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Short Communication

An Update on Initiatives to Reduce Prawn Trawl Bycatch in the Western Indian Ocean

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Abstract—While prawn trawling contributes substantially to the economies of some Western Indian Ocean countries, there is usually a considerable bycatch, much of which is wastefully discarded. Conflict between trawlers and other fisheries sectors often occurs, for example when trawlers catch species which are targeted by these other sectors, or if they interfere with their fishing operations. This short communication reviews initiatives in the Western Indian Ocean to reduce prawn trawler bycatch, and notes that, with the exception of Madagascar, most initiatives have been limited or sporadic. Lack of will and/or interest, as well as a lack of technical expertise and funding, are identified as possible reasons, but there is scope for improvement if the Madagascan example is followed.

INTRODUCTION

The Western Indian Ocean (WIO) countries of Madagascar, Mozambique, Kenya, Tanzania and South Africa all have industrial trawl fisheries which target shallow water penaeid prawns. Total landed catches are around 24 000 tonnes per annum, ranging from about 100 tonnes per annum in South Africa to 11 000 tonnes per annum in Madagascar (Fennessy *et al*. 2004). The target prawn species are *Penaeus indicus* and *Metapenaeus monoceros*, with far lesser quantities of other penaeids such as *Penaeus monodon*. In common with prawn fisheries elsewhere, there is a substantial and varied bycatch, due to the small size of meshes used in trawls. The scale and composition of prawn trawl bycatch have been documented in several WIO countries, and annual bycatch is in the region of 80 000 - 100 000 tonnes (Fennessy *et al*. 2004; FAO unpubl.). Most of the bycatch is killed in the trawling process (Wassenberg and Hill 1989, Hill and Wassenberg 1990) and is discarded, as it is not economically viable for commercial operators to retain and market it – notwithstanding the high demand for fish in local informal markets. Other local fisheries sectors target many of the same species which occur in trawl catches, and there is frequently conflict between trawling and these sectors (Bwathondi and Mwaya 1984, Fennessy 1994, FAO 2000, van der Elst and Govender 2001, Fennessy *et al*. 2004). The conflict with other fisheries sectors is both direct (e.g. damage to artisanal nets by trawlers; trawlers catch species which are targeted by other sectors) and indirect

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(e.g. by trawlers possibly modifying habitats (Turner *et al*. 1999) or by altering predator-prey interactions). However, in some WIO countries, particularly Madagascar and Mozambique, the prawn trawling industry contributes substantially to GDP and also provides significant amounts of foreign capital. Fisheries managers are therefore placed in a difficult position, having to trade-off the negative impacts of prawn trawling (perceived or actual) against economic benefits.

Approaches to resolving the prawn trawl bycatch problem have varied from country to country in the WIO, and this paper briefly reviews the various initiatives by each country. Information on the various activities in each country has been presented in several regional workshops since 2003, and forms the basis of the review, together with the authors' knowledge and solicited inputs received from several stakeholders. A regional approach to reduce prawn trawl bycatch was made by the GEF/UNEP/FAO programme on "*Reduction of environmental impact from tropical shrimp trawling, through the introduction of bycatch reduction technologies and change of management*" (FAO 1999, FAO 2000), which issued invitations to several countries with substantial prawn fisheries. This was followed up by several regional workshops and resulted in 13 countries from four regions (Latin America/Caribbean, Asia, the Near East and West Africa) participating in the programme, ending in June 2008. Three of the WIO countries (Mozambique, Kenya and Tanzania) that attended the initial workshops in 1999 did not subsequently participate in the implementation phase of the programme. However, under the auspices of this programme and/or under the auspices of the FAO programme on the Ecosystem Approach to Fisheries Management (FAO 2003), these countries participated in subsequent workshops on prawn trawl bycatch in the WIO.

Kenya

In 1997, a demonstration workshop on Turtle Excluder Devices (TEDs) for prawn trawlers was hosted by the Kenya Wildlife Service and IUCN (Wamukoya and Salm 1998). TED trials were subsequently undertaken in Malindi-Ungwana Bay in 1999 and in 2001/2002, with levels of bycatch being reduced by around 25%, without significant loss of prawns (Mueni and Mwangi 2001, Gerald Mwatha - Kenya Marine and Fisheries Research Institute, unpublished). Other measures which were intended for resource management or user-conflict purposes, but which would also have resulted in reduced bycatch, have been introduced at various times, either as legislation or, intermittently, as permit conditions. These included an inshore trawling distance limit of 5 nm, a closed season from November to March, and a restriction on nocturnal trawling. In 2000, continual user-conflicts between artisanal fisheries and trawlers (Ochiewo 2004) led to the closure of the industrial shallow-water prawn fishery for two years. Subsequently, several stake-holder workshops were held, which re-affirmed the need for the permit conditions, and, following the re-opening of the fishery, also encouraged the trawling companies to land greater quantities of bycatch in order to satisfy the demand for fish in coastal markets (FAO 2007). In 2003, the compulsory use of TEDs was legislated, although compliance was poor, and in the same year an observer program was initiated. A moratorium on shallow-water trawling was again introduced in 2006, followed by a partial opening of the fishery (beyond 5 nautical miles) in 2007. The fishery was again closed in January 2008. More recently in 2008, a draft discussion paper aimed at developing a prawn fishery management plan was circulated to stakeholders. This plan will be implemented once input has been assimilated, with particular focus on gear modification for bycatch reduction, reduced fishing effort for shallow water prawns, and zonation of the various fishing grounds into artisanal and industrial areas in order to reduce user-conflict.

Tanzania

The earliest investigation of a solid grid installed in a trawl in order to reduce trawled bycatch in the WIO took place off Bagamoyo in 1991 (Mahika 1992). While some initial success was demonstrated, no follow-up studies occurred until 2007, when an NGO (Tanzania Coastal Management Programme) commenced an investigation of the threat posed by trawlers to turtles in the region. Similarly to Kenya, there are several permit conditions which potentially

reduce the amount of bycatch caught: a restriction on the number of trawling permits issued, a closed season, an inshore depth limit (5 m) for trawling, annual rotation of spatial effort zonation, and a ban on nocturnal trawling (FAO 2007, FAO unpubl.). More recently, in early 2008, a workshop was held for all stakeholders in the Tanzanian prawn fishery, at which Bycatch Reduction Devices (BRDs) were demonstrated. It was agreed that before BRDs are implemented in the Tanzanian fishery, they need to be tested, and funding may be made available for this shortly.

Mozambique

An initial investigation of the effect of grids on trawl selectivity for fish bycatch was conducted in 1995 (Pinto 1998), and this was later followed by testing of a TED in 2001 (Gove 2004). In 2003, legislation was passed which required the compulsory use of TEDs by 2005, and, in preparation for this a TED training course was presented by NOAA in Maputo in 2004. In 2005, a collaborative South African/Mozambican experiment investigated the performance of a square-mesh panel (SMP) Bycatch Reduction Device (BRD) and a Nordmøre bycatch grid on a Mozambican trawler. Individually, the SMP and the grid reduced bycatch by 23% and 25% respectively, with minimal effects on prawn catches; however, when the SMP and the grid were combined in one trawl net, discards were reduced by 47% but prawn catches were also reduced by an unacceptably high 25% (Fennessy and Isaksen 2007). This was followed by demonstrations using a square-mesh panel BRD and a 90° codend BRD following a trawl bycatch workshop hosted by FAO in Maputo later in 2005 (FAO unpubl.). The Instituto de Investigação Pesqueira also undertook further trials of a TED in 2006, but with limited success (FAO 2007). Currently there are initiatives to investigate prawn trawl gear technology generally, including TEDs, and it appears that the industry is amenable to the ultimate implementation of these devices. Measures which have been implemented and aimed at sustainable harvesting of the prawns, but which also reduce bycatch, are: a six-month closed season, an inshore distance limit (3 nautical miles) for trawling, restricted trawl mesh size (55 mm), and a limited number of trawling permits.

South Africa

User-conflict between trawlers and the hook and line fishing sector instigated an assessment of trawl bycatch, following which the shallow-water trawl grounds were closed for two months of the year in order to reduce impacts of trawlers on fish targeted by the linefish sector (Fennessy 1994). This period was subsequently extended to six months following further investigation of the bycatch rates obtained outside of the main prawn trawling season (Fennessy, unpubl.). An SMP BRD was trialled in 1999 (Fennessy 2002), showing that discard catches could be reduced by 32% without compromising prawn catches, and the results obtained were used to improve the planning for the collaborative project testing an SMP BRD and a TED (Nordmøre grid) in Mozambique in 2005 (referred to above). Further trials with the Nordmøre grid were conducted in South Africa in 2006 with reasonably successful results: elasmobranch numbers were reduced by 60%, discarded bycatch was reduced by 25% and prawn catches were not reduced. However, additional experimentation is required before BRDs can be implemented in the fishery (FAO 2007) – not least because the same trawling gear is used in the deep-water crustacean trawl fishery, and the effects of the BRDs in this latter sector need to be established. Further trials are planned in 2008. Other legislated measures which reduce bycatch as an adjunct to their primary objective have also been implemented, namely a mesh size limit (50 mm), an inshore trawling distance limit of 0.5 nautical miles, and a prohibition of the sale of certain fish species which occur in the bycatch.

Madagascar

A range of fisheries measures have been implemented in the industry over several years, and which would have contributed to the reduction of bycatch. These include mesh size restriction, trawl gear size limits, closed seasons/areas, a partial prohibition of nocturnal trawling, limited numbers of permits, and zonation of effort. Preliminary TED trials were conducted in an industry initiative in 2000, and, from 2001, discussions commenced about a formalised strategy for implementation of TEDs and BRDs by all stakeholders in a series of meetings convened

by GAPCM (Groupement des Aquaculteurs et Pêcheurs de Crevettes de Madagascar). By mid-2003, this strategy was agreed to, and use of TEDs by the industry was legislated at the end of 2003. However, this was not enforced until the beginning of the 2005 fishing season. In the interim, further trials were conducted and trawler crews and fisheries observers were trained in the installation, usage and performance of TEDs, with the assistance of IFREMER, in turn supported by the French Global Environment Facility (FFEM : Fonds Français pour l'Environnement Mondial), the French Development Agency (AFD : Agence Française de Développement) and the French Ministry of Foreign Affairs (MAE - DGCID : Ministère des Affaires Etrangères - Direction Générale de la Coopération Internationale et du Développement). Training and awareness programmes for trawler crews continued with the support of these agencies in 2005, and, by 2006, there was almost complete compliance by the industry (FAO 2007). Based on these initiatives, the Madagascan industry was certified for export of prawns to the United States by that country's State Department, and there has been ongoing and recent interaction (in the form of technical modifications to the TEDs) between industry and U.S. representatives in order to comply with U.S. regulations. While some experimentation on BRDs (square mesh panels and fish-eyes) was undertaken with the assistance of IFREMER, the apparent reduction in fish bycatch following the use of TEDs has meant that there is less focus on BRDs. There is also some resistance to the implementation of BRDs (as opposed to TEDs), possibly because of uncertainty in the impacts of these on prawn catches, particularly when fishing is poor. Implementation of TEDs in the less formal artisanal prawn fishery has been delayed, owing to the diverse nature of the fishing craft used by this sector. Some trials have been conducted with the assistance of IFREMER, but considerable prawn loss has meant that a new series of trials with different TED specifications has been planned for 2008.

With the exception of South Africa and Madagascar, initiatives to reduce prawn trawler bycatch in the WIO have been limited and/or sporadic. Why is this? Firstly, there appears to have been a lack of political, industrial and managerial interest and will to resolve the problem of the quantity of bycatch being caught. This may have stemmed from a lack of appreciation of, or indifference to, the extent of the bycatch problem – specifically the possible consequences of trawler bycatch for other fisheries sectors and the environment. It is reasonable to assume that the series of multi-stakeholder workshops on prawn trawler bycatch in the region over the past five years have at least partly addressed this, building on the increased international awareness of bycatch issues. There is certainly a role for NGOs to play in increasing this awareness. But of more importance recently is the need for the industry to be aware of their image in the light of changing market forces, with consumers becoming more conscious of eco-certification and consequently being more selective when purchasing marine food products. Industry need not feel that they are being forced into adopting BRD technologies – there are direct benefits which can accrue to the users of BRDs, such as reduced catch processing times, improved product quality, improved catch rates and reduced fuel consumption (e.g. Broadhurst and Kennelly 1997, Broadhurst 2000, Salini *et al* 2000). Secondly, it could be argued that WIO countries lack the technical capacity and funding to test and implement BRDs. While there may be some initial advice and demonstration required in installing BRDs, trawler crews are professionals who can quickly adapt and modify fishing gear, particularly when there are tangible benefits. The initial training of trawler crews, in the form of workshops and onboard demonstrations, would probably need some funding support from outside agencies. The example set by Madagascar in implementing TEDs in its fishery is a good one, and there are several reasons for their success. These include the existence of a credible forum for dialogue and communication, which promoted co-ordination between industry and government; a well-thought out, multi-stage process was followed in order to implement TEDs; there was strong technical expertise and support available; there was legislative support for the compulsory use of TEDs, but compliance was phased in gradually together with a training schedule; and there was recognition that there had to be some flexibility

in the implementation process (FAO 2007). Other WIO countries would do well to emulate their example by also following these steps.

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