FINAL REPORT

Project No. MAL/SGP/OP4/Y3/RAF/2009/01

Project Title:

Improving the Sustainable Livelihood of Fishermen and Conservation of Marine Biodiversity Through the Reduction of Sea Turtle By-Catch in Commercial Fisheries in Sabah, Malaysia – Phase II

Implementing Agency:

Marine Research Foundation (MRF), Malaysia

Global Environment Facility Funded by GEF SGP Malaysia SGP The GEF Small Grants Programme UNDP

March 2011

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A project by:

In association with:

Funded by:

1.0 Introduction

Sea turtles are extremely long lived and have late maturation and as such are under huge pressure from anthropogenic sources, with all seven species listed on the IUCN Red List and Appendix I of CITES. Conservation plans have historically focussed primarily on nesting beaches, despite the fact that turtles spend just a tiny fraction of their lives on land. Incidental capture at sea is arguably the greatest threat faced by individual sea turtles. However, the at-sea threats from mechanised fisheries can not simply be halted. Livelihoods of fisher communities need to be taken into account, and a balance between conservation, fisheries sustainability and fisher livelihoods to be sought. Turtle excluder devices (TEDs) impart huge benefits to turtle conservation by excluding turtles from fishing nets, but not at the exclusion of catches. May parts of the world have seen turtle bycatch decrease by 97% in trawl fishing fleets since adopting TED technology.

Recent studies by the Marine Research Foundation indicate that some 2000-3000 sea turtles a year are lost to shrimp trawl fisheries (Pilcher et al. 2007) in Sabah. Worldwide, trawl fisheries are considered the number one threat to turtles at sea (NRC 1990). Sea turtles are integral components of marine ecosystems, and provide valuable eco-tourism related services ranked in the millions of Ringgit in Sabah. While the ongoing protection of critical nesting beaches (such as through the work carried out by Sabah Parks) is a necessity, these efforts will be inadequate to save the species unless complementary protection is afforded the at-sea life stages of turtles, which account for over 99.9% of the turtles' lifetime. MRF is convinced that the reduction of bycatch of marine turtles is a critical step in ensuring the survival of marine turtles in Sabah waters, and indeed beyond.

During the project, a common question related to the value of sea turtles and the value of protecting a single species. Sea turtles play an extremely important ecological role, and have a wide range across the earth. They occur in oceanic and neritic habitats from the tropics to subarctic waters and venture onto terrestrial habitats to nest. Throughout this range, sea turtles serve as substrate and transport for a diverse array of epibionts. Loggerhead turtles nesting in Georgia, USA, had 100 species of epibionts from 13 phyla (Frick et al. 1998). Furthermore, sea turtles can transfer substantial quantities of nutrients and energy from nutrient-rich foraging grounds to nutrient-poor nesting beaches. Less than one third of the energy and nitrogen contained in eggs deposited by loggerheads in Melbourne Beach, FL, returned to the ocean in the form of hatchlings (Bouchard & Bjorndal 2000). Sea turtles are also extremely important as consumers: They can have major effects on nutrient cycling and community structure in their

foraging habitats. This is particularly true for green turtles which graze seagrass beds. Green turtles establish and maintain grazing plots in pastures of the seagrass *T. testudinum* by continually recropping areas that they have earlier grazed, which greatly increases the speed of nutrient recycling by shortening the amount of time required for normal decomposition (Thayer et al. 1982). This maintenance of seagrass beds is extremely important as they are vital for primary production. Seagrasses are ranked among the highest primary producers of any natural biotic community and their primary production is estimated to be 1012g dry weight/m^2/year (Duarte & Chiscano 1999). Furthermore, seagrass beds are extremely important as acting as nursery grounds, providing juvenile invertebrate and fish species with nutrients as well as protection from predators (Heck et al. 2003). Without this cropping, seagrass will tend to grow upwards, instead of outwards through deposition of faeces. The importance of sea turtles in this respect cannot be underestimated as one of few animals, which keep check on seagrass beds.

Sea turtles are not only important in an ecological sense but have become extremely important in terms of revenue from tourism. Non-consumptive wildlife-oriented recreation has exploded over the last two decades and turtles play a large part in this. In Malaysia there is not a single tourism poster or pamphlet or video which does not feature sea turtles. They are viewed as a majestic and magnificent creature, and now control significant amounts of tourism revenue, in a number of different ways. The Turtle Island Park off the coast of Sabah is a huge hatchery operation, which receives large numbers of green and hawksbill turtles that lay eggs all year round. This is a major draw for tourists who can pay to spend a night on the island and watch a turtle lay its eggs as well as release hatchlings into the wild. Space on the island is limited to 50 people a night and the cost is in excess of USD350 per person, which provides significant amounts of revenue to the Park. Turtles also attract divers and dive tourism has also expanded rapidly over the past two decades. Premium diving locations, which are often only considered as such if they host macrofauna such as turtles, are able to charge large amounts for commercial diving (van Treeck & Schuhmacher 1999). Wildlife tourism generates a lot of capital and provides a large amount of jobs and tourism involving turtles is no exception to this.

Over and above the value of turtles, MRF is also concerned about the livelihoods of the thousands of fishermen who ply their trade in Sabah waters, and developed this project to address both fisher livelihoods and turtle conservation simultaneously. This project is introducing Turtle Excluder Devices (TEDs; **Figure 1**) as a means to more sustainable fishing in Sabah. The current project builds on the results of Phase I in 2007 and 2008 implemented in Sandakan, by expanding the project to Kudat, and upscaling the project to involve the Federal Department of Fisheries. This current project phase also benefits from the recent production of an educational video in July 2009 on how TEDs work underwater in Sabah, and a site visit developed by MRF to take Malaysian fishers and Fishery Department personnel to the US, to work alongside US fishers and regulatory agency personnel.

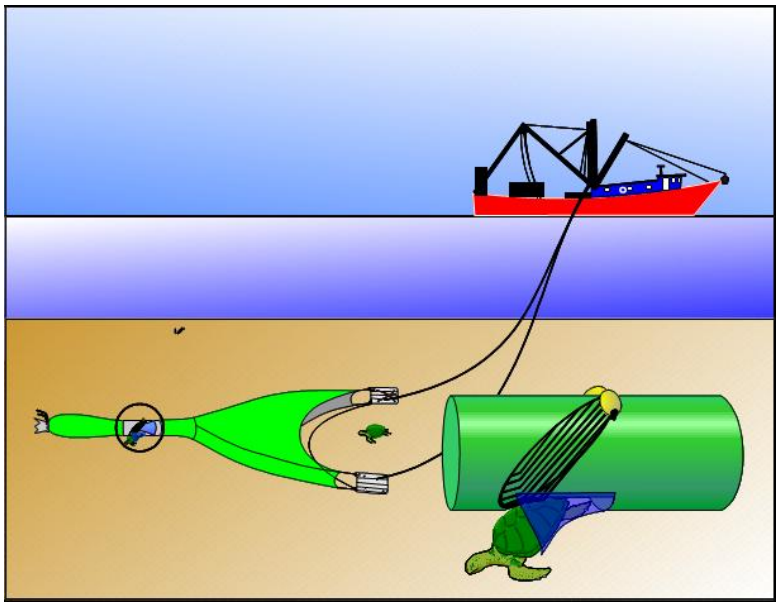


Figure 1. Schematic of a Turtle Exclude Device TED grid.

The TED was a simple contraption invented in Georgia in the early 1970s by a fisherman named Sinkey Boone and after several modifications, today consists of a metal grid before the cod end of the net with bars spaced no more than 10cm apart. Beneath the grid is a flap which opens up and allows for escape back into the ocean of large objects when pressure is applied. TEDs allow animals smaller than the width of the bars to pass through and enter the cod end (the catch). Those that are too big, i.e. turtles, are not able to pass through and instead push their way out through the escape flap back into the open ocean (the bycatch and trash). TEDs were drafted in to U.S. Legislation in 1987, requiring all shrimp vessels twenty-five feet or over operating in the Gulf of Mexico and the Atlantic Ocean off the south-eastern United States to use TEDs in their nets in offshore waters at certain times of the year to reduce the incidental catch and mortality of endangered and threatened sea turtles in shrimp trawls (Yaninek 1995).

In 1989 the US Government passed Section 609 of the US Public Law 101-162 restricting the import of shrimp to countries with shrimp fisheries that did not have an adverse impact on sea turtles. Initially, this embargo was introduced to protect local sea turtle populations and applied only to countries in South America and the Caribbean Sea. In 1996 the embargo was extended to include all countries worldwide that export shrimp to the US. In effect this embargo meant that the USA would not import shrimp from any country that did not have in place a sea turtle protection programme of comparable effectiveness to the US TED programme. This programme also needed to be supported by appropriate regulations governing TED design, rigging and operation in each country. An effective monitoring enforcement program was also needed so that evidence that fishermen were using these devices could be provided (Eayrs 2007). This move catalysed TED compliance and now around

40 countries are able to export shrimp to the USA (NOAA 2010). Turtle bycatch has dropped dramatically in the US, where before TEDs were mandatory it was thought up to 100,000 turtles were being caught in nets every year (Moore et al. 2009). TEDs are claimed to have reduced turtle bycatch by 97% (Watson 1981) but it has taken nearly two decades to perfect the design (Moore et al. 2009).

This project was conducted in partnership with the Sabah Department of Fisheries, and provides the data and experience upon which the Government may base fishery practice controls (such as mandatory use of TEDs at some point in the future) to conserve marine turtles and develop more sustainable fisheries, be it through the use of excluder devices, or possibly seasonal and/or temporal closures. MRF's work on the introduction of Turtle Excluder Devices (TEDs) in Sabah has been ongoing now for more than three years through this joint project, primarily dealing with awareness and pilot trials, funded by GEF/SGP Malaysia (2007-2008, present) and by CI-Philippines (2009), with technical support and matching funding from the US National Marine Fisheries Service (2007 to present). This work has received wide attention both locally and overseas, and is the focus of ongoing trial and expansion efforts.

2.0 Project Implementation

The project works in close consultation with the local fishing communities and provides the foundations of sustainable fisheries in Sabah through the use of TEDs. The project also empowers the local fisher community to design, modify and install TEDs on shrimp trawlers of Sabah, and to test their efficacy under a suite of conditions. MRF has built a substantial rapport with local fishers and boat owners in Sandakan and Kudat, and in general amongst the fishery community in Sabah, as well as the fisheries development agency, fishery cooperatives and the Sabah Fisheries Department, and has used the personal connections to facilitate project activities. It was envisioned that the fishers who participated in the project would become local advocates for use of TEDs in Sabah fisheries, and even beyond, and enlist the participation of their fellow fishers over time. Because of this, MRF placed great importance on the development and maintenance of these relationships and invested a substantial amount of time in the ports and their ancillary sites. Phase II of this project was designed to be implemented through four key activities:

1. **Project Start-Up.** This project component involved liaisons with local fishery cooperatives in Sandakan and with the Sabah Fisheries Department, and hiring of a local project coordinator.

2. **TEDs Workshop.** The second activity involved a workshop to introduce the TEDs at a broader Sabah level, and install them on local vessels and the construction of additional units for the at-sea trials, and the development of the observer programme (selection of observers and training in use of GPS, reporting, data standardisation, and turtle release procedures).

3. **Sea Trials.** The third activity of the project involved the fishery representatives as they implemented the at-sea trials with research design and protocols guidance from the Marine Research Foundation.

4. **Data Analysis.** The fourth and last activity involved joint analysis of the trial results, particularly catch loss and bycatch data, and reporting and development of potential future plans of action regarding TEDs in the two Sabah trawler fleets.

This final report covers the entire project period between January 2010 and December 2010. Due to circumstances beyond our control, we were unable to continue the trials in Sandakan, as a number of market forces and other commercial priorities kept fishers from wanting to try something new (see **Section 4.1**). However, we doubled up the trials in Kudat to make up for the loss of as-sea time in Sandakan, while continuing to liaise with our Sandakan colleagues and friends, and keeping them abreast of project developments. The other major variation to our project involved the further development of the TED video based on fisher feedback: fishers wanted to be able to see what was happening with the nets on a day-to-day basis, and so we requested for a variation in the budget to reinvest the funds for the video enhancement to purchase miniature underwater video cameras which would be easily downloaded and presented as short video clips to fishers. These video clips became possibly the largest selling point in our efforts to introduce TEDs, and by far were a major component of the latter trials in Kudat (see **Section 4.2.4**). The novel approach to monitoring TED and net performance have even been taken up by our own advisors at NOAA NMFS in the US, who admired the video quality and simplicity of the design, and who are currently using them in their own operations. Irrespective of this variation, we managed to use matching funds to enhance the TEDs video so that it is now available in three languages (English, Bahasa and Cantonese) through a simple screen selection, making it more widely understood amongst the fisher community (see **Section 4.3**).

3.0 Matching Funds

MRF has secured a USD 20,000 grant from Save our Seas Foundation to complement funding provided through this GEF/SGP finance allocation. These funds were deposited in the MRF account in May 2010. MRF will use a substantial portion of the funds to cover participation for outstation fishers and Fishery Department personnel at the Workshop in September 2010. More recently, the Save our Seas Foundation have renewed their commitment to TEDs in Malaysia through the commitment of a second USD 20,000 grant, matched by a USD 10,000 grant from the Mohammed bin Zayed Species Conservation Fund. MRF was also able to secure a USD 39,000 grant to support a learning site visit by the PI to the US to further his experience with TED manufacture and design, and to run an additional workshop in peninsular Malaysia on TEDs. Finally, the Malaysia TEDs project has received a USD 35,000 grant from the NOAA Pacific Islands Regional Office to support a site visit to the US facilities and officials by the Director General of Fisheries (Dato' Ahmed Sabki) along

with the Sabah Fisheries Department Director (Rayner Stuel Galid) and MRF staff. Overall then, the USD 50,000 grant by GEF/SGP Malaysia has complemented by roughly a 1:2.5 match raised by MRF though alternate donors. We are grateful to GEF/SGP Malaysia for the seed funding which has enabled us to develop this programme.

MRF will continue to build on these matching funding initiatives to increase the value of the GEF/SGP grant, and to justify applying in the future for a medium-sized GEF grant from the Malaysia UN office.

4.0 Project Implementation Report

4.1 Sandakan

While Sandakan was the location for the start-up phase of this project, and at-sea trials were ongoing during January and February 2010 with vessels typical shrimp trawlers belonging to Hai Leng Enterprise Sdn. Bhd., these activities have not recommenced due to a number of indirectly-related but important events:

- A ban on exports of fishery products to the EU was imposed on Malaysian fishers recently based on health assessments.
- The Malaysian shrimp fishers and exporters have no access to US markets due to the TED ban.
- This has left Japan as the only major export market, which is now in a position to dictate (less-favourable) trading terms for Malaysian fishers and exporters.
- Recent re-evaluations by the EU have not reinstated licences to export, and thus the export markets have stagnated, leaving many fishers supplying only local markets.
- A number of licensed boats have ceased to operate, and a number of businesses are finding the day-to-day struggle of staying in business challenging to the point that considerations of TED trials has taken a back seat.

Vessels SN-2511/F, SN-2475F, SN-2477F, SN-5314F and SN-6266/F, all fifty eight foot typical shrimp trawlers belonging to Hai Leng Enterprise Sdn. Bhd. were involved in trials in which we switched the configuration of the TED opening to the bottom of the net (all of the previous trials the opening had been at the top) and reduced the number of floats to allow a lower net position in the water. Unfortunately we were unable to provide observers for these trials as none were available in the earlier months. Because of this we have not factored in the results of the trials into the overall results, other than to note the complexity of introducing the technology amongst fishers who are reluctant to change. Hai Leng enterprise was extremely generous and understanding in sharing with MRF the actual costings for the trips and thus we were able to look at the financial implications of TED implementation – notwithstanding the costs of the units themselves. The trials were unfortunately not as encouraging as we had hoped, but there are a number of reasons why the results were so. The TED-equipped vessel consistently returned only 50% of the catches of other boats, and the company were not pleased with the results. There are a few outside factors which we believe lead to the decreased catches, including illicit at-sea trading and changes in fishing location during the short trials, and we hope to repeat these with observers on board at a future date.

MRF continued to maintain contact with Chua Yau Tsen at Hai Leng Enterprise and he indicated he was tentatively willing to try the process again, this time using MRF's new video systems to document TED and net behaviour. N. Pilcher travelled to Sandakan again in August 2010 to follow up with Chua on trials, and we had hoped trials would recommence towards the end of the season, but this did not materialise. MRF will continue to liaise with Sandakan fishers and hopefully not lose entirely the momentum which was built up by the programme in the first place.

4.2 Kudat

4.2.1 Community Engagement

Fisher representatives Johnny Wong and Desmond Chiang were instrumental in helping MRF coordinate with key fishermen, and also in introducing us to boat captains and crews. Johnny and Desmond participated in the US site visit and since that time have been extremely supportive of TED trials in Kudat.

MRF also worked hard to develop and maintain contacts in the fishing industry to expand the TED implementation process. Key contacts and interested fishers in Kudat include Johnny Wong, Desmond Chiang, Voon Tien Yin and Voon Tien Yian (brothers), Ng Kin Wah, Ho Ngyuk Thien, Lu Tong Chen, Cheong Chee Shun, and Mr. Phan. These contacts have all been nurtured through a number of site visits by MRF staff, so that MRF could expand the number of vessels and interested captains and crew involved in the TED process.

Initial discussions on the TED project were held in Kota Kinabalu in January 2010 with Johnny and a training workshop / dialogue session was planned for February / March 2010 to coincide with a planned visit from the US National Marine Fisheries Service (NMFS) personnel. MRF has worked with the US NMFS since 2007 to provide professional development help for the TEDs programme, and this support has been continued into 2010 with site visits to Malaysia (reported here) and a visit for N. Pilcher to the US in June 2010for additional training.

In early May MRF arranged a dialogue session with fishers as well as a demonstration trial for which the GEF/SGP Malaysia Representative was present. At this time the boat was not outfitted with a TED, but provided valuable non-TED data for the data comparisons, and provided an indication of the types of bycatch and trash associated with trawling in Sabah. Coconuts, logs, construction debris, domestic waste and others are routinely dragged up in Sabah trawls. Each of these adds to the weight of the net, creating additional drag and increasing fuel consumption, along with increased sorting times for the crews which decrease actual fishing times. All of these factors are used in our explanations as to the benefits of TEDs over and above exclusion of sea turtles.

MRF arranged a further dialogue with fishers in July, and again another in August during which many of these issues were once again raised. In between these (more formal) discussions, MRF staff held regular meetings with fishers in the coffee shops by the landing docks. The larger gatherings were typically conducted over a dinner during which we screened the TED video, the results of the underwater filming, and discussed various aspects of the project. During the August meeting much of the discussion revolved around the issue of compensation: MRF had budgeted for and offered to

compensate fishers for loss of catch, but an exact formula to which all fishers could agree was proving complex. In brief, MRF offered to determine an 'average daily catch' and from that determine if the monthly total catches exceeded or were lower than this. Fishers argued that month to month catch averages could vary substantially, and thus comparing August, to, say, July, might not be appropriate (incidentally MRF uses this same argument to highlight how decreases in catches can not solely be attributed to the installation of TEDs). During subsequent follow-up meetings and discussions we settled on a simple formula: Boat crews employed a TED-equipped net and a non TED-equipped net on alternate days. This was logistically possible as the nets are attached to the otter boars in just four places by way of stainless steel shackles. Vessel 309, which worked closely with MRF, found this practice easy and acceptable. Fishers routinely switched nets when one was damaged, so the practice was not new or labour-prohibitive. Trials in September and November / December followed this format, from which the catches on TED and non-TED days were compared.

4.2.2 Training Workshop and Community Dialogue – Kudat

MRF arranged for a workshop to introduce a larger number of Kudat fishers to the TED technology, and involved members from WWF Kudat office and the Fisheries department. The meetings were facilitated by Johnny Wong, Secretary of the Kudat Fishery Association. Johnny and Desmond Chiang were gracious hosts during the event, and arranged for boats from their company (Fook Soon Seafood Products Sdn. Bhd.) and one additional company to participate in the demonstration trials.

MRF was able to arrange for the support and input by the US specialists once more for this workshop and trials event, and a team consisting of Robert Hoffman (Biologist) and Nick Hopkins (Gear Specialist) from the National Marine Fisheries Service (NMFS) and James Hogan III from the Department of State's (DOS) Office of Marine Conservation travelled to Kota Kinabalu and Kudat from February 20 to 26, 2010. Nick Hopkins had worked with MRF and the Malaysia TEDs project in 2007 as one of the trainers in Sandakan, and knew Johnny and Desmond from the US site visit.

On Feb 23 we met with the Director of the Sabah Fisheries Department, and then travelled to Kudat to run the short workshop and dialogue session with fishers, and demonstration trials at sea. Onboard shrimp vessel SN 309/F we installed a TED on the back deck, while shrimp vessel SN 1318/F operated without a TED. At-sea trials were clearly demonstrative of equal catches but substantially lower amounts of debris in the TED-equipped vessel. A second fishermen from another company was with us on the trip, and his sceptical comments as the TED was deployed reflected many of the impressions local fishers had at first: that the TED would allow catch to escape and that no large fish would be caught. However, after the first tow he turned to us and asked if he could have the spare TED we had brought along, and this is now installed on his boat. He was a convert after just one demonstration tow.

Visits to the fish market and the fishing docks revealed that very few fish of a size that would not enter a TED grid were being caught – indeed much of the area has been extensively fished for decades, so we believe it is only a matter of time before fishers accept that TEDs will not negatively impact their livelihoods. As the fishery becomes TED-compliant, the potential to reopen the direct trade with the US becomes more of a possibility, thus providing additional income-generation potential to the local fishers. Of course, having complete buy-in from fishers on this aspect is still in its infancy. The scepticism raised over the use of TEDs ranges from 'the flap will open and all the fish will swim out' to 'large fish will not be able to enter the net' to 'the flap will be stuck in the open position and we will lose catch'. MRF's understands that these are common misconceptions in the start-up phase of the process and will continue to seek ways to address these. One option which involved the use of underwater video during actual fishing operations was later used to highlight how nets actually fish and how TEDs behave underwater, particularly the flaps and their ability to eject debris (see **Section 4.2.3**).

4.2.3 TED Modifications

Trials took place in Kudat in February, May, August, September and November. Vessels 309 and 3232 from Fook Soon Sdn. Bhd. worked with MRF on testing the TEDs. Additional vessels had been slated to joint the project in September, but the fishers were not ready to trial the TEDs when approached. During the rest of the trials, MRF observers maintained records on standardised record sheets developed during Phase I, along with detailed notes on vessel location during the trials. In addition, the project benefited by receiving accurate catch weight and cost data from Fook Soon at the docks when boats unloaded their catch. Trials in Kudat started out with substantial reductions in trash and debris in the net with but with a 15-20% loss in catch. This prompted a search for a solution, and the use of the new UW video units proved revolutionary in determining net behaviour while towed underwater. Given that the TED flap behaviour and net fishing characteristics are variable, MRF tested and corrected for the following mechanical / technological issues over the course of numerous trials during the latter half of the year:

- **TED Grid Angle** – The angle at which a TED grid 'hangs' as the net is fishing is an important consideration in TED design. If the grid angle is too steep, items such as coconuts and turtles will not 'slide out' easily, and are more likely to get stuck in the grid (**Figure 2a**). If the grid angle is too shallow, items striking the bars easily slide out and are expelled from the net, but the flap covers also have a tendency to lift off the grid edge, allowing catch to escape (**Figure 2b**). An angle which is too steep is ineffective and illegal in those places where TEDs are mandatory. An angle which is too shallow is bad for business – as it represents a potential catch loss to the fisher. Angles of the TED grid were checked using simple angle meters, after suspending the net in an inverted position ensuring a level row of meshes all around the support rope. MRF frequently checked and where necessary adjusted the TED angle as part of the performance trials. In

August we spent time with the crew of 309 explaining how to cut out the leading half of the TED grid from the net and re-sew it at a steeper angle to promote greater catch retention.

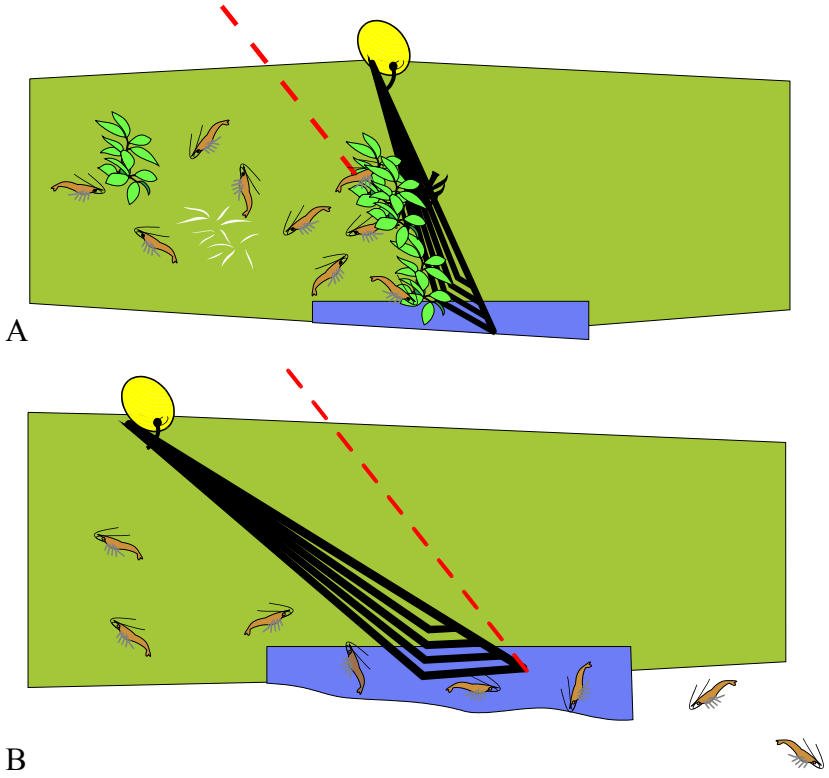


Figure 2. Impacts of grid angle change on TED performance: A- angle too steep promotes clogging and impedes escape of turtles; B – angle too shallow allows catch to escape.

- **Lazy Line Length**– The lazy line is a slack additional line which does not take up any load when the nets is being fished, but is used to pull in the cod end at the end of the trawl. It is typically attached to the otter board at the leading end, and just forward of the bag neck at the trailing end. Use of the lazy line allows the fishing boat crew to pull in the cod end without having to retrieve the whole net – thus its name. Ironically, the trawl fishers in Kudat retrieve the net by hand and *then* use the lazy line to pull in the bag… We are not sure why this is the case, unless they believe the lazy line might not close the bag sufficiently and possibly allow catch to escape. In Sandakan all boats reel in the bag using the lazy line and do not retrieve the net, as its design was intended. Even more ironically, the Sandakan fishery uses hydraulic net drums to reel in the net automatically, while the Kudat boats use sheer manpower. If there were ever an argument for using the lazy line, it would be in the Kudat fishery! Normally the line is very slack when the boats are towing, dragging behind the net and not influencing how the net fishes (**Figure 3a**). If the line is too short because of an added TED extension, it would pull up on the bag and possibly influence how the whole net fishes (**Figure 3b**).

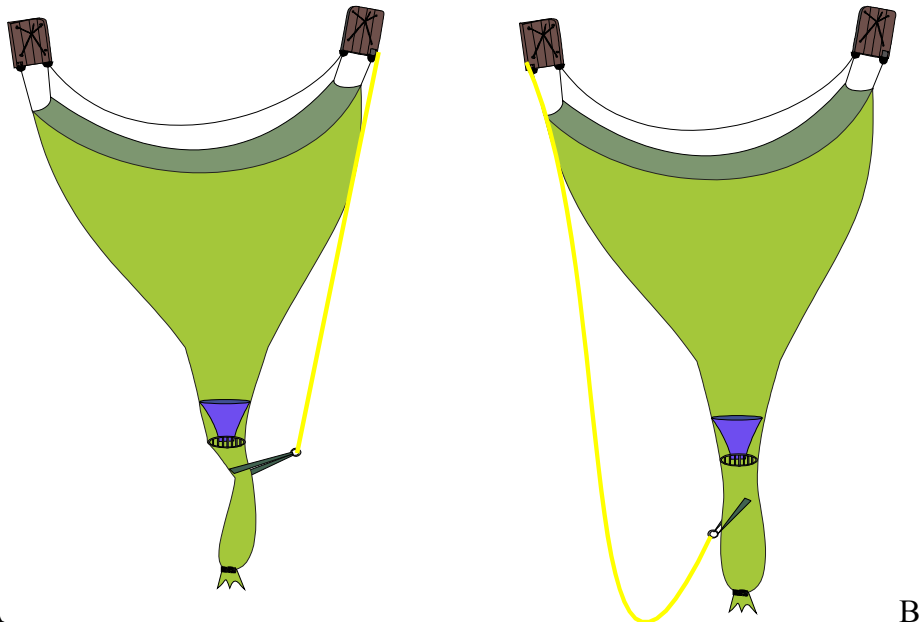


Figure 3: Illustration of a typical lazy line attached to the otter boards at the leading end, and used to retrieve the bag when nets are pulled in. A – Incorrect (short) lazy line rigging; B – correct (longer) lazy line rigging.

- **Insertion of a Net Extension / Accelerator** – The exact placement of the TED extension so that it takes up equal tension on all meshes is often a tricky part of TED installation. One solution to this is the addition of a Net Extension, which allows the net to 'suck in' just before the TED grid and this provide better catch retention and better closure of the flaps. The net extension is simply a piece of webbing sewn into a tube (**Figure 4**) which is then inserted between the net itself and forward of the TED extension.

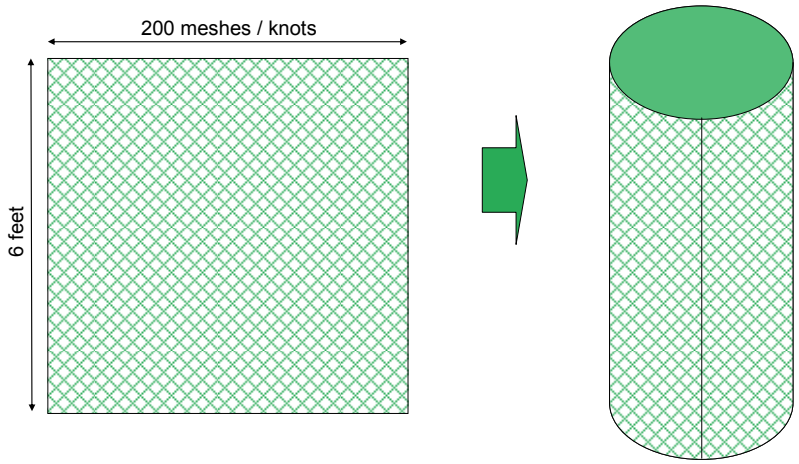


Figure 4: Illustration of basic materials needed to construct a Net Extension.

As the net takes up the load from the fishing boat and opens out, the extension narrows in the middle creating a funnel effect into and over the TED grid, acting as an accelerator of sorts. This action also concentrates the flow of catch into the middle two thirds of the diameter of the net, and keeps it away from the edges where the possibility of escape through the flaps is higher (**Figure 5**).

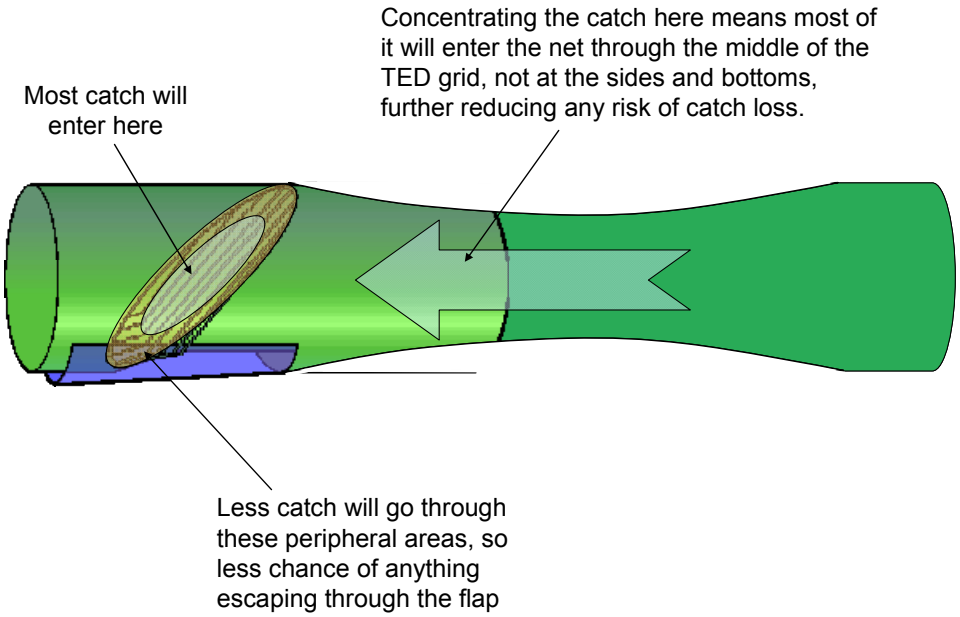


Figure 5: Illustration of accelerator / concentrating action after insertion of net extension.

- **Attachment of Gore / Rib Lines** – Gore / Rib lines ensure that the TED grid fishes at a fixed angle by spreading the tension which is placed on the net more evenly amongst the leading meshes in front of the grid itself. As the escape hope is cut away to allow turtles and debris to escape, there is nothing to hold the bottom of the TED from moving backwards if under load. The Gore / Rib lines take up this tension when they are tightly sewn into the net forward of the grid itself (**Figure 6**). If the Gore / Rib lines were absent or loose, the TED grid could swing back under load, resulting in a shallower angle of attack, and subsequent catch loss as in the above section on **TED Grid Angle.** MRF has instructed fishers on how to attach these lines to promote greater catch retention.

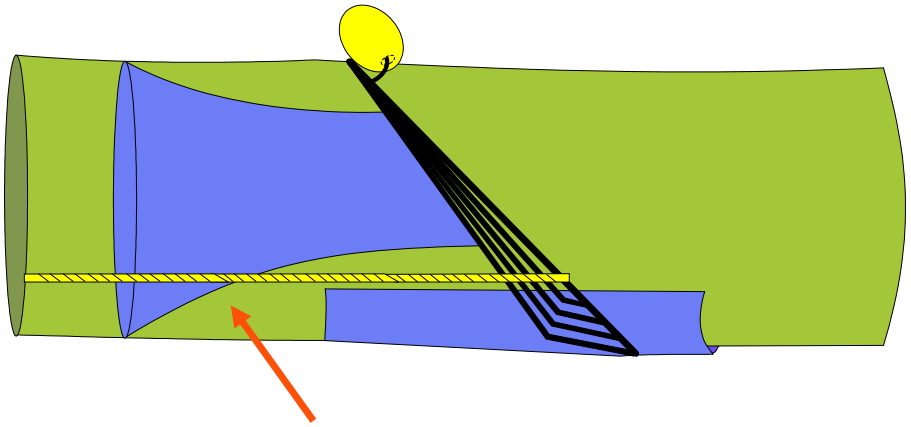


Figure 6: Illustration of a typical gore line attached to the TED grid and sewn into the leading meshes on the net to take up tension during fishing.

4.2.4 Video Documentation

In July MRF invested in three UW video cameras and one UW camera to record the behaviour of TEDs and provide virtual real-time inspection capacity to captains and vessel owners. The key lesson being shared was as follows: Provided the TED flaps are

closed during fishing, no catch loss can occur *as a result* of TED installation. So far, captains and owners have accepted this position. The key thereafter has been to inspect the TEDs using the videos, and to make a number of adjustments to bring the TED as close to perfect as possible. The video cameras are small and able to withstand submergence to 60m which is well within the fishing range for shrimp trawlers. MRF designed a harness to attach the cameras to the nets, and we currently place one in front in an inverted position at the top of the net, and one behind the TED on the lower trailing portion of the net (**Figures 7** to **9**). Both video feeds allow an inspection of the flap covers, the TED angle and the net tension as it takes up tension under tow.

Figure 7. Video camera (circled in red) being attached to upper reach of the net in front of the TED grid. The camera was stabilised by a 6 x 10 sheet of PVC with holes dripped in the four corners, attached to the net with cable ties.

Figure 8. Video camera being attached to the lower reach of the net behind the TED grid (note upside down camera in front of the TED up top).

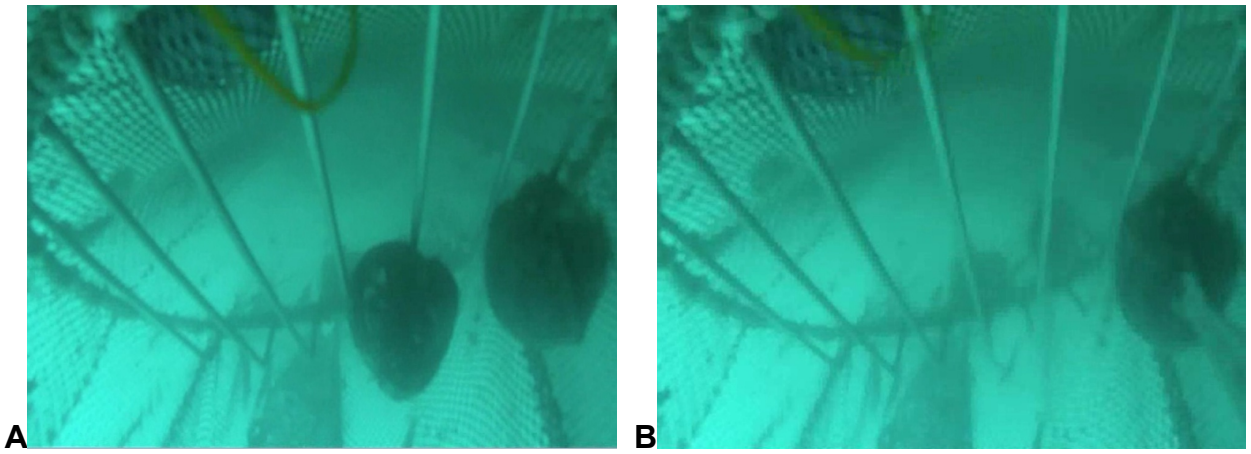


Figure 9. Screenshots of a typical camera feed from the camera in front of the TED grid. A – One of the TED grids having trapped two coconuts. B – Following ejection of one of the coconuts, reducing drag on the net (the coconut can actually be seen exiting the bottom of the net between the second and third bars from the right).

4.2.5 Results of Sea Trials

Paired comparison trials were conducted in March, August, and November/December 2010. Given substantial variations in fisher activities during the trials (trawl locations, number of days fished, number of TED vs. non TED tows, difference in boat specifications), it was not practical to combine all of the trial results and analyse jointly. However, the overall TED results of the trials were not as promising as we had hoped, although a major portion of the results were collected when the TED performance was being perfected (see **Section 4.2.3** above on modifications) and thus there is likely a lot of interference with the results.

During trials in March 2010, there were no major differences in total shrimp catch quantity, but there were differences in composition. While not significantly different ($ANOVA_{8,7}$ F=0.818, P=0.05), the non TED net caught larger amounts of the larger tiger shrimp and large yellow shrimp than the TED net - which caught more of the smaller shrimp. Possibly there is a behaviour difference in the shrimp when they care caught, with the larger ones settling to the lower portion of the net earlier and potentially lost through the TED flap opening. While the overall catch values over the month were not considered statistically different, in practice there was a **-2.2%** difference in shrimp catch. During these trials we noted that the TED flap was likely staying open a lot more than was to be expected, and until later trials using the video camera we were not able to determine the reasons for the catch loss. Regardless, the catches were not acceptable to fishers, and overall TEDs effectiveness was brought into question

While quantities were found to decrease somewhat, the quality of the catches, as expected given the lack of debris and associated damage, were substantially better. Catches were categorised by quality into three categories (A, B and C) and these were assessed by the fishers as catch was landed. Catches in August and September recorded substantially better quality proportions of high grade catch for both fish (**Figure 10**) and shrimp (**Figure 11**). While these quality markers do not represent final market price, they provide an indication of the values of using TEDs to improve catch quality based on the exclusion of debris.

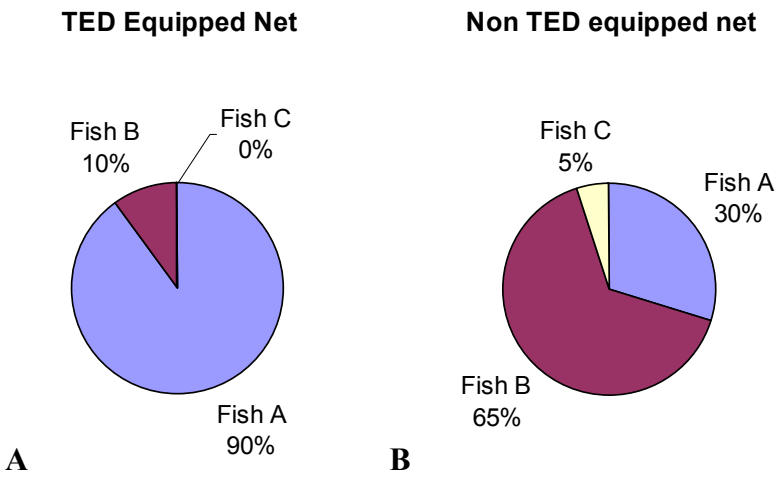


Figure 10. Catch quality for fish during the August / September trials: A –TED equipped net with mostly A-class fish. B – Non TED net with mostly B-class fish.

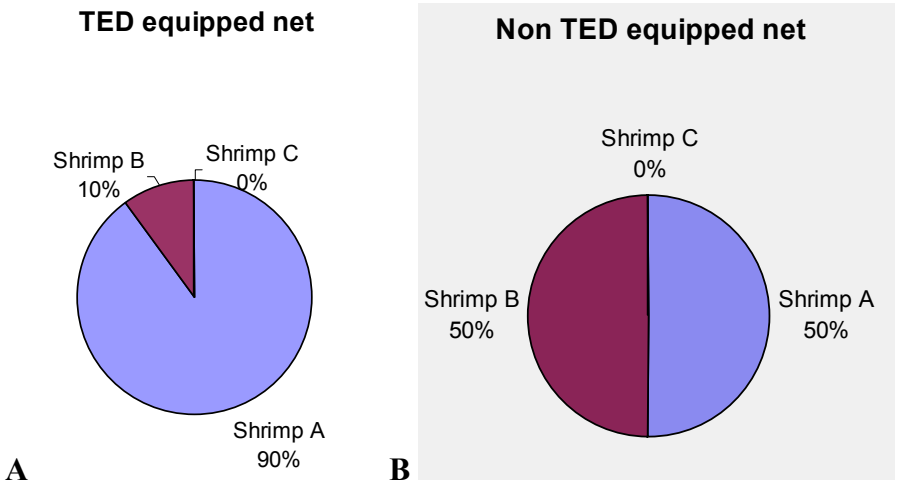
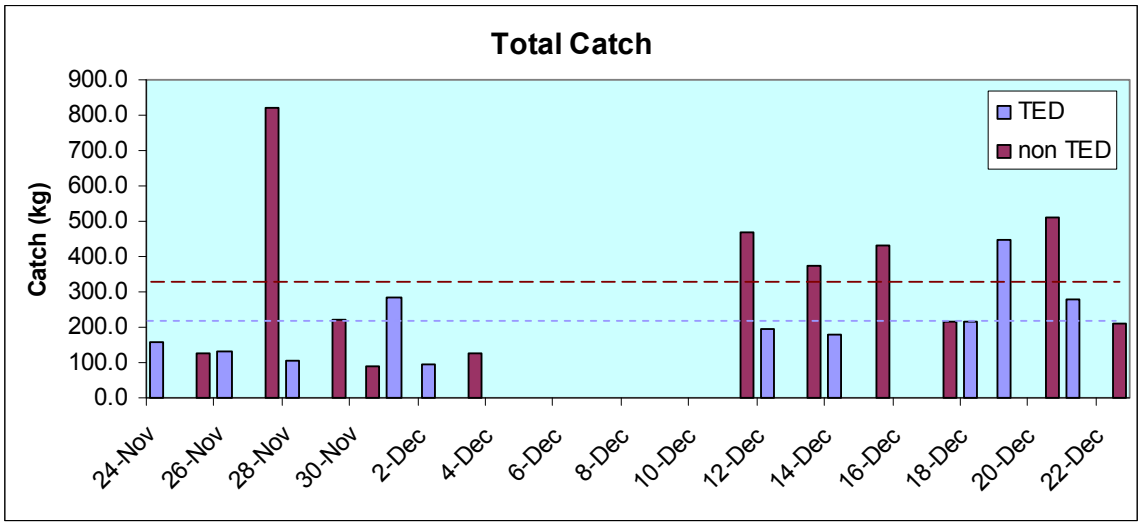
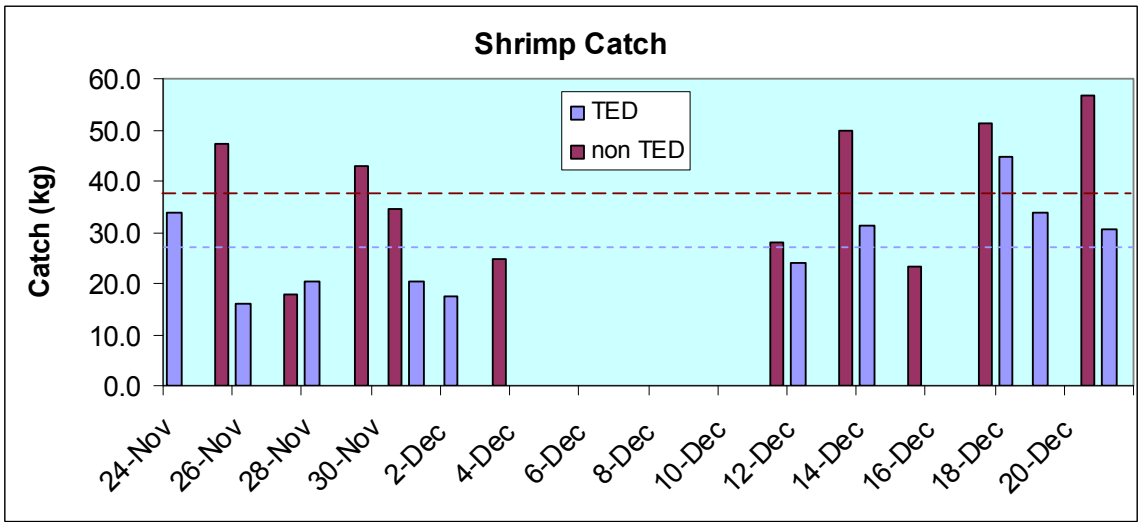


Figure 11. Catch quality for shrimp during the August / September trials: A –TED equipped net with mostly A-class fish. B – Non TED net with equal amounts of A- and B-class fish.

During the November / December 2010 trials, catches were significantly smaller catches when TEDs were used ($ANOVA_{1,19}$: F=2.37, P=0.05; **Figure 12**), and it is likely additional trials to determine precisely what caused this reduction are necessary. On other trials around the world, shrimp catches varied by -2.1% to + 6.14%, so there is no real reason why the TED should result in substantial catch losses. However, there was a significant difference between locations when TEDs were used compared to when TEDs were not used. Taking only the position at which the nets were deployed, non TED deployments were made significantly farther north and away from the traditional fishing grounds than non-TED deployments ($ANOVA_{1,40}$ F=4.253, P=0.05).



A



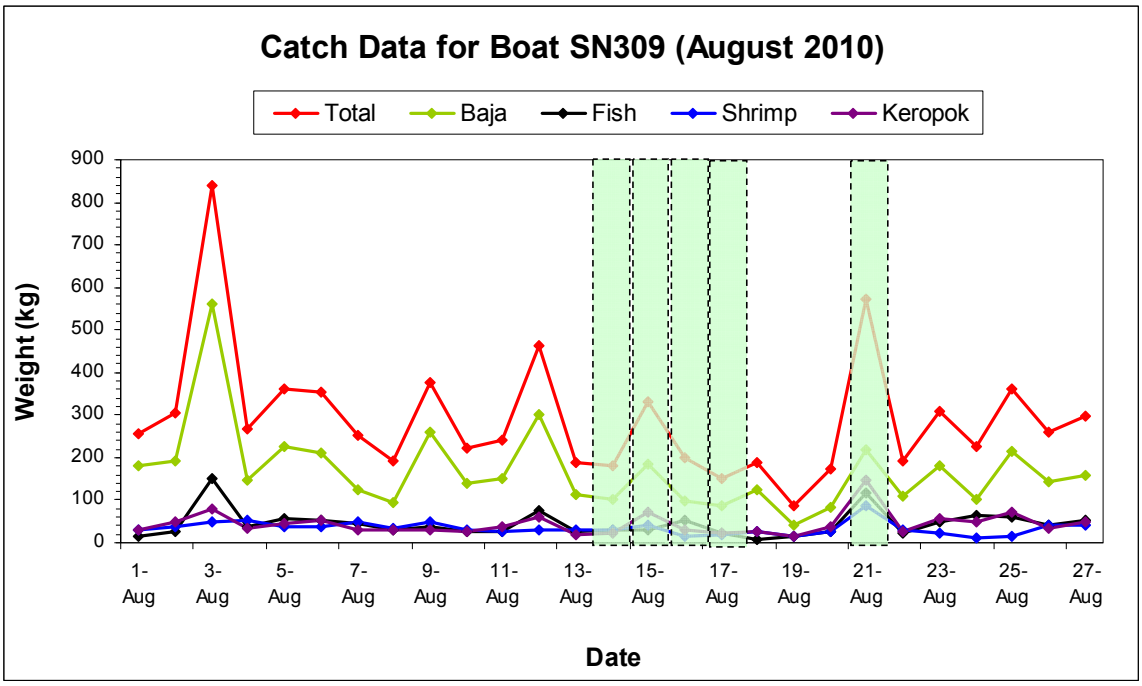
B

Figure 12. Catch quantities during the November / December trials: A – Total catch including fish. B – Shrimp only.

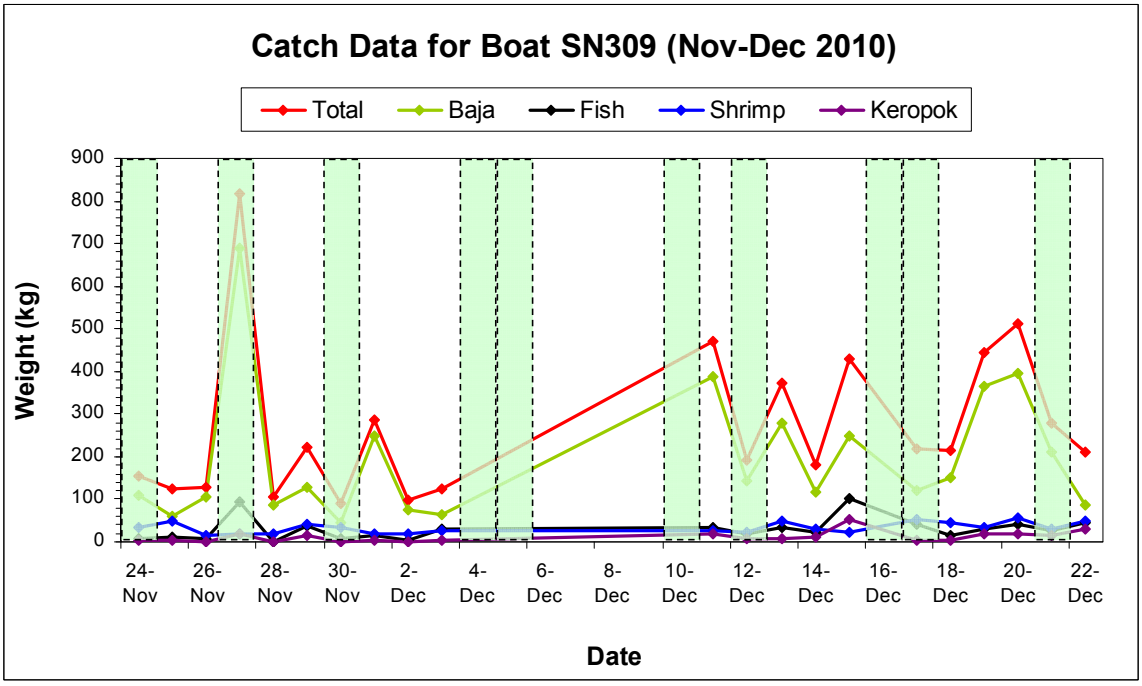
The contrast in catch quantities in the trials at the end of the year compared to the beginning of the year also came at a time when there were a number of different captains for the boat, with the main captain on leave. Anecdotal observations suggest the new people did not know exactly where the fishing grounds were, or deliberately went to non-productive areas on nights when the TED was installed. There was a far greater correlation between catches and deployment site without TEDs (R^2= 0.009) than when TEDs were used (R^2=0.39) indicating a much more consistent fishing location when TEDs were not used, and a much more random approach to fishing when TEDs were installed. It is likely that with paired trials on similar boats, or on a boat with twin nets, that the catch results were not as different as noted above.

It is important to note that the main difference in catch weights was accounted for not by the target catch of shrimp and fish, but by the trash fish kept for making fertiliser. Catches during both August and November/December were punctuated by one day of extremely high catch of trash fish (3rd Aug & 27 Nov; **Figure 13**), which created substantial bias in the overall catch statistics. If these two outlier points are not considered in the analysis, then comparisons of catch data are not reflected in any

significant differences. It is safe to say that the trash fish for fertiliser accounts for only a very small portion of overall revenue, and thus if one were to consider the valuable fish and shrimp catches alone, then the TED trials did not result in any significant differences (August: $ANOVA_{1,24}$: F=0.001, P=0.05; November/December: $ANOVA_{1,18}$: F=1.34, P=0.05).



A



B

Figure 13. TED and non-TED fishing periods and variation in catches: A – August landings. B – November / December landings.

4.3 MRF TEDs Video

In 2009 MRF commissioned a video from a commercial film-maker which described the Sabah TEDs project and highlighted the values of TEDs, and how they worked. This video received wide support both in Malaysia and overseas, having been screened at the 30th Annual Sea Turtle Symposium in Goa, India, in April 2010. Many copies of the video have been distributed in Malaysia and to foreign NGOs working on TED issues in other countries. The NOAA MNFS team we work with also requested copies, and indicated they were extremely impressed with our production. However, the original video was only produced in English, and not suitable for presentation to fishers who only spoken Malay or Chinese. With matching funds to the GEF/SGP Malaysia grant, MRF commissioned translations and a DVD with versions of the same video in three languages through an up-front menu selection (**Figure 14**). This video was then shown in Kudat during several dialogue sessions and during the TEDs Seminar in Kota Kinabalu, and drew many complimentary comments. The video is available free of charge to any group who is interested in promoting TEDs in Malaysia, and elsewhere.

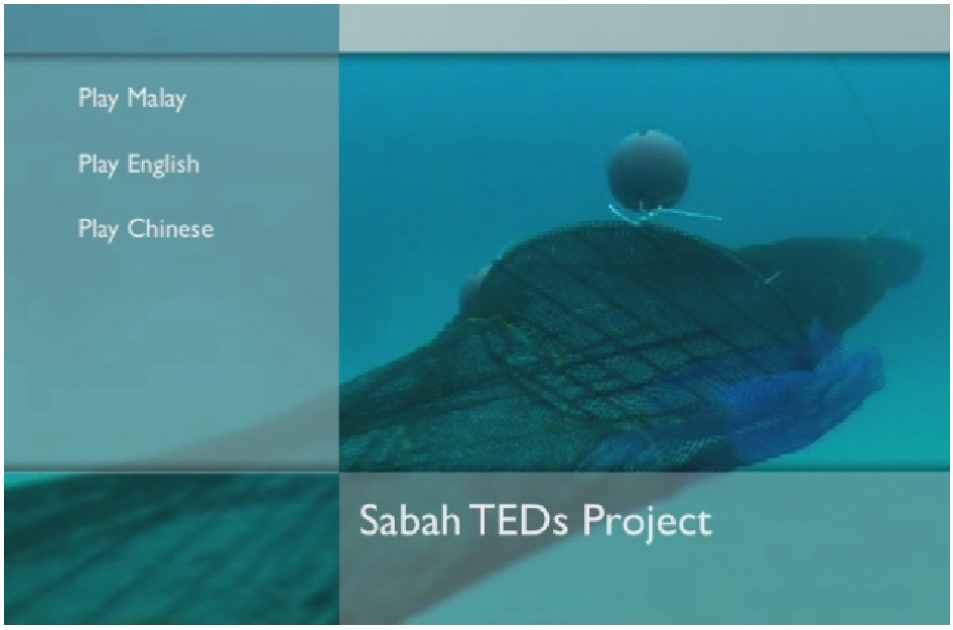


Figure 14. A screenshot of the selection menu for the TEDs video.

4.4 US Study Trip

In late June / early July, N. Pilcher conducted a site visit to three TED-fishery States in the US and worked closely with the National Marine Fisheries Service on TED enforcement, design, construction and outreach. Funding was made available through a matching funds grant to MRF by the US National Oceanic and Atmospheric Administration International Affairs office. During this time the team worked on a number of projects including:

- Implementing at-sea TED inspections and enforcement in collaboration with both the Texas and the Alabama Fish and Wildlife Enforcement divisions, providing technical backup and training;
- TIG arc and pulse aluminium welding;
- Double-shooter TED design and manufacture; and,
- Development of funding proposals to support technology transfer.

The training and lessons learnt dtzuring this short site visit will better enable MRF to assist the Department of Fisheries develop an enforcement programme for TEDs in Malaysia, and also to empower fishers to design and modify TEDs (within legal constraints). MRF now owns the equipment to construct TEDs in-house, and modify the designs and construction to meet Malaysian vessel requirements. We are also in a position to better respond to fisher requests for design changes and trials.

MRF is also working with the National Marine Fisheries Service to acquire a vessel which would allow us to conduct paired trawls from a single vessel (such as that depicted below in **Figure 15**). At present we are looking at two options: a) the donation of the NMFS research vessel RV *Caretta*, or b) the purchase of a used shrimp trawler in Sabah. The advantages of the former would be that the vessel is ready to fish, and little modifications would be necessary to get it ready for fishing in Sabah – not to mention that it would be free. The disadvantages would include having to ship the vessel from the US and the logistical constraints and costs involved, and the fact that it is not a local wooden boat to which local fishers could relate. The advantages of the latter would be that it would not need to be transported, and that it would be acceptable as a local boat by local fishers as it was manufactured locally. However, there would be substantial costs in outright purchase, servicing, and redesign with outriggers for twin-trawl fishing. At present, given the economic situation in the US, these plans have been temporarily shelved.

Figure 15. A twin trawl fishing boat with outriggers to spread two sets of nets and otter boards.

4.5 Observer Programme

MRF conducted Observer training workshops in June 2010 with four students / staff from Universiti Malaysia Sabah and MRF interns. All were trained in the objectives of the work, maintaining relations with the fishers, the use of GPS and completion of the data sheers / electronic data upload file. Two of the observers returned several times to assist with data collection. Given the small number of boats in the programme, and the fact that the UMS observers could only help over the weekends, we ended up having the two interns assisting with most of the data collection, thus the UMS observer participation was limited.

4.6 TEDs Workshop

As part of our awareness-raising efforts and our desire to bring as many stakeholders on board as possible, MRF and DoF Sabah convened a workshop in September 2010 which brought together fishery associations, fishery development agencies and cooperatives, along with NGOs, Universities, and the Federal Department of Fisheries, to introduce the programme's objectives and seek solutions to the way forward. Actual TEDs were on display, along with a scale model of a trawl net and a miniature TED to give participants a visual appreciation of the grid and its design.

The workshop benefited from presentations on the history of TED development (Nicolas Pilcher), Malaysian fisher experiences (Chua Yau Tsen and Johnny Wong), Sabah Department of Fisheries involvement and commitment (Rayner Datuk Stuel Galid), the past trials with TEDs in Malaysia (Syed Abdullah Syed Abdul Kadir), and a perspective on the value of this work by the donors (Muthusamy Suppiah). Recognising this as a limited geographical scope, we sought feedback form the multi-disciplined participants on challenges, opportunities and next steps to generate increased buy-in from fishers as the programme moves forward. The feedback sessions allowed participants to write down on cards, in any language, their responses to three key questions presented one at a time. The results were then collated and categorised where overlaps occurred (for instance, many people called for greater awareness-raising efforts and enforcement of TED requirements, as will be seen below). These primary responses were then graphically depicted, and presented as proportions of the overall responses. Efforts were made to ensure than singular responses were not lost during the process.

The workshop was a simple way of reaching numerous and varied stakeholders and introducing them to Turtle Excluder Devices and their benefits. It was a useful step in the overall process of developing TED-compliant fisheries, seeking stakeholder input and expanding the awareness audience, which will now serve as the foundations upon which further work can be developed. As summed up by the Sabah Department of Fisheries Director, "TEDs have been proven to work, trials have been conducted which have taken on board fishers' feedback, and there is really no reason not to implement this fully

across the board". In his concluding remarks, the Director also indicated he was prepared to raise the matter directly with the Director General of Fisheries (Federal) and explore mechanisms to have TEDs as mandatory equipment on shrimp trawlers in the State. A full report of the workshop is presented in **Annex I**.

5.0 Financial Report

Detailed final finance reporting to GEF/SGP Malaysia standards and copies of the last reporting period's expenses are attached separately to this report. In brief, the project spent RM 162,002.22 of GEF/SGP funds and an additional RM 117,515.23 of matching funds for a total RM 279,517.45 for the period January to December 2010. Exchange rate depreciation over the year meant that we received less than the original RM contribution, but were able to complete the project using surplus matching funds. We presently request the final disbursement of USD 5,000 to close out this grant. A summary of third term expenses and the overall budget are presented below:

ACCT CODE	DESCRIPTION	APPROVED PROJECT BUDGET			EXPENDITURE Sep '10 - Dec '10)			BALANCE		
		GEF / SGP	CO-FINANCING	TOTAL	GEF / SGP	CO-FINANCING	TOTAL	GEF / SGP	CO-FINANCING	TOTAL
		(RM)	(RM)	(RM)	(RM)	(RM)	(RM)	(RM)	(RM)	(RM)
1.0	**Administration**									
1.1	Office running expenses	10,800.00		10,800.00	3,600.00	-	3,600.00			
1.2	Utilities & communication	1,800.00	1,800.00	3,600.00	366.75	-	366.75	**1.83**	**(2,964.28)**	**(2,962.45)**
	Sub-total	**12,600.00**	**1,800.00**	**14,400.00**	**3,966.75**	**-**	**3,966.75**	**1.83**	**(6,964.28)**	**(6,962.45)**
2.0	**Capacity Building Trainings, Workshops & Seminars**									
2.1	Travel	6,770.00	5,090.00	11,860.00	4,394.57	-	4,394.57	**(3,197.86)**	**(18,191.10)**	**(21,388.96)**
2.2	Hotel	11,550.00	10,350.00	21,900.00	3,408.00	-	3,408.00	2,279.40	6,771.39	9,050.79
2.3	DSA	5,325.00	1,925.00	7,250.00	1,250.00	-	1,250.00	**(375.00)**	**1,925.00**	**1,550.00**
	Sub-total	**23,645.00**	**17,365.00**	**41,010.00**	**9,052.57**	**-**	**9,052.57**	**(1,293.46)**	**(9,494.71)**	**(10,788.17)**
3.0	**Any other specific activities linked towards meeting the goals and objectives of the project:**									
3.1	Boat Compensation	12,000.00	12,000.00	24,000.00	**5,500.00**	**-**		**2,560.00**	**12,000.00**	**20,060.00**
3.2	Principal Investigator	21,000.00	21,000.00	42,000.00	-	-	-	(7,000.00)	(18,155.32)	(25,155.32)
	Sub-total	**33,000.00**	**33,000.00**	**66,000.00**	**5,500.00**	**-**	**-**	**(4,440.00)**	**(6,155.32)**	**(5,095.32)**
4.0	**Equipment & Materials:**									
4.1	TEDs and Supplies	3,750.00	3,750.00	7,500.00	126.20	-	126.20	**(1,166.20)**	**(9,055.98)**	**(10,222.18)**
	Sub-total	**3,750.00**	**3,750.00**	**7,500.00**	**126.20**	**-**	**126.20**	**(1,166.20)**	**(9,055.98)**	**(10,222.18)**
5.0	**Publicity and Outreach**									
5.1	Community Dialogue Session: Food/Beverage	2,500.00	2,500.00	5,000.00	169.30	-	169.30	**(1,367.90)**	**(23,429.94)**	**(24,797.84)**
5.2	Community Dialogue Session: Food/Beverage	2,500.00	2,500.00	5,000.00	-	-	-	2,500.00	2,500.00	5,000.00
5.3	Multi-stakeholder meeting	12,500.00	12,500.00	25,000.00	20,966.10	-	20,966.10	**(8,650.00)**	**12,500.00**	**3,850.00**
	Sub-total	**17,500.00**	**17,500.00**	**35,000.00**	**21,135.40**	**-**	**21,135.40**	**(7,517.90)**	**(8,429.94)**	**(15,947.84)**
6.0	**Monitoring and Evaluation**									
6.1	Site coordinator	12,000.00	12,000.00	24,000.00	4,000.00	-	4,000.00	-	**12,000.00**	**12,000.00**
6.2	Observer Fees	24,000.00	-	24,000.00	12,800.00	-	12,800.00	11,200.00	-	11,200.00
	Sub-total	**36,000.00**	**12,000.00**	**48,000.00**	**16,800.00**	**-**	**16,800.00**	**11,200.00**	**12,000.00**	**23,200.00**
7.0	**Documentation**									
7.1	MRF TEDs Coordinator	18,000.00	-	18,000.00	13,000.00	-	13,000.00	**(7,000.00)**	**(4,000.00)**	**(11,000.00)**
7.2	UW Video	17,500.00	15,500.00	33,000.00	1,499.00	-	1,499.00	10,365.41	15,500.00	25,865.41
	Sub-total	**35,500.00**	**15,500.00**	**51,000.00**	**14,499.00**	**-**	**14,499.00**	**3,365.41**	**11,500.00**	**14,865.41**
8.0	**Miscallaneous**									
8.1		-	-	-	156.90	-	-	**(156.90)**	-	-
	Sub-total	**-**	**-**	**-**	**156.90**	**-**	**-**	**(156.90)**	-	-
9.0	**Others**									
9.1		-	-	-	-	-	-			
	Sub-total	**-**	**-**	**-**	**-**	**-**	**-**			
	TOTAL	**161,995.00**	**100,915.00**	**262,910.00**	**71,236.82**	**-**	**65,579.92**	**(7.22)**	**(16,600.23)**	**(10,950.55)**

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Annex I - SABAH TEDS SEMINAR REPORT

Project Title:

Improving the Sustainable Livelihood of Fishermen and Conservation of Marine Biodiversity Through the Reduction of Sea Turtle By-Catch in Commercial Fisheries in Sabah, Malaysia – Phase II

Implementing Agency:

Marine Research Foundation (MRF), Malaysia

Funded by

October 2010

Table of Contents

A project by:

In association with:

List of Acronyms

CI – Conservation International
GEF – Global Environment Facility
GPS – Global Positioning Satellite
IUCN – World Conservation Union
MRF – Marine Research Foundation
MTSG – Marine Turtle Specialist Group
NMFS – National Marine Fisheries Service
NOAA – National Oceanic and Atmospheric Administration
SGP – Small Grants Programme
SSC – Species Survival Commission
TED – Turtle Excluder Device

1.0 Introduction

The Marine Research Foundation is introducing local fishers to Turtle Excluder Devices (TEDs), which are simple grid devices that fit in the narrow neck of trawl nets and help eliminate unwanted bycatch such as endangered sea turtles, along with all kinds of debris. They also help reduce fuel costs, increase product value and reduce net down-time, all of which increase fishery efficiency.

Shrimp trawl fisheries have been identified as the world's leading cause of sea turtle declines. Recent studies by the Marine Research Foundation indicate that hundreds of turtles a year are lost to fisheries in Sabah each year. These turtles are integral components of marine ecosystems, and provide valuable eco-tourism related services valued in the millions while supporting cultural and traditional values. The turtles also possess, through their charismatic qualities, an ambassadorial value to wider conservation issues. While the ongoing protection of critical nesting beaches, such as through the work of Sabah Parks, is an important necessity, these efforts will be doomed unless adequate and complementary protection is afforded during their at-sea periods, which account for over 99.9% of their lifetime. MRF believes that the reduction of bycatch of marine turtles is a critical step in ensuring the survival of marine turtles in Sabah waters, and indeed beyond.

TEDs are simple grid devices that fit in the narrow neck of trawl nets and help eliminate unwanted bycatch, along with all kinds of debris. They have the advantage of reducing fuel costs, increasing product value and reducing net down-time, all increasing fishery efficiency. They also save sea turtles, icons of Malaysia's seas and protected throughout their range. While TEDs have many advantages, fishers are wary of using them as they require a large exit trapdoor in the net to allow the turtles and debris to escape. While the opening is covered by self-closing netting flaps, the fishers are concerned that their target catch will also be lost through the net opening. Through preliminary trials in Sabah we found that the TEDs did result in small catch declines, in the region of 2-3%, which needs to be recovered if the fishers were to continue using the devices.

Given that MRF is concerned about the livelihoods of the thousands of fishermen who ply their trade in Sabah waters alongside its concern for turtles, the primary goals of our TED project have been to improve fisher livelihoods and build the capacity of local fisher communities while reducing the loss of marine biodiversity, especially of the green turtle *Chelonia mydas*, listed as Endangered by the IUCN Red List. The project builds on the results of Phase I (2007-2008) implemented in Sandakan, with the intention of expanding the project to a second port (Kudat), continuing trials in Sandakan and reinforcement of lessons learnt, upscaling the project to involve the Federal Department of Fisheries so that the lessons learnt can be applied on a more comprehensive basis nation-wide. Phase II also benefits from the recent production of an educational video in July 2009 on how TEDs work underwater in Sabah.

The TED project was developed in partnership with the Sabah Department of Fisheries, and provides the data upon which the Government can base further fishery practice controls to conserve marine turtles, be it through the use of excluder devices, or possibly seasonal and/or temporal closures. Work on TEDs has been ongoing now for slightly more than two years through this joint project, through awareness and pilot trials, funded by GEF/SGP Malaysia, the Save our Seas Foundation, and by CI-Philippines. This work has received wide attention, and is the focus of ongoing trial and expansion efforts.

The Sabah TEDs project started off as a simple trial program at one fishing port in Sandakan. It has now expanded to a second major fishing port, Kudat, and combined these ports represent over 1500 boats of the fishery. At the same time the program has upscaled to the Federal Department Fisheries, whereby the Department is now asking MRF to help with Peninsular Malaysia TEDs programs, and has offered its continued support to the ongoing initiatives in Sabah. A recent increased exposure to the process, through direct fisherman-to-fisherman interactions during a CI-Philippines-sponsored site visit to the US National Marine Fisheries Service in Pascagoula, Mississippi, provide a far greater recognition of the values of TED use and the historical stumbling blocks which were overcome in a TED-compliant fishery - valuable lessons which have now been brought back and introduced in Sabah. In 2009 NOAA's National Marine Fisheries Service, through their Harvesting Systems Branch hosted five Malaysians (fishers and fishery officers) over to their lab to learn all about TEDs, how they work, changes needed to vessels and legal processes. The trip was a resounding success, with the NMFS sharing a great deal of knowledge. The main difference during this trip was that the backdrop was every boat was TED-compliant, whereas when trainers came to Sabah in 2007 the backdrop was a fishery with not a single TED in sight.

As an incentive to fish more sustainably and save sea turtles, MRF brokered a partnership between local hotels and the committed fishing companies. The hotels agreed to purchase shrimp from TED-equipped boats at a premium price and help cover any losses TEDs may induce. The demand from just two hotels is substantial, and represents a substantial proportion of the company's total monthly catch. The hotel benefits by meeting, amongst other things, their ISO certification requirements (which call for purchases from sustainable sources), building on their corporate and social commitments to the environment, and enhancing customer satisfaction. The company enjoys a no-nett loss relationship through the adoption of TEDs, and the environment benefits substantially. By brokering the partnership between supplier and purchaser at a premium level, MRF is helping meet bycatch reduction goals while not impacting on local livelihoods of fishers, and promoting industry buy-in for endangered species conservation.

As part of our awareness-raising efforts and our desire to bring as many stakeholders on board as possible, MRF and DoF Sabah convened a workshop in September 2010 (**Annex I: Agenda**) which brought together fishery associations, fishery development agencies and cooperatives, along with NGOs, Universities, and the Federal Department of Fisheries, to introduce the programme's objectives and seek solutions to the way forward (**Annex II: Participant List**). Actual TEDs were on display, along with a scale model of a trawl net and a miniature TED to give participants a visual appreciation of the grid and its design.

The workshop benefited from presentations on the history of TED development (Nicolas Pilcher), Malaysian fisher experiences (Chua Yau Tsen and Johnny Wong), Sabah Department of Fisheries involvement and commitment (Rayner Datuk Stuel Galid), the past trials with TEDs in Malaysia (Syed Abdullah Syed Abdul Kadir), and a perspective on the value of this work by the donors (Muthusamy Suppiah). Finally, the workshop concluded with a feedback session amongst all participants, during which feedback was solicited on three key topics: Constraints envisioned in becoming TED-compliant; Opportunities TED-compliance will bring to the fishery? and what MRF and the Sabah Department of Fisheries should do next? It is the findings of this discussion session that will be used to drive future work on implementing TED-compliance in Malaysia.

2.0 A brief history of TEDs

A TED is little more than a metal grid inserted into trawl nets to reduce accidental take of unwanted bycatch such as sea turtles. The grid allows the catch to pass through to the cod end of the net (the bag at the back) while large objects, including debris and large marine fauna, are trapped and ejected out of a flap of net material. TEDs are mandatory in many countries, and the US, for instance, will not allow imports of shrimp into the country if trawlers do not use TEDs. TEDs can help save on fuel costs by reducing the load placed on the nets, they can reduce downtime by reducing the damage done to the net by large animals and large debris items such as logs and branches, and they can increase the value of the catch as this does not get damaged during the tow.

The original TED was developed by a fisherman in the US who wanted to keep jellyfish out of his net back in the 1970s. After it was adopted by the US National Marine Fisheries Service as a way to help protect sea turtles, the TED underwent a number of modifications and continues to evolve even today. While turtles drive the development process, fishers found that the TED also had a number of accompanying benefits, and today the TED is used without objection in many fisheries around the world as a way to increase productivity. The history of TED implementation was not a smooth one though, with many fishers initially objecting and fighting their introduction. This scene has been repeated country by country, but similarly so has the eventual uptake and understanding of the many benefits they bring.

The US drove the development of the TEDs based on Federal requirements to protect sea turtles, which were being lost at a rate of over 10,000 per year. With a fishing fleet of over 17,000 vessels and an industry worth over USD 450 million, their task was a mammoth one. A number of designs were trialled, and while some of these reduced bycatch of turtles, they did so at great expense to the catch (over 30%) which was unacceptable to industry. In the 1980 the TED was a large box-like device which fishermen disliked based on bulk and safety (**Figure 1**).

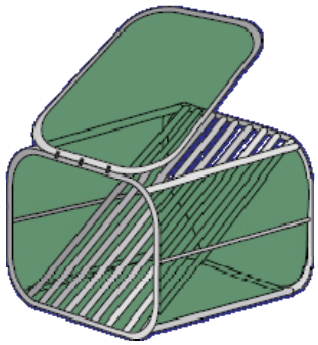


Figure 1: Original box-like excluder device from the 1980s.

In the early 1980s the NMFS tried to get TEDs to be voluntarily adopted by fishers, but by middle of the decade voluntary adoption occurred in only 1% of the fishery. During this time fishers had the opportunity to help redesign the TED into something they could use and be happy with, and the development of the net flap, soft TEDs, followed by the move to single grid devices was driven by fishers themselves. In 1978 TED use was made compulsory and this led to even further refinements and development of new ideas by fishers. All designs were tested by the NMFS in controlled trials, and were made available for fishers to provide all kinds of input and new ideas. These included the use of floats, changes in angle of deployment, funnel installation, and materials. After the enforced use of TEDs, turtle bycatch was reduced dramatically, and the programme has continued to develop. Soft type TEDs, double flap covers, increased opening size – all are examples of subsequent improvements in TED design. With the new designs, trials showed that turtle captures could be reduced by over 97% while catches only varied by -2.5% to +6.0%. More recent research involves changing from tube designs to flat bar designs, top and bottom openings on one TED, and even flexible stainless steel wire grids. Research is showing how larger TEDs are actually better for the fishery as debris is more easily ejected, and that bottom-shooting TEDs are more efficient at ejecting debris than top-shooter TEDs – without any impact to turtle escape potential.

Today 18 countries in the world require TEDs under a legal framework, and these include all major shrimp producing nations in the world. The key lessons learnt through TED programmes in all of these all include: 1) They industry needs to be an active participant in every aspect of planning, development, and evaluation of new technologies; 2) That planning for new technology

development needs to include major commitment for technology transfer activities; 3) Acceptance of new sustainable technologies requires financial or other incentives; 4) Technologies which result in increase costs and or loss of revenue will likely be resisted by users; 5) Mandatory use of new sustainable technologies requires effective enforcement commitment; 6) Regulations implementing new sustainable technologies need to as flexible and easily modified as possible to allow fishers to successfully implement; and 7) Effective communication and cooperation between industry, fishery researchers and regulators is of paramount importance.

3.0 Outcome of Group Discussions / Feedback Sessions

MRF and Department of Fisheries Sabah have conducted TED trials in Sabah since 2007. During this time we have sought the input of fishers on design, implementation, and general uptake amongst the fisher community issues, both in Kudat and in Sandakan. Recognising this as a limited geographical scope, we sought feedback form the multi-disciplined participants on challenges, opportunities and next steps to generate increased buy-in from fishers as the programme moves forward. The feedback sessions allowed participants to write down on cards, in any language, their responses to three key questions presented one at a time. The results were then collated and categorised where overlaps occurred (for instance, many people called for greater awareness-raising efforts and enforcement of TED requirements, as will be seen below). These primary responses were then graphically depicted, and presented as proportions of the overall responses. Efforts were made to ensure than singular responses were not lost during the process. The results are presented in summary format in the following sub-sections.

3.1 What constraints do you (fishers) envision in becoming TED-compliant?

This question aimed to judge the stakeholders' concerns about a wide-scale implementation of TEDs in Sabah. The key concerns raised by the participants revolved around the need for TEDs to be made compulsory (legal requirements), and a general lack of education / awareness amongst the fishing crews, the effective lack of enforcement and monitoring, a concern over cost leading to suggestions that TEDs may not be adopted unless TEDs are provided free to fishers, the lack of more widespread trials and tests (at present the project has only worked in Sandakan and Kudat), and a concern over potential decreased catches (**Figure 2**). Interestingly the two largest responses addressed the need for TEDs to be required legally on vessels (30%), and a need for greater general awareness of the use of TEDs (27%), the values they bring, and their correct installation and use. Other issues that were raised as possible concerns with implementing TEDs on a wider scale included lack of knowledge on TED construction / maintenance; concern over TED fitting on net drums; concern over catch loss, the need for collaboration from all government agencies; motivation to market TED-caught shrimp; that there may not be a need for TEDs in all areas; a lack of understanding of the need for sustainable fisheries; a lack of open-mindedness by fishers; a lack of interest in turtle conservation or even change inertia; that fishers are mainly foreign and not concerned with Sabah's marine ecosystems, and also a concern over the initial TED costs.

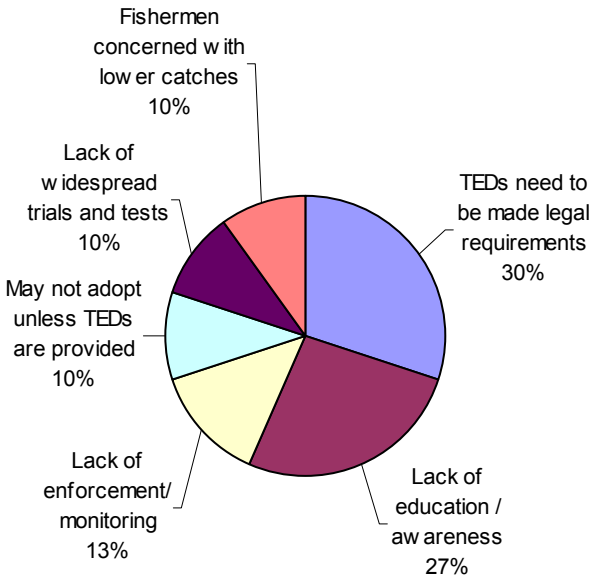


Figure 2: Key issues raised by participants at the workshop, showing proportional relationship of concerns.

3.2 What opportunities do you envision TED-compliance will bring to the fishery?

This question aimed to solicit feedback on how the workshop participants felt the TED process could be beneficial to the trawl shrimp fisheries in Sabah. In response however, the participants provided mechanisms through which they felt TEDs might be more easily taken up by fishers. The primary opportunities seen by the delegates which would foster TED uptake included increased training / awareness; involving LKIM in TED promotion; making TED use a legal requirement (similar to that raised under concerns); making TEDs compulsory through licence renewals; valuing feedback from boat crews; getting fishers to train other fishers; having owners accountable for training crews, the provision of finance incentives; the involvement of higher government levels; the provision of increased enforcement, and the promotion of turtle conservation in general (**Figure 3**).

Again, increased training and awareness was considered a major factor in driving the process forward, over and above all other factors. Other secondary opportunities identified by participants included awareness programmes in multiple language awareness, promotion at an annual Sabah Fishermen's Day, involving Fishery Associations in a greater manner, gradually eliminating trawling, subsidising the cost of the TEDs, certifying boats as Turtle-Free, price guarantees for catch with TED, and engagement of all trawl operators. These factors will be taken into account during future phases of the TED implementation programme.

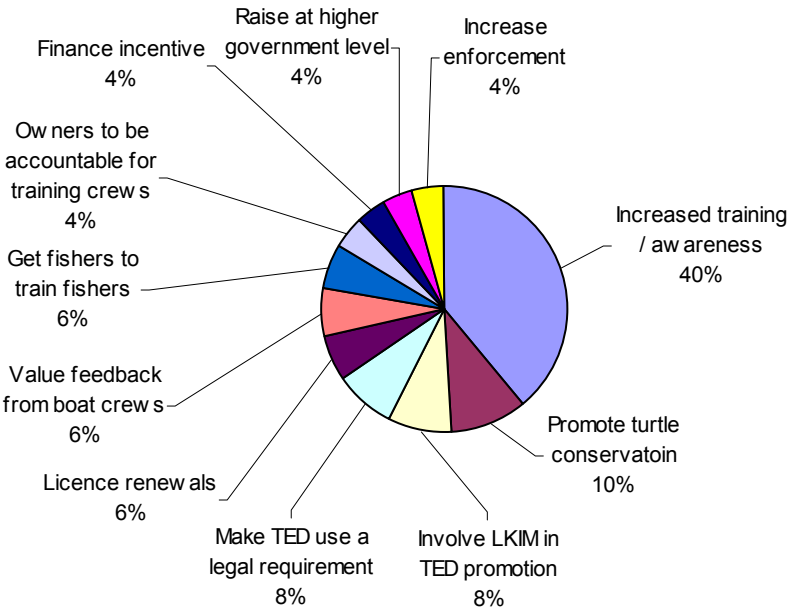


Figure 3: Opportunities for improved TED uptake in Sabah

3.3 What would you like MRF and the Sabah Department of Fisheries to do next?

Finally, the last question posed to delegates aimed to identify the future path for MRF and the Sabah Department of Fisheries in developing the TED programme. Key requests from participants included increased awareness (MRF); making TED a legal requirement (DoF); enforcing the use of TEDs (DoF); expanding the programme to other parts of Sabah (both agencies); promoting TED uptake amongst other Government agencies (both agencies); increased research (MRF) and increased monitoring (**Figure 4**). Additional responses provided by delegates, but which were not as widely embraced, included using feedback from users to improve the system; using current project crews to train others; removing incentives / licences for lack of compliance; reducing the overall number of boat licences; providing finance incentives for TED compliance; implementing existing regulations more effectively; exploring additional funding options; continued development and expansion of the TED project; banning / reducing all trawling effort; training fishers and crews on TED construction; promoting sustainable fisheries as a concept, limiting areas for shrimp catches, involving overseas stakeholders (such as in the EU & the USA); including other relevant stakeholders; establishing seasons for shrimp fishing, and enforcing TED use in turtle breeding areas.

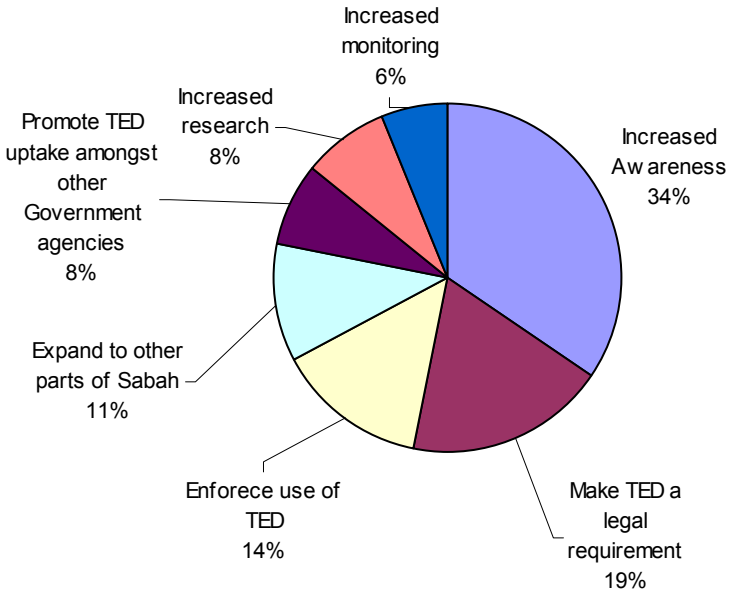
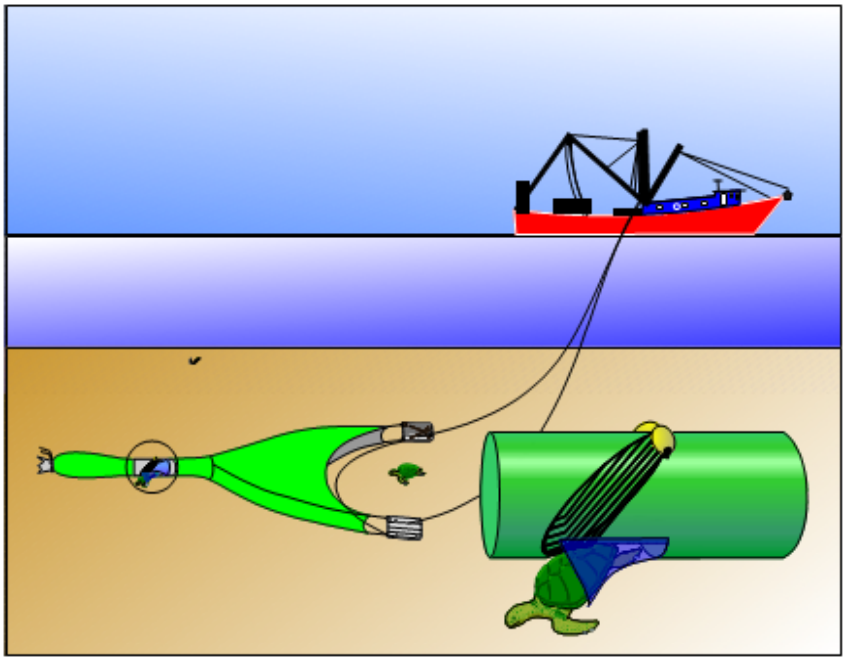


Figure 4: The way forward for MRF and Department of Fisheries Sabah

We feel that this last question most clearly reflects how participants feel we should move forward. Clearly there was a call for more widespread awareness-raising (34%), and this response was composed of many potential options: a road show around Sabah, having existing crews train new crews, teaching people how to sew the grid into the net extension, bringing higher levels of Government on board, etc. Similarly indicative of the support this process received was reflected in the proportion of respondents who indicated making TEDs a legal requirement (19%), which could possibly become one of the requirements for licence renewals, or could be a stand-alone requirement of the act. Further investigation will be required to identify just which legal mechanism is most effective and which can most easily be implemented.

The workshop was a simple way of reaching numerous and varied stakeholders and introducing them to Turtle Excluder Devices and their benefits. It was a useful step in the overall process of developing TED-compliant fisheries, seeking stakeholder input and expanding the awareness audience, which will now serve as the foundations upon which further work can be developed. As summed up by the Sabah Department of Fisheries Director, “TEDs have been proven to work, trials have been conducted which have taken on board fishers’ feedback, and there is really no reason not to implement this fully across the board”. In his concluding remarks, the Director also indicated he was prepared to raise the matter directly with the Director General of Fisheries (Federal) and explore mechanisms to have TEDs as mandatory equipment on shrimp trawlers in the State.



Annex I September 2010 Workshop Agenda

SEMINAR AGENDA

"Promoting Turtle Excluder Devices (TEDs) in Sabah Shrimp Fisheries: Linking Environmental Protection with Sustainable Fisheries"

28 September 2010

Beverly Hotel, Kota Kinabalu, Sabah

TIME	ACTIVITY
0800	Registration
SESSION 1 - INTRODUCTION	
0900	Welcoming Remarks Rayner Datuk Stuel Galid *Director, Sabah Department of Fisheries*
0910	Keynote Address *Datuk Hj. Ujang bin Sulani* *Permanent Secretary, Ministry of Agruculture*
0930	Introduction to Turtle Exclude Devices Dr. Nicolas J. Pilcher *Executive Director, Marine Research Foundation*
1000	Coffee and Tea Break
SESSION 2 - BACKGROUND: TED DEVELOPMENT AND USE	
1030	History and development of Turtle Exclude Devices *Dr. Nicolas J. Pilcher*
1130	TED Experiences in Malaysia *Chua Yau Tsen (Hai Leng Enterprise Sdn. Bhd.)* *Johnny Wong (Fook Soon Sdn. Bhd.)*
1200	Potential application of TED technology in Sabah fisheries *Dr. Nicolas J. Pilcher*
1230	TEDs in Malaysia: A Funding Agency Perspective *Muthusamy Suppiah, GEF/SGP Malaysia*
1245	TEDs in Malaysia: A Department of Fisheries Perspective *TBA, Department of Fisheries Malaysia*
1300	Lunch
SESSION 3 – GROUP DISCUSSION	
1400	Open forum for discussion on TED implementation in Malaysia *Concerns and Queries* *Participation of Malaysian Fishermen* *Future Direction*
1530	Coffee and Tea Break
1545	Open forum for discussion on TED implementation in Malaysia, continued.
1645	Concluding Remarks Rayner Datuk Stuel Galid *Director, Sabah Department of Fisheries*
1700	End of Seminar

Annex II – Participants

Mr. Muthusamy Suppiah
National Coordinator
GEF Small Grants Programme Malaysia
Tel: 03-2095 9122 / 3315
Fax: 03-20941309
Email: muthusamy.suppiah@undp.org

Ms. Hivilin Binijin
Penolong Penguasa Pejabat
Ko-Nelayan Kunak
Tel: 089-852766
Fax: 089-852755
Email: Hivilin.Binjin@sabah.gov.my

Ms. Haslini Suit
Ko-Nelayan Tawau
Tel: 089-763969 / 089-763866
Fax: 089-763867

Mr. Jamri
Ko-Nelayan Kota Kinabalu
Tel: 089-763969 / 089-763866
Fax: 089-763867

Ms. Sylvia Yorath
LEAP Project Managers
Land Empowerment Animals People
Tel: 088-270705
Fax: 088-270705
Email: syorath@hotmail.com

Ms. Katie King
LEAP Project Managers
Land Empowerment Animals People
Tel: 088-270705
Fax: 088-270705
Email: katiehking@gmail.com

Mr. Mohd. Azrul Jidir
Pembantu Ehwal Ekonomi
Lembaga Kemajuan Ikan Malaysia (LKIM)
Kota Kinabalu
Tel: 088-487450
Fax: 088-487457 / 459

Mr. Irman Isnain
Jabatan Perikanan Sabah

Mr. Adumat Rahmat @ Rakmat
Pembantu Ehwal Ekonomi
Persatuan Nelayan Kudat
Tel: 088-622691
Fax: 088-622690
Email: adumat07@yahoo.com.my

Mr. Muhammad Firdaus Sabari
Assistant Manager PNK Teluk Padas
Persatuan Nelayan Sipitang
Email: air_durst86@yahoo.com

Mr. Noorazizul Kadir
Pembantu Ehwal Ekonomi
Persatuan Nelayan Kota Marudu
Tel: 088-662823
Fax: 088-662823
Email: e.jull@yahoo.com

Mr. Kamrin Kandi
Penyelia Akaun Dana
Persatuan Nelayan Kota Marudu
Email: kamrin_77@yahoo.com

Mr. Mohd. Alifuddin Mohd. Jainudin
Pemasaran
Persatuan Nelayan Kota Marudu
Email: didiealiff@ymail.com

Ms. Masdalina Shyrry Rosman
Penolong Pegawai Kawalan
Jabatan Alam Sekitar
Tel: 088-488169 ext 231
Fax: 088-488177
Email: masdalina@doe.gov.my

Mr. Ahmad Khusyairie Ahid
Juruteknik
Jabatan Alam Sekitar
Tel: 088-488169 ext 251
Fax: 088-488177
Email: khusyairie@doe.gov.my

Mr. Silvester Saimin
Wildlife Officer
Jabatan Hidupan Liar Sabah - Kota Kinabalu
Email: silvester.saimin@sabah.gov.my

Mr. Roland Niun
Wildlife Officer
Jabatan Hidupan Liar Sabah - Sandakan
Tel: 089-666550
Fax: 089-666551
Email: ronjhl@yahoo.com

Ms. Maznah Othman
Head, Resource Conservation Section,
Licencing and Resource Management
Division.
Department of Fisheries Malaysia Putrajaya
Tel: 03-88704406
Email: maznahoth@dof.gov.my

Mr. Syed Abdullah Syed Abdul Kadir
Head, FRI Rantau Abang, Terengganu
Tel: 09-8458169
Fax: 09-8458017
Email: syedabdmfrdmd@yahoo.com;

Mr. Rayner Datuk Stuel Galid
Pengarah Perikanan Sabah
Jabatan Perikanan Sabah
Tel: 088-235966
Fax: 088-250321
Email: rayner.galid@sabah.gov.my

Mr. Harun Duin
Jabatan Perikanan Sabah
Tel: 088-235966
Fax: 088-250321
Email: rooney.biusing@sabah.gov.my

Mr. Jephrin Zefrinus Wong
Ketua Penolong Pengarah
Jabatan Perikanan Sabah
Tel: 088-235966
Fax: 088-250321
Email: jephrin.wong@sabah.gov.my

Mr. Saili Hj Libi
Ketua Bahagian Khas
Jabatan Perikanan Sabah
Tel: 088-235966
Fax: 088-250321
Email: Saili.libi@sabah.gov.my

Mr. Marin Achil
Jabatan Perikanan Sabah - Beaufort

Mr. Mohd Yusof @ Anthony Gamat
Ketua Cawangan Perundangan &
Penguatkuasaan
Jabatan Perikanan Sabah
Tel: 088-235966
Fax: 088-250321
Email:
MohdYusoff.Abdullah@sabah.gov.my

Ms. Priscilla Justin
Jabatan Perikanan Sabah

Mr. Amadeus Benjamin
Jabatan Perikanan Sabah

Ms. Midah Gintin
Jabatan Perikanan Sabah

Ms. Norasimah Kassim
Jabatan Perikanan Sabah

Mr. Ernest Jinuat
Jabatan Perikanan Sabah

Mr. Jamlidin Manap
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah
Tel: 088-262359
Fax: 088-231033
Email: Jamlidin.Manap@sabah.gov.my

Mr. Yaakuf Hj. Matnor
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Papar
Tel: 088-913361
Fax: 088-917527

Mr. Julin Bagang
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Kuala Penyu
Tel: 087-884378
Fax: 087-884378

Mr. Abd Kahar Mohd Hassan
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Beaufort
Tel: 087-221236
Fax: 087-221236
AbdKahar.MohdHassan@sabah.gov.my

Mr. Jum Hj Abas
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Sipitang
Tel: 087-821009
Fax: 087-821009
Email: Jum.Abas@sabah.gov.my

Mr. Shamsudin Harun
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Tuaran
Tel: 088-788534
Fax: 088-788363

Mr. Lamjah Juka
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Kota Belud
Tel: 088-975242
Fax: 088-975242
Email: Lamjah.Juka@sabah.gov.my

Mr. Mohd Intam Hj Ali
Jabatan Perikanan Sabah - Kota Belud
Mr. Masrani Madun
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Kota Marudu
Tel: 088-661159
Fax: 088-661159
Email: Masrani.Madun@sabah.gov.my
Mr. Justin Agon
Jabatan Perikanan Sabah

Mr. Well Jaimal
Jabatan Perikanan Sabah - Kota Marudu

Mr. Soibil Madun
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Pitas
Tel: 088-671980
Fax: 088-611980
Email: Soibil.Madun@sabah.gov.my

Mr. Primus Lukas
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Beluran
Tel: 089-511284
Fax: 089-561284

Mr. Mohd Din Gapang
Jabatan Perikanan Sabah - Beluran

Mr. Awang Hj Pakar
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Sandakan
Tel: 089-208870
Fax: 089-208873
Email: Awang.Pakar@sabah.gov.my

Mr. Maurice @ Kassim Anchi
Pembantu Perikanan
Jabatan Perikanan Sabah - Sandakan
Email: Maurice.Anchi@sabah.gov.my

Mr. Arman Shah bin Ambo Dalli
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Kunak
Tel: Direct Room Number, (089-851043),
089-851041
Fax: 089-851042
Email:
Armanshah.Ambodalli@sabah.gov.my

Mr. Musli Sappan
Pembantu Perikanan
Jabatan Perikanan Sabah - Kunak
Tel: 089-851041

Mr. Azhar/Azhar Hj. Kassim
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Tawau
Tel: 089-772060
Fax: 089-772304
Email: Azhar.Kassim@sabah.gov.my

Ibni Hassim
Jabatan Perikanan Sabah - Semporna

Mr. Musah @ Shamsuddin/ Musah Hj.
Ohang
Pembantu Perikanan
Jabatan Perikanan Sabah - Tawau
Fax: 089-772304
Email: musahohang@sabah.gov.my

Mr. Ruzlee Jumatin
Penguasa Perikanan Daerah
Jabatan Perikanan Sabah - Semporna
Tel: 089-781711
Fax: 089-782275
Email: ruzlee.jumatin@sabah.gov.my

Ms. Farahdyna Ambroh
Pegawai Perikanan
Jabatan Perikanan Malaysia
Tel: 088-235966
Fax: 088-240511
Email: farahdyna.ambroh@sabah.gov.my

Mr. Oswald Braken Tisen
Senior Manager, Biodiversity Conservation, Protected Areas and Biodiversity Conservation Division
Sarawak Forestry Corporation Sdn. Bhd.
Tel: 082-629622 / 082-629539
Email: oswaldtisen@sarawakforestry.com

Ms. Fung Chen Chung
Marine Biologist
Reef Guardian Sdn Bhd - Sugud Islands Marine Conservation Area (SIMCA)
Tel: 089-234000 /089-675999
Fax: 089-234001 / 089-675111
Email: achier300@yahoo.com

Mr. Johnny Wong
Chief of USF BOA - Kudat
United Sabah Fisheries and Boat Owners Associations - Kudat

Mr. Soo Chea Chua
Shrimp boat owner
United Sabah Fisheries and Boat Owners Associations - Kudat

Mr. John Chai
Shrimp boat owner
United Sabah Fisheries and Boat Owners Associations - Kudat

Mr. Peh Chee Phua
Chief of USF BOA - Sandakan
United Sabah Fisheries and Boat Owners Associations - Sandakan
Fax: 089-273250

Mr. Yau Seng Chua
Shrimp boat owner
United Sabah Fisheries and Boat Owners Associations - Sandakan
Email: hailengs@streamyx.com

Mr. Tet Kong Yong
United Sabah Fisheries and Boat Owners Associations - Sandakan

Mr. Steven Kwek
United Sabah Fisheries and Boat Owners Associations - Sandakan

Mr. Fan Kui Wing
Ex Chief of USF BOA
United Sabah Fisheries and Boat Owners Associations - Sandakan

Mr. Lee Nyuk Tong
United Sabah Fisheries and Boat Owners Associations - Sandakan

Mr. Arsani
Chief of USF BOA - Tawau
United Sabah Fisheries and Boat Owners Associations - Tawau
Fax: 089-773336

Mr. Vui Hen Chin
United Sabah Fisheries and Boat Owners Associations - Tawau

Mr. Nyuk Thin Chin
United Sabah Fisheries and Boat Owners Associations - Tawau

Dr. Pushpa M. Palaniappan
Senior Lecturer, Borneo Marine Research Institute, Universiti Malaysia Sabah
Universiti Malaysia Sabah
Tel: 088 320000 ext. 2597
Fax: 088-320261
Email: pushpapala@gmail.com

Ms. Angela Lim
Senior Communications Officer
WWF Malaysia
Email: ALim@wwf.org.my

Ms. Robecca Jumin
Co-Team Leader, Fisheries, Kudat-Banggi
WWF Malaysia
Email: RJumin@wwf.org.my

Mr. Gavin Jolis
Species Officer, Semporna
WWF Malaysia
Email: GJolis@wwf.org.my

Ms. Sofia Johari
CEPA Officer, Kudat-Banggi
WWF Malaysia
Email: sofia2611@gmail.com

Mr. Irwin Wong
Live Reef Fish Trade officer
WWF Malaysia
Email: YJWong@wwf.org.my

Dr. Juanita Joseph
Universiti Malaysia Terengganu
Email: juanitajoseph@gmail.com

Assoc. Prof. Hock Chark Liew
Universiti Malaysia Terengganu

Mr. Sukur Sukardi
Sabah Parks
Mr. Raymond Winfield
Kudat Turtle Conservation Society

Dr. Nicolas J. Pilcher
Executive Director
Marine Research Foundation
Tel: 088-244089
Fax: 088-387136
Email: npilcher@mrf-asia.org

Mrs. Carmen Leong Pilcher
Manager
Marine Research Foundation
Tel: 088-244089
Fax: 088-387136
Email: carmen_pilcher@hotmail.com

Mr. Clement Liew
Research Fellow
Marine Research Foundation
Tel: 088-244089
Fax: 088-387136
Email: cliew@mrf-asia.org

Mrs. Francesca Winfield
Kudat Turtle Conservation Society
Email: francescawinfield@msn.com

Annex II – Press Coverage

The delegation showing the Turtle Evacuation Device during their US trip.

Turtles-saving TED on trial in Kudat

KOTA KINABALU: The use of the Turtle Evacuation Device (TED) in fishing nets not only saves turtles but also brings benefits to fishermen in terms of catches as well as operational costs.

With Sabah being home to various species of turtles, the Marine Research Foundation, led by turtle conservation expert, Dr Nick Pilcher, Kudat Turtles Conservation Society (KTCS) chairwoman, Francesca Winfield, and two fishermen — Johnny Wong and Desmond Chiang — visited the National Marine Fisheries Service Lab in the United States to learn more about TED.

The delegation was told that TED allows for greater fuel efficiency as it allows foreign objects caught in the fishing net to exit and this will also lessen damage to the catch in the net such as prawns.

They were also told that the US did not import prawns from countries that do not use TED.

On their return to Sabah, TED will put on sea trial in Kudat where a film crew from the National Geographic channel will be filming the process.

Pilcher said the use of TED was a win-win situation for fishermen in the State, adding TED was also simple and easy to use.

He said Kudat had a large population of turtles and had the potential to become an attraction similar to Sipadan provided the creatures are protected, adding that divers from all over the world relish a chance to swim with the turtles and that the State will surely benefit with their arrival.

US technology for fishermen to protect turtles, save fuel cost

Wong (standing in the middle) and Chiang (squatting right) posing with the fish experts during their visit to the US recently.

KOTA KINABALU: Two local fishermen made a fruitful tour to the United States to study the use of Turtle Evacuation Device (TED) for fishing.

Johnny Wong and Desmond Chiang believe the TED technology will help to save fuel and protect the turtles.

"Floating logs and turtles caught in the fishing nets tend to destroy our valuable prawn catches. The technology is definitely a win win for Kudat and Malaysia fishermen," said Wong.

The US trip was jointly organised by the Marine Research Foundation led by Dr Nick Pilcher, the world's leading turtle conservation expert, Kudat Turtles Conservation Society (KTCS) chairwoman Francesca Winfield and local fishermen who are keen to save the turtle population and run their fishing business at a lesser cost with more efficient catch.

"We visited the NOAA National Marine Fisheries Service laboratory in Pascagoula and met with US fisheries experts. Currently US will not be importing prawns from countries who are not using the TED technology," said Wong.

Chiang, meanwhile, said that a TED sea trial will be carried out in Kudat where the Scuba Zoo, which is the Sabah-based National Geographic film crew, will be filming TED in action in the Kudat waters later this year.

"They said they are looking forward to filming underwater footage of the TED technology in action, in order to help Sabahan fishermen get maximum yield out of their catch," he said.

Pilcher, who helps governments around the world restore their turtle populations, believes that TED will help to protect the turtle populations and be more fuel economy for local fishermen and cause less destruction to the prawn catch.

"It is a winning combination of simple and easy-to-use technology," he said, adding that the large turtle population in Kudat would help put the district in the world map as many divers would fly in to see its rich marine life, thus boosting the tourism industry.

亞洲時報 www.asiatimes.com.my Asia Times 西海岸新聞版

左圖：馬來西亞海洋研究基金會總監，美國海洋資源保護專家及古達漁業公會成員在古達推介海龜環保儀器時合影。右圖：古達漁業公會秘書黃聖發市議員在交流會贈送紀念品予美國海洋資源保護專家時攝。

三美國海洋資深保護專家抵古達
向漁民推介海龜環保儀器

（本報古達記者廿五日訊）馬來西亞海洋研究基金會總監尼克拉斯博士于昨天率領三位來自美國的海洋資源保護專家前來古達推介海龜環保儀器，鼓勵古達漁民使用環保儀器保護海龜。

二〇一〇年二月廿六日（星期五） A31

該三位來自美國的海洋資源保護專家分別是波何曼，畝柯拉斯及占斯何干。

尼克拉斯博士等人抵步古達后，除了向漁民推介使用海龜環保儀器外，也受到古達漁業公會主席鄭必成，秘書黃聖發，理事鄭必全及古達世界野生動物保護基金會負責人熱忱設宴招待及交流。

據尼克拉斯博士說，海龜是海洋中一種重要的動物，它的生存與海洋生物，魚蝦息息相關。它經常會被漁夫拖魚蝦的網致死，使到海龜愈來愈少。

他說，為了保護海龜及提高海龜生存率，馬來西亞海洋研究基金會特來古達推介海龜環保儀器，讓古達漁民使用環保儀器保護海龜。

他說，海龜一旦落入捕魚蝦的網中，它因呼吸困難，四小時后便會死亡。若此種情況持續下去，海龜遲早會面臨絕種。

他又說，漁夫使用海龜環保儀器，好處多多。即可保護漁穫，節省燃油又可減少補網損失與避免麻煩。

尼克拉斯博士說，我國出產的魚蝦目前因受各種因素影響導致輸往歐洲國家銷售面對困難。如果出口商要將魚蝦轉銷往美國的話，美國則僅收購使用海龜環保儀器捕捉的魚蝦。

他說，將來如果我國政府若硬性規定漁夫需使用海龜環保儀器的話，那麼使用海龜環保儀器作業者，有助辦理更新漁業執照手續。

他又說，他目前不知道我國政府何時會硬性規定漁夫使用海龜環保儀器作業。

他說，目前該海龜環保儀器是免費供給漁夫使用的，一旦政府硬性規定要漁夫使用海龜環保儀器時，那麼漁夫必須自掏腰包購買之。

尼克拉斯博士助理蕭甜蜜說，該海洋研究基金會目前在古達推介海龜環保儀器是試驗性的，並未強迫漁民使用。

黃聖發表示，對馬來西亞海洋研究基金會總監前來古達推介海龜環保儀器，惠益古達漁民，至深感激。 (F/C)

The Director of the Marine Research Foundation, Dr Nicolas Pilcher invited three Americans of the marine conservation to promote TED and to encourage local fishers to use TED for the conservation of sea turtles. The three Americans are named James Hogan, Bob Hoffman, and Nick Hopkins. Besides promoting TED after arrival, Dr. Nicolas Pilcher and the rest also received a warmth welcome from the Director of the Kudat Fishery Association Cheng Bi Cheng, Secretary Johnny Wong Sheng Fa and ExCo member Mr. Cheng Bi Quan, as well as Kudat WWF personnel. Dr. Nicolas Pilcher said, sea turtles play an integral role in the marine ecosystem. Its existence with other marine life, fishes and prawns is closely related. Turtles are often caught accidentally in fishing nets, which result in decrease of turtle population. In order to increase the viability of turtle populations, the Marine Research Foundation came to Kudat to promote the device and to provide free trials of the TED usage for fishers in order to protect turtles. He also added, a turtle will have difficulty in breathing once it is accidentally caught in the net and it will suffer from suffocation and death within four hours. Turtles will face extinction if such practise continues. He also mentioned that there are many benefits of using TED. Other than saving turtles, it helps to reduce diesel consumption, improve quality of fish catch, and prevent hassle of net mending for the fishermen. Currently, the national export of shrimp products has difficulties exporting to European countries due to several factors. If the locals wish to export its shrimp products to the States, they will have to use the device because only fishery products harvested by boats equipped with TEDs will be imported to the States. He mentioned that TED users will have less difficulty renewing their fishing licenses when the government finally decides to make TED compulsory in the future. Currently, it is unsure exactly when the government will make this compulsory. He added that the device is currently given to the locals for 'free' and fishers would have to purchase by themselves when TED is made compulsory in the future.

Dr. Pilcher's assistant Melanie mentioned that Marine Research Foundation was here with the intention to run experimental trials for TED but not to force fishers in using the device. Mr. Wong expressed his gratitude to the Marine Research Foundation for promoting the device, and also on the behalf of Kudat fishers that everything is much appreciated.

Many sea turtles perish due to fishing: Study

Dr Pilcher

Barnard Yaang

KOTA KINABALU: Hundreds of turtles are lost to fishing in Sabah every year with shrimp trawling identified as among the world's leading causes of sea turtle declines.

Non-governmental organisation Marine Research Foundation (MRF) revealed this in a study that indicated many turtles perished mainly due to fisheries activities.

Its Executive Director, Dr Nicolas J. Pilcher, said the turtles are integral components of the marine ecosystems and provide valuable eco-tourism related services to the tune of millions of US dollars while supporting cultural and traditional values.

"The turtles also possess, through their charismatic qualities, an ambassadorial value to wider conservation issues," he said during a Seminar on Promoting Turtle Excluder Devices (TEDs), here.

He said while the ongoing protection of critical nesting beaches, such as through the work of Sabah Parks, is an important necessity, these efforts will be doomed unless adequate and complementary protection is afforded during their at-sea periods, which account for over 99.9 per cent of their lifetime.

The MRF, he said, believes that the reduction of by-catch of marine turtles is a critical step to ensuring the survival of marine turtles in Sabah waters and beyond.

He said the foundation is introducing local fishermen to the TEDs, which are simply devices that fit in the narrow ueck of trawl nets and help eliminate unwanted by-catch such as endangered sea turtles, along with all kinds of debris.

"They also help reduce fuel costs, increase product value and reduce net down-time, all of which increase fishery efficiency," he said.

The TEDs, Dr Pilcher said, save sea turtles, an icon of Malaysian seas and protected throughout their range.

While the TEDs may have many advantages, he said fishermen are wary of using them as they require a large exit trapdoor in the net to allow the turtles and debris to escape.

He said that despite the opening being covered by a self-closing netting flap, fishermen are concerned their target catch would also be lost through the net opening.

"Through preliminary trials in Sabah, we found that the TEDs did result in small catch declines, in the region of two and three per cent, which needs to be recovered if the fishermen were to continue using the devices," he said.

Because of this, he said the MRF is concerned with regards to the livelihood of the thousands of fishermen who ply their trade in Sabah waters.

Thus, he said the primary goals of the project are to improve fishermen's livelihoods and build the capacity of the local fishing communities.

He said this would enable them to undertake much more sustainable fishing efforts, especially among the local communities operating out of Kudat and Sandakan and at the same time reduce the loss of marine biodiversity, especially the green turtle Chelonia mydas, listed as endangered by the IUCN Red List.

Dr Pilcher said the project now builds on the results of Phase I (2007-2008) that was implemented in Sandakan, with the intention of expanding the project in Kudat and continuing with trials in Sandakan and reinforcement of lessons learnt. The project, he said, would involve the Federal Department of Fisheries so that the lessons learnt can be applied on a more comprehensive basis nationwide.

Phase II of the project, he said, will also benefit from the recent production of an educational video in July 2009 on how the TEDs work underwater in Sabah.

According to him, the project was developed in partnership with the Sabah Fisheries Department.

"It provides the data upon which the Government can base further fishery practice controls to conserve marine turtles, be it through the use of excluder devices, or possibly seasonal and or temporal closure," he said.

He said work on the TEDs has been ongoing for more than two years through a joint project between the MRF and Fisheries Departmeut primarily dealing with awareness and pilot trials.

It is funded by the Global Environmeut Facility-Small Grants Programme (GEF/SGP) Malaysia and last year by Conservation International (CI)-Philippines, he said.

Initially, he said the Sabah TEDs started off as a simple trial programme at a fishing port in Sandakan and later expanded to a second major fishing port in Kudat.

The two ports, he said, have more than 1,500 fishing boats.

"The programme has also up-scaled to the Federal Department Fisheries in which MRF has been requested to assist with the Peninsular Malaysia TEDs programmes while offering its continued support to the on-going initiatives in Sabah," he said.

Dr Pilcher said the CI-Philippines sponsored site visit to the US National Marine Fisheries Service in Pascagoula in Mississippi provided them with information on the values of TED use and historical stumbling blocks that were overcome in a TED-compliant fishery.

These valuable lessons, he said, were brought back and introduced to Sabah.

As an incentive to fish more sustainably and save sea turtles at the same time, he said the MRF brokered a partnership between local hotels and committed fishing companies.

The hotels, he said, agreed to purchase shrimp from TED-equipped boats at a premium price and help cover any losses TEDs may induce.

"The demand from just two hotels is substantial, and represents a substantial proportion of the company's total monthly catch," he said. He said the hotels benefit by meeting, among others, their ISO certification requirements (which call for purchases from sustainable sources), building on their corporate and social commitments to the environment and enhancing customer satisfaction.

"The company enjoys a no-nett loss relationship through the adoption of TEDs while the environment benefits substantially," he said.

By brokering the partnership between supplier and purchaser at a premium level, he said the MRF is helping to meet by-catch reduction goals while not impacting on local livelihoods of fishermen and at the same time promoting industry buy-in for endangered specie conservation.

Knowledge about needs of fishermen vital to save turtles — researcher

By Gordon Chin

KOTA KINABALU: Knowing the needs of fishermen and key players in the fishery industry is key towards moving forward, said Marine Research Foundation (MRF) executive director Dr Nicolas J Pilcher.

He said that knowing what the industry really needed will help MRF and the Department of Fisheries to plan out future actions to promote turtle excluder devices (TEDs) in Sabah shrimp fisheries.

"I have a few things in mind on what should be done next, but that would not necessarily work in Sabah. So we want to know what the local fishermen or people who work with fishermen think and want," he said when met by The Borneo Post during the "Promoting Turtle Excluder Devices (TEDs) in Sabah Shrimp Fisheries: Linking Environmental Protection with Sustainable Fisheries Seminar," held here yesterday.

"The people attending this seminar are the very people who know best about issues faced by them in Sabah.

"Therefore, during the second part of this seminar in the afternoon, we want to gather as much feedback and information as possible from these people so that MRF and the Fisheries Department would know which direction to head in the future," he said.

Earlier during the morning session of the seminar, the participants were introduced to the TEDs system, a grid device which acts as a filtration system trawl for fisheries to make sure turtles and sea debris do not get caught.

The participants were also exposed to how TEDs works, its benefits, and how it can be widely used in Sabah's fishery industry based on various small pilot projects conducted in Sandakan and Kudat.

"Now that they know what is going on, we want to know what they think would work for them rather than having only one person on stage talking to them what work where, when, and what to do," said Pilcher.

After gaining and processing the feedback from the participants, Pilcher hoped that both MRF and the Fisheries Department can base future fishery controls practice to conserve marine turtles.

"This can be done through the use of excluder devices (TEDs) or possible seasonal and/or temporal closures," he added.

The Sabah TEDs project started off as a simple trial program at a fishing port in Sandakan and has expanded to a second major port, Kudat, and combined these ports to represent over 1,500 boats of the fishery.

At the same time the program has upscaled to the Federal Department of Fisheries, where the Department is now asking MRF to help with Peninsular Malaysia TEDs programs, and has offered its continued support to the ongoing initiatives in Sabah.

A recent increased exposure to the process, through direct fisherman-to-fisherman interactions during a CI-Philippines-sponsored site visit to the US National Marine Fisheries Service in Pascagoula, Mississippi, provide a far greater recognition of the values of TEDs.

As an incentive to fish more sustainable sea turtles and save them, MRF brokered a partnership between local hotels and the committed fishing companies.

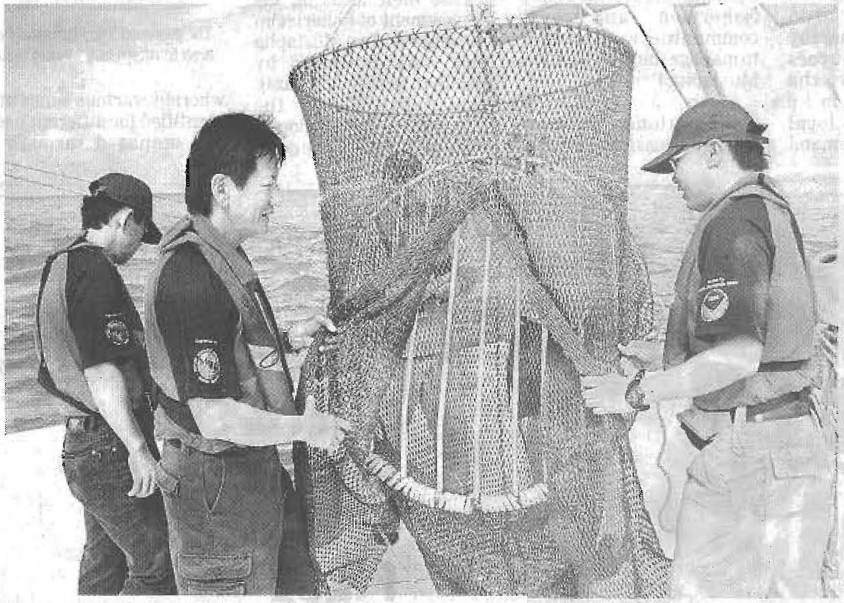
The hotels agreed to purchase shrimp from TED-equipped boats at a premium price and help cover any losses TEDs may include.

Use Turtle Excluder Devices, fishermen told

By Chok Sim Yee

Pilcher

Rayner



A trawl net equipped with TED being used in the pilot project.

A model of the TED exhibited at the seminar.

KOTA KINABALU: The Sabah Fisheries Department could take the next step by enforcing Turtle Excluder Devices (TEDs) on trawl nets if few fishing operators volunteered, said its director, Rayner Stuel Galid.

Rayner said the department was undertaking efforts to attract more fishermen to fit TEDs into their nets but currently the move was purely voluntary.

TEDs are grid devices that fit in the narrow neck of trawl nets to eliminate unwanted by-catch such as sea turtles and debris. With TEDs, turtles and debris going into the net, are able to exit through a trapdoor in the net.

"Our long-term goal is to ask the fishermen to join, but if we can't get there, the next step may be to enforce through legislation, that those who don't fit the TEDs will not go against the conditions in their licence."

Asked what was being done to turtles that were trapped in trawl nets not fitted with TEDs, Rayner said most fishermen would return the turtles back to the sea.

"But if the turtles were trapped in the net early on, and the net was towed for up to four hours, the turtles will drown," he said.

Rayner pointed out that the major hindrance to the TEDs was not because of the cost. A TED can cost up to RM 500, but the perception of fishermen.

Many assume that the trapdoor, located at the side of the TEDs, would allow their catch to escape.

Currently the pilot project involved four companies in Sabah, two based in Sandakan and two in Kudat.

Marine Research Foundation executive director Dr Nicolas J. Pilcher said hundreds of turtles were lost to fisheries in Sabah each year.

With TEDs, not only sea turtles could escape from the trapdoor, but also trash such as logs, tyres and other debris.

"TEDs have the advantage of reducing fuel costs, increasing product value and reducing net down-time, all increasing fishing efficiency."

Agreeing with Rayner, Pilcher said many fishermen were wary of using TEDs as they were concerned that they would lose their catch through the self-closing netting flaps.

"Through preliminary trials in Sabah, we found that the TEDs did result in small catch declines, in the region of two to three per cent, which needs to be recovered if the fishermen were to continue using the devices."

Apart from partnering with Sabah Department of Fisheries in the project, MRF also enlisted local hotels to purchase shrimp from the TED-equipped boats at premium price to help cover the losses TEDs may induce.

Pilcher said he was also working with the government to convince the need to amend legislation.

"In Malaysia, there was only one Act for fisheries at the Federal level. So amendment to the Act has to happen at the highest level," he said.

He added that TEDs are now compulsory in Central and South America, Africa, Thailand and Pakistan.

被列瀕臨絕種生物

捕蝦拖網漁業已被鑑定 全球海龜銳減主要導因

圖：海洋研究基金會執行董事尼古拉斯畢哲爾博士。

海龜的存續。

在一九七三年，海龜被認為是直接或間接受到貿易影響而有絕種危險的物種，因而被華盛頓公約中的瀕臨絕種野生動植物國際貿易公約列為最高級別的瀕臨絕種之生物。從此，非法物種貿易被有效且嚴格的控制，然而海龜的數量仍然持續減少，於是各界將問題焦點移至因使用拖網捕蝦而造成誤殺海龜的漁業技術層面上。

海龜基於的生物特性，需要經常浮到海面換氣，若不慎被誤捕，會因為在水中滯留時間過長而死亡。根據世界野生動物基金預估，每年有超過逾十二萬五千隻海龜喪生於捕蝦網中，如果國際間不採取一定的補救措施，則海龜有滅種之危機。在此背景下，美國為保護海龜物種的存續，於一九七三年立法通過「瀕危物種法案」，規定在未取得美國商務部部長或內政部部長許可之前，禁止在美國所轄海域及公海從事捕獲海龜之行為，並將一切佔有、加工以及因被蝦網誤捕或誤殺而加害於海龜的行為視為非法行為。

斯約翰(右)與執法人
本報吳健強攝)

於一九八七年，為防止美國海域的五種海龜遭受捕捉或侵害，美國發佈規定，規範其領海中從事捕蝦活動者，必須加裝「海龜逃脫器」(turtle excluder device, TED)，協助海龜順著網內導引動線逃脫；或限制拖網時間少於九十分鐘，避免海龜窒息死亡。

海龜脫逃器是一種可以裝置在拖網端或後端開口，狀如烤架的金屬環，蝦只過環入網，而海龜則觸環後從開口逃脫，既不影響漁獲又保護海龜，可謂一兼二顧。

除了海龜之外，裝置海龜逃脫器也隔開海中雜物，從而減少拖網船的耗油量，上網的漁獲更新鮮更有價值，也縮短下網時間，提高捕魚效益。

無論如何，海洋研究基金會執行董事尼古拉斯畢哲爾博士於二零零七年向蝦產最豐富的山打根一帶拖網漁民介紹海龜逃脫器時受到排斥，因為本地拖網漁民擔心入網的蝦只從開口脫逃導致漁獲減少。

在州漁業局和幾位本地拖網漁民的合作下，尼古拉斯博士於二零零七年至二零零八年在山打根展開試驗，並不斷從經驗中學習和加以改良，直至證明了漁獲祇減少二到三巴仙為止。

如今範圍已擴大至聯邦漁業局的參與以便更全面推廣至全國各地。

次期計劃將延伸到古達，他們去年七月下水拍攝海龜逃脫器操作情形的錄影片段對次期計劃相當有用。超過一千五百艘船在山打根和古達運作。

尼古拉斯博士說，該基金會關心的是本州數以千計漁民的生計，推出海龜驅逐器無非是鼓勵本地漁民，尤其在古達和山打根的漁民採用永續性捕魚，以及減少海洋生態的流失，尤其是綠龜。

為鼓勵永續性捕魚和保護海龜，該基金會與本地酒店和漁船公司合作，有關酒店願意出較高價向採用海龜逃脫器的漁船採購蝦隻，雖然祇獲二家酒店支持，但需求量龐大，漁船公司也賺了不少，而酒店方面因為向永續性來源採購，滿合了ISO品管證書的條件，抬高酒店聲望。(K)

圖：沙巴漁民局總監雷納爾史迪沃。

圖：拖網漁民蔡耀清。

【亞庇廿八日訊】為配合沙巴進步黨十一月五日至七日舉行的黨大會，彼等將在十一月一日起在州內道路豎立黨旗，向全沙人民宣告沙巴進步黨正是「候任政府」！

該黨主席拿督楊德利日前出席進步黨利亞灣、冰谷、蘇克、擔布南聯委會聯合常年大會時，向出席的內陸區黨要黨員加強彼此聯繫，確保大家凝聚力量在來屆大選攜手達致目標。

莫諾指本州歷屆政府沙統、人民黨及團結黨輪掉政權都是因為黨內分裂不和以及民心求變所造成，他相信來臨的第十三

進步虎視

年出席沙巴進步黨的活動以及參與丹南、納巴灣及根地咬的常年大會。認為沙巴進步黨將多元種族黨員團結起來將會見到該黨在來屆大選中取得勝利。

莫諾也挑戰沙巴團結黨黨魁丹斯里佐瑟百林吉丁岸、民統黨黨魁丹斯里班納東博、以及沙巴人民團結黨黨魁丹斯里佐瑟古祿若真的關心與愛

創刊七十四年 260 號 OVERSEAS CHINESE DAILY
華僑日報 沙州新聞

海龜

圖：昨日在研討會上展出的海龜逃脫器

【亞庇廿八日訊】捕蝦拖網漁業已被鑑定為全球海龜數量銳減的主要導因，海洋研究基金會最近展開的一項研究顯示，本州每年有數百隻海龜因捕魚活動而喪命。

雖然相關各造，譬如沙巴公園持續不斷保護沙灘讓海龜孵育是必要的，但是，若未能「在海之中」提供充足的補助也是徒然的，畢竟海龜的九十九巴仙生命是在海裡度過。

海洋研究基金會相信避免海龜被拖上岸乃確保本州海龜存活的關鑑性步伐。

海龜的一生遷徙於產卵和築巢的地方，是一種古老又珍貴的遷徙性海洋生物。目前世界上公認有七種海龜生存在各大洋中。由於人類海上及沿岸活動的頻繁，已經嚴重威脅到

尼古拉斯

所有拖網漁船 經二年試驗 採用海龜逃脫器

【亞庇廿八日訊】海洋研究基金會執行董事尼古拉斯畢哲爾博士希望政府立法規定所有拖網漁船必須採用海龜逃脫器。

表示自己在過去二年來與本地漁民合作在山打根和古達試驗性採用海龜逃脫器已證明行得通，尼古拉斯博士在州漁業局的合作下，正積極向內亞和印度等好幾個國家展開物種保育使命，二零零七年來到山打根向漁民推廣海龜逃脫器。

他說，最困難的是糾正漁民的觀念，因為漁民不希望有漏網之魚的心理是可以理解的，他們擔心採用海龜逃脫器之後，魚蝦會隨出口逃走。

他說：「開始時的設計的確有問題，

http://www.malaysiakini.com/news/144929

Sabah embarks on plans to save turtles

Joe Fernandez
Oct 10, 10
7:16pm

TEXT SIZE 1 2 3

The Sabah Fisheries Department (SFD) or Jabatan Perikanan Sabah plans to make it mandatory for all fishing vessels in the state to install turtle excluder devices (Ted) on trawl nets.

The mandatory ruling would follow if less than a satisfactory number of fishing operators volunteer to install the devices on their own accord.

This is the stark warning from SFD director Rayner Stuel Galid after assessing preliminary results from an ongoing pilot study on usage of Ted in Sabah waters.

The assessment was done jointly with Marine Research

Foundation (MRF) executive director Nicolas J Pilcher.

The MRF is an international NGO based in Kota Kinabalu.

The pilot study involves four fishing companies, two each in Kudat and Tawau. The two ports have an estimated 1,500 fighting boats between them. This is the second such study, the first being conducted in Sandakan from 2007 until the end of 2008.

"At the moment, we prefer to make usage of Teds voluntary but the long term goal is legislation to enforce in the licensing conditions," said Galid. "The major hindrance is not the cost which is only RM500 per device but the perception among fishermen."

The fishermen assumed, according to Galid, that the trapdoor located at the side of the nets would allow the fish to escape as well besides the turtles.

Many fishermen were apparently concerned that their catch would escape through the self-closing netting flaps and hence were wary of using the Teds. The preliminary trails did find that Teds resulted in smaller catches but by only two to three percent.

But apparently this was sufficient to deter usage.

As an incentive for fishermen using the Teds, the SFD is partnering the MRF in getting local hotels to purchase shrimp from Ted-equipped boats at premium price to cover any losses that Teds usage may induce.

Increasing fishing efficiency

On the plus side, Teds have the advantage of reducing fuel costs, increasing product value, reducing net down-time and increasing fishing efficiency.

Teds are grid devices that fit in the narrow neck of trawl nets to eliminate unwanted by-catch. With Teds, turtles and debris going into the net are able to exit through the trapdoor. Debris often includes logs and old tyres, among others.

"Most fishermen who have not fitted Teds in their trawl nets would return the turtles back to the sea," conceded Galid. "But if the turtles were trapped in the net early on, and the net was towed for up to four hours, the turtles will drown."

To help the fishermen come around voluntarily to the idea of using Teds, the SFD has produced an educational video in partnership with the MRF.

The production of the video had additional input from a site visit sponsored by Conservation International-Philippines to the US National Marine Fisheries Service in Pascagoula in the Mississippi.

The video shows how the Teds work underwater and how historical stumbling blocks were overcome in a Ted-compliant fishery.

Amend legislation

Pilcher agrees with Galid that many fishermen are wary of using the Teds. The MRF, he disclosed, was working with the federal government to convince them of the need to amend the appropriate legislation and make Ted usage mandatory.

"In Malaysia, there was only one Act for fisheries at the Federal level," said Pilcher. "So, amendment to the act has to happen at the highest level."

The MRF, stressed Pilcher, was concerned about reducing the loss of marine biodiversity, especially the green turtle - Chelonia mydas - listed as endangered on the **International Union for Conservation of Nature** (IUCN) Red List.

The usage of the Teds in Sabah is being promoted after a MRF study revealed that hundreds of turtles are lost to fishing in Sabah every year with shrimp trawling identified as among the leading causes of sea turtle declines.

Turtles, at the same time, are integral components of marine eco-systems and provide valuable eco-tourism related services to the tune of millions of ringgit while supporting cultural and traditional values.

The study found that while the ongoing protection of critical nesting beaches is an important measure, such efforts by Sabah Parks will be doomed unless adequate and complementary protection is afforded during the at-sea periods which account for over 99.9 per cent of a turtle's lifetime.

"The reduction of by-catch like marine turtles is a critical step to ensuring their survival in Sabah waters and beyond," notes the MRF study.

Teds are already compulsory in Central and South America, Africa, Thailand and Pakistan.

Aktiviti tangkap ikan punca bilangan penyu susut

Barnard Yaang

KOTA KINABALU: Ratusan penyu hilang disebabkan aktiviti penangkapan ikan di Sabah setiap tahun dengan pukat udang dikenal pasti sebagai antara punca utama penurunan jumlah hidupan laut itu.

Pertubuhan bukan Kerajaan, Yayasan Penyelidikan Marin (MRF), mendedahkan perkara itu dalam kajian mereka yang menunjukkan banyak penyu lenyap disebabkan aktiviti menangkap ikan.

Pengarah eksekutifnya, Dr Nicolas J. Pilcher berkata, penyu merupakan komponen penting dalam ekosistem marin dan memberikan khidmat berkaitan ekopelancongan yang amat berharga kepada sekitar berjuta-juta dolar Amerika sambil menyokong nilai-nilai budaya dan tradisional.

"Penyu melalui kualiti karismatik mereka, juga memiliki nilai kedutaan kepada isu-isu pemuliharaan yang lebih luas," katanya semasa Seminar Promoting Turtle Excluder Devices (TEDs) di Beverly Hotel apada Selasa.

Katanya, walaupun langkah melindungi pantai-pantai tempat penyu bertelur, seperti apa yang dilakukan Taman-Taman Sabah merupakan keperluan yang amat penting, namun segala usaha itu akan menjadi sia-sia sekiranya perlindungan mencukupi dan saling melengkapi tidak diambil sepanjang tempoh hidupan itu berada di laut, yang meliputi 99.9 peratus daripada hayat mereka.

Katanya, MRF percaya usaha mengurangkan jumlah kehilangan penyu disebabkan penangkapan ikan adalah langkah kritikal untuk memastikan kewujudan penyu marin di perairan Sabah dan juga sekitarnya.

Katanya, yayasan itu memperkenalkan TED kepada nelayan, iaitu sejenis alat yang dipasang pada pukat dan membantu menghalang tangkapan lain yang tidak dikehendaki seperti penyu yang dilindungi, termasuk juga pelbagai jenis sampah, daripada melekat pada jaring.

"Alat itu juga membantu mengurangkan kos minyak, meningkatkan nilai produk dan mempercepatkan kerja menurunkan pukat, semuanya meningkatkan kecekapan menangkap ikan," katanya.

Dr Pilcher berkata, penggunaan TED boleh menyelamatkan penyu, yang menjadi ikon laut Malaysia.

Walaupun TED mempunyai banyak kelebihan, nelayan teragak-agak untuk mengunakannya kerana ia memerlukan lubang keluar perangkap yang agak besar pada pukat untuk membolehkan penyu dan sampah-sarap itu terbolos keluar, katanya.

Katanya, walaupun lubang itu diangkapi dengan jaring yang boleh tertutup sendiri, nelayan bimbang sasaran tangkapan mereka turut keluar semasa jaring terbuka.

"Melalui ujian awal di Sabah, kami dapati TED memang menyebabkan tangkapan sedikit berkurangan, sekitar dua dan tiga peratus, yang perlu ditangkap semula sekiranya nelayan terus menggunakan alat itu," katanya.

Atas sebab itu, katanya, MRF prihatin terhadap kehidupan beribu-ribu nelayan yang menyara hidup di perairan Sabah.

Dengan itu, katanya, matlamat utama projek itu adalah untuk menambahbaik kehidupan nelayan dan membina keupayaan masyarakat nelayan tempatan.

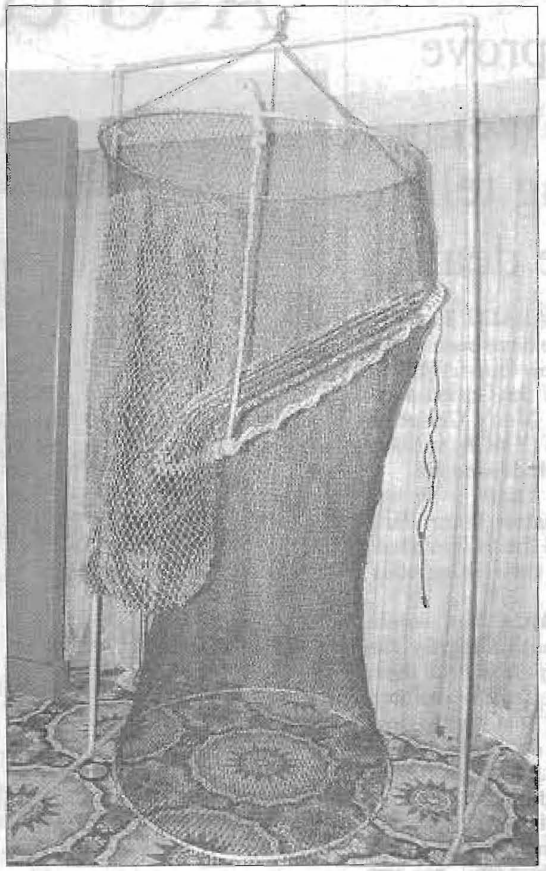
Katanya, ini akan membolehkan mereka mengendalikan usaha penangkapan ikan yang lebih mapan terutamanya dalam kalangan masyarakat tempatan yang beroperasi di Kudat dan Sandakan serta pada masa yang sama mengurangkan kepupusan kepelbagaian hayat laut, terutamanya penyu hijau, Chelonia mydas, yang disenarai sebagai spesies dilindungi dalam Senarai Merah IUCN.

Dr Pilcher berkata, projek itu sekarang ini dilaksanakan susulan hasil Fasa 1 (2007-2008) yang dilaksanakan di Sandakan, dengan hasrat memperluaskannya ke Kudat dan meneruskan ujian di Sandakan untuk tujuan penambahbaikan.

Projek itu, katanya, melibatkan Jabatan Perikanan Persekutuan supaya pengajaran yang diperoleh boleh digunakan secara lebih meluas di seluruh negara.

Fasa II projek itu, katanya, juga mendapat faedah daripada pengeluaran video berbentuk pendidikan yang dikeluarkan pada Julai 2009 tentang bagaimana TED beroperasi di dasar laut Sabah.

Menurut beliau, projek itu dilaksanakan secara perkongsian dengan Jabatan Perikanan Sabah.



An actual replica of the fishing net using TED system.

Dept's long-term plan to introduce TED to trawler fishermen

Barnard Yaang

KOTA KINABALU: The Fisheries Department may consider providing subsidies to fishermen in Sabah if more want to use the Turtle Excluder Device (TED) in an effort to further protect the endangered species.

Its Director, Rayner Stuel Galid, said the TED steel frame cover costs between RM400 and RM500 to be fitted to the fishing net.

However, he said cost is not the factor that hinders the promotion of the TED.

"It is the catch that concerns the fishermen because some of it may be released back into the marine environment when the turtles make their exit," he told reporters after officiating at the Seminar on Promoting Turtle Excluder Devices at Beverly Hotel, here, Tuesday.

Nevertheless, he said it is the department's long-term plan to introduce the TED to trawler fishermen in Sabah as a legal requirement similar to what other countries are practising.

However, because there is no existing enactment to compel the fishermen to use the TED, the department has not been able to force them to use the system on their boats.

So far, he said there are four fishing companies, two in Sandakan and two in Kudat, involving eight vessels that have applied the TED voluntarily.

He said the department is actually in its initial stage to re-introduce the TED since its introduction to Sabah about 12 years ago.

The previous attempt to establish TED among fishing companies here, he said, was not successful due to several impediments.

"But we are re-introducing it because its design compared to previously is different," he said.

He said the present TEDs were more effective in protecting the sea turtles and the fishermen's catch.

Nevertheless, Rayner said the TED projects were facing an uphill battle because the fishermen are concerned they might lose some of their catch.

However, he said the Fisheries Department firmly believes that it would rise above it with the assistance from MRF in terms of its technical support, including the legal framework of the department and the Fisheries Act.

He said the department aspires to work in harmony with all concerned parties, namely the fishermen, fisheries officers, government officials and NGOs, among others.

"We want this to be a true partnership and to make sure TED programmes would not disadvantage the fishermen.

"We are also committed to accomplish this until the TEDs are required by law to safeguard the fragile seas," he said.

On sea turtles' mortality rate, he said the surveys conducted by the Fisheries Department showed many of those that were accidentally netted by fishermen drowned.

Executive Director of Marine Research Foundation (MRF), Dr Nicolas J. Pilcher, said sea turtles need to resurface regularly for air.

However, Rayner said because the fishing nets were only hauled in after three or four hours, most of the turtles perished.

On other developments, he said they need to look at sustainable fishery options that protect both the livelihoods of fishermen and the fragile marine ecosystems.

To this, he said Sabah is a member of the tri-national Sulu Sulawesi Marine Ecoregion (SSME) programme and also the greater Coral Triangle Initiative (CTI).

He said through both agreements, they are committed to protect the marine resources, namely the target catches of fishermen – fish and shrimp and non-target catches such as endangered species.

Rayner said marine fisheries are a way of life for many Sabahans. He said it is how fishing communities throughout the State earn a living and also what many downstream industries are based on, from ice factories to market resellers, transport agencies and processing plants.

In short, he said many people's lives are tied to the fragility of the marine landscapes.

"Bnt it is not just these direct use type of linkages that are important to us. A loss in health of the oceans through pollution for instance can mean a loss of income to the fishermen," he said.

He said a loss in ocean productivity such as when habitats do not support reproduction of the target catches, can also reduce incomes.

Hence, the introduction of the TED, he said.