey and remove lost gear. However, greater technical capacity for retrieval from gear lost at depth is required;

28. **Further Research and Development**

- The most favoured gear marking method was the Septillion FibreCode tag due to the possibility to collect more detailed information within the tag around ownership and location, which has clear benefits for traceability, but further research is needed to trial the use of codes on non-plastic tags;
- Shape and material was also a key factor in fisher feedback on the trial, with rigid, strong marks (e.g. those made from metal) becoming an issue of fisher safety when manually hauled, and likely to cause issues for mechanical hauling. These aspects must therefore be considered when developing new gear marking methods;

- This trial predominantly addressed the practical application of marks to fishing gear and evaluated their effectiveness, however it was acknowledged that whilst gear marking can be an effective tool in addressing ALDFG and IUU, it needs to be incorporated into a more holistic approach aimed at increasing understanding of responsible fishing gear management, for example through guidelines and associated training as an essential preventative tool, and to incentivise responsible behaviour through subsidies or programmes to generate value from waste fishing nets;
- A second phase of this project is highly recommended which, in addition to addressing the technical aspects of gear marking, e.g. testing non-plastic alternatives and other technologies for marking, should incorporate increased emphasis on retrieval, preventing gear loss in high risk conditions, education, and some scoping to explore the practical challenges of a circular economy model in Java for recycling end of life and recovered fishing gear;
- Lack of robust data on gear loss and dynamics of the loss was a noted concern within the project. Existing data for the baseline in the project was compiled from focus group surveys and interviews with fishermen. However there is a need to establish more robust quantification of gear loss and location, via data collection, reporting systems and 'hotspot' mapping to focus efforts for mitigation and recovery;
- Support and collaboration with multi-stakeholder platforms with expertise in developing ALDFG solutions such as the Global Ghost Gear Initiative has been viewed as beneficial by the local stakeholders and could be considered as a route to further research and development in these project sites as well as a way of applying learnings from this project to other locations;

29. **Awareness Raising and Capacity Building**

- There is a clear need for building awareness within small-scale fisheries about best practice for broader fishing gear management and about the benefits of applying these measures;
- Capacity building at local fisheries management level is essential for increased community engagement and to address the logistical and infrastructural challenges identified around net collection, storage and recycling;
- Case studies providing practical examples from other regions may be used to increase understanding and positive engagement with best practices. Increased capacity to share learnings internationally would be a clear benefit to facilitate the replication of successful solutions in new regions;

30. **Conclusions**

In general small-scale fishers were cooperative and supportive of the gear marking activities. However a need exists for greater understanding of the benefits of gear marking and further work should be done on related issues, particularly the ability to retrieve the gear when lost.

Implementing gear marking within the context of a small-scale gillnet fishery, such as those that have been subject to this trial in Indonesia, is possible providing that a holistic implementation plan is in place encompassing capacity building and related support, data collection, fisher education and incentives. There is a recognized appetite for a multi-pronged approach to address ALDFG and IUU fishing through prevention, mitigation and cure.

There may be some challenges to applying certain types of technology in the context of both small scale fisheries in general, and gillnet fisheries in particular, due to the cost of more technical marking options and the comparative low value of the gear itself. Marking at manufacture and adding value to end-of-life gear could be potential approaches to address these issues.

Availability of environmentally friendly materials for markers and their attachments and fisher safety when operating gear featuring physical marks were both key issues that arose during this project and further guidance on these aspects within the gear marking guidelines may be helpful.

Gear marking must be implemented in the context of broader measures for managing fishing gear and wider fisheries management measures. Without due consideration of the wider framework of measures that should be in place, gear marking alone is unlikely to solve the significant ALDFG issues that are apparent in Indonesian small scale-scale and probably other similar fisheries, particularly in developing countries. Such measures could include fisher education and awareness raising, capacity building in general, spatial management of fishing effort and a circular economy approach to managing end of life gear.