

- ◆ Formation of turtle clubs at village level
- ◆ Awareness among fisher children regarding conservation can be initiated at school level onwards by arranging competitions like debate, painting and poster making.

After the workshop was completed, the enthusiasm it generated among the public has influenced the Fisheries Department to take up more demonstration programmes in various coastal districts to educate the fishers about the use of TEDs in their trawls.

Interactions with trawl operators

The demonstrations and workshops helped to convince the fishers to some extent that the TED is no longer a bane to them and instead may be a boon to sea turtle conservation. Some of the fishermen suggested that there should be some refinements in the TED. Some of the suggestions were that:

- ◆ The space between spokes may be increased
- ◆ Weight of the TED may be reduced

The SIFT, Kakinada has been in touch with the concerned organisations, in particular CIFT, Kochi, to attend to these issues.

TED Demonstration Centre

A TED Demonstration cum Information Centre was established in SIFT, Kakinada where the fishers, public and officers of various allied departments will be constantly motivated on the need to protect marine turtles. Hand-outs were prepared and distributed on various occasions like awareness programmes, and other local events in coastal villages. Posters highlighting the urgency to save turtles were affixed in villages at important places and at fishing harbours and made available to all. Youth fishers undergoing a one year training programme at SIFT were also educated and trained on the use of TED during their fishing trips. We plan to conduct awareness camps during pre-nesting periods in all coastal villages with audio-visual aids and results of last year's data. Furthermore, demos at all important mechanized landing centres to create awareness on the use of TED are also planned. Apart from this, we propose to conduct refresher training programmes at SIFT for all coastal fisheries staff. Thus the Department of Fisheries is taking all necessary measures to safeguard the marine turtles of Andhra Pradesh, in collaboration with the Wildlife Institute of India

CIFT – TED: Construction, Installation and Operation

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Due to harvesting of sea turtles and their eggs and their accidental mortality associated with shrimp trawling and other fishing operations, turtles have been threatened with extinction in all parts of the world. The incidental catch of marine turtles is reported to occur particularly along the east coast of India. Researchers have developed a Turtle Excluder Device (TED) that greatly reduces incidental death of sea turtles in shrimp nets. TEDs were introduced in US shrimp trawling operations in 1980s. A TED is a frame consisting of a grid of bars installed before the cod end of the trawl net at an angle leading upward and downward to an escape slit. Small animals such as shrimp, slip through the bars

and are retained in the cod end, while large animals, such as turtles, large fishes and large elasmobranchs are stopped by the grid bars and can escape through the opening. Experience has shown that the use of TEDs when combined with other elements of an integrated turtle conservation, can stop the decline in sea turtle population and will, over a period of time, lead to their recovery.

Shrimp is the major foreign exchange earner contributing to over 70% of the marine products export earnings. Shrimp trawling is currently the most valuable fishing system in India, in terms of the export earnings and domestic supply for fish.

Concerns expressed by trawler fishermen over the lessening quantity of shrimp and fish by-catch owing to the installation of TEDs have to be taken into consideration. Standardization of TEDs for regional bottom trawling operations has to take place before regulations in terms of its mandatory use, can be brought into operation. Trade barriers by the environmentally conscious importing nations of Indian shrimp are still a perceived threat, unless regulatory measures are taken up.

Construction and Installation of CIFT-TED

Construction of the Frame: An oval frame measuring 1000 × 800 mm is constructed of 10 mm diameter stainless steel rod. Five vertical grid bars of 8 mm diameter stainless steel rod are welded to the inside of frame. The spacing between deflector bars is 142 mm and the maximum spacing between the frame and the adjacent deflector bar is 86 mm.

Construction of TED extension: The TED extension is constructed of a single piece of polyethylene netting of 40 mm stretched mesh size and 1.5 mm diameter twine of size 150 × 60 meshes. The 60 mesh sides of the netting piece are sewn together to construct a cylinder.

Construction of hoop: A single hoop having a diameter of 900 mm is constructed of 8 mm stainless rod, for attachment to the leading edge of the TED extension.

Fixing the grid at the correct angle: The hoop may be laced to the TED extension leaving 5 meshes from the leading edge. For ease of installation, another hoop could be attached to the other end of the extension. The TED frame may be slid into the extension. Using the hoops, the extension tube may be stretched so that it is taut. The TED extension may be so positioned that the extension seam is at the bottom. Starting from the rear edge of the extension, 36 meshes forward from the rear edge of extension along the seam may be counted followed by counting of 75 meshes perpendicular to the seam to arrive at the top centre attachment point. Later, the TED frame may be attached to the extension netting. The sides of the secured TED frame may then be sewn to the extension netting. The grid angle should be between 40° to 55° from the horizontal for proper operation.

Cutting the exit hole: The mesh cut may be initiated in front of the top centre of the TED frame and continued along the frame maintaining mesh distance from the frame to either side until the first and fifth grid bars are reached. The distance between the first and fifth grid bars is 620 mm. 19 meshes may be turned and cut forward on either side. They may be turned again and cut to obtain a rectangular opening of 40 × 19 meshes in the extension.

Construction and attachment of exit hole cover (flap): The exit hole cover is made of a single piece of depth stretched and heat set polyethylene netting of 90 × 50 meshes, with 25 mm stretched mesh size and 1 mm diameter twine size. The centre mesh of 96-mesh edge of the flap may be attached to the centre mesh of forward edge of the exit hole opening and this may be continued to 45 meshes of the flap to 20 meshes of the opening on either side of the attachment point. Remaining meshes of the flap may be sewn to the extension meshes to provide strength and shape to the flap. Along the sides may be attached 30 meshes of the flap to 19 meshes of the extension ahead of the TED frame. Six meshes of the flap are attached to 4 meshes of the extension ahead of the TED frame. The remaining 14 meshes of the flap are to be left unattached.

Construction and installation of accelerator funnel: Two trapezoidal pieces of depth stretched and heat set polyethylene netting (25 mm stretched mesh size and 1.0 mm diameter twine size) with 75 meshes each in the leading edge may be cut; 30 and 42 meshes each in depth with a cutting rate of 1NIB resulting in 55 and 47 meshes, respectively, in the rear edge. The two pieces are sewn together along the tapered edges, beginning from the leading edges, to form the funnel. The funnel may be installed inside the extension, forward of TED frame with the longer half of the funnel positioned opposite to the exit hole. The funnel is sewn to the TED extension, immediately after the hoop, which is attached to the leading edge. 150 meshes of the funnel may be attached, mesh to mesh to the 150 meshes of the extension. The longer half of the funnel, may be secured at appropriate intervals, to the grid bars, a few centimetres from the bottom.

Attachment of floats: Two 150 mm hard plastic floats are to be attached to the outside of TED on the upper side, to the frame at the junction of outer grid

bars, and another float is to be attached to the top of the hoop for weight compensation and stability during operation.

Installation of TED in trawl: The complete TED is installed between cod end and hind belly extension of the trawl, with the exit hole facing upwards, by joining the edge meshes.

Operation and Maintenance

Before shooting the gear, the net should be inspected to ensure that the netting ahead of the TED is not twisted. The speed of vessel should be increased before deploying the otter boards, so that the TED extension will ride high in water and twists, if any, can be easily detected. If twists are present, they should be removed before deployment of the gear.

While hauling the gear, it is better to keep the vessel against the current or maintain low speed, in order to prevent the catch from being washed forward, to the exit hole. Once the otter boards are hauled up, the vessel should maintain speed and direction for a few

minutes so that all catch is washed past the TED, into the cod end. After each haul, the accumulated trash and debris that may clog the grid may be removed. Also, any gilled fish in the netting around the TED may be removed in order to permit good filtration.

It is important to check the grid angle on a regular basis, and make sure that it is between 40° to 55° from the horizontal. This can be done as follows:

- ◆ An even row of meshes around the trawl body located approximately 1 m forward of the TED frame may be gathered and tied tightly with a whip line;
- ◆ Using the whip line, the TED frame may be suspended freely, about 1 m off the deck, ensuring that there are no twists;
- ◆ The angle of the grid bar to the horizontal may be measured by using a carpenter's protractor, inserted through the exit hole.

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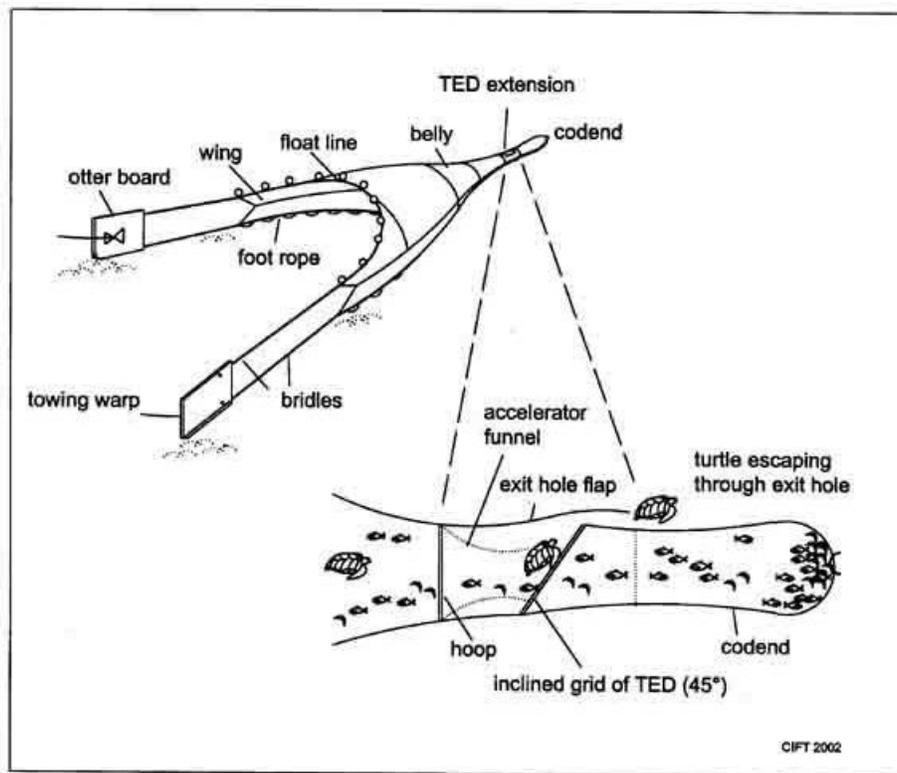


Fig 1. Principle of TED operation