Mukherjee, Z. & S. Segerson. 2001. Turtle Excluder Device regulation and shrimp harvest: The role of behavioral and market responses. Marine Resource Economics 26: 173–189.

National Research Council, 1990. The Decline of the Sea Turtles. Washington, D.C. National Academy of Science Press.

Renaud, M., G. Gitschlag, E. Klima, A. Shah, D. Koi & J. Nance. 1993. Loss of shrimp by turtle excluder devices (TEDs) in coastal waters of the United States, North Carolina to Texas, March 1988–March 1990. U.S. National Marine Fisheries Service Fishery Bulletin 91:129–137.

World Trade Organization 1998. United States– import prohibition of certain shrimp and shrimp products. Report of the Panel. WT/DS58/R, 15 May 1998 (98-1710). Rue de Lausanne 154, CH-1211, Geneva 21, Switzerland 426 pp.

World Trade Organization. 2001. United States– import prohibition of certain shrimp and shrimp products. Recourse to article 21.5 by Malaysia AB-200104. Report of the Panel. WT/DS58/RW, 15 June 2001 (01-2854). Rue de Lausanne 154, CH-1211, Geneva 21, Switzerland 108 pp.

DEMONSTRATION AND TRIALS OF CIFT- TURTLE EXCLUDER DEVICES (TEDS) IN TAMIL NADU

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INTRODUCTION

The south Indian coast is the migratory route for olive ridley turtles en route to their mass nesting habitats along the beaches of Odisha in north-east India. The breeding season for the olive ridley is between the months of December to April. Turtles migrate from their various feeding grounds, which may be spread across ocean boundaries, and congregate a few kilometers off-shore from their natal beaches for mating. The nesting females use the same off-shore habitat during the 11-15 day inter-nesting intervals between their 2-3 nesting events per season.

It is during this time that breeding turtles may be threatened by accidental interactions with commercial and artisanal fishers and their gear. A high number of dead and live stranded adult olive ridleys are recorded along the east coast between January and March each year. The number of strandings has increased during the past 5 years, which the cause of death believed to

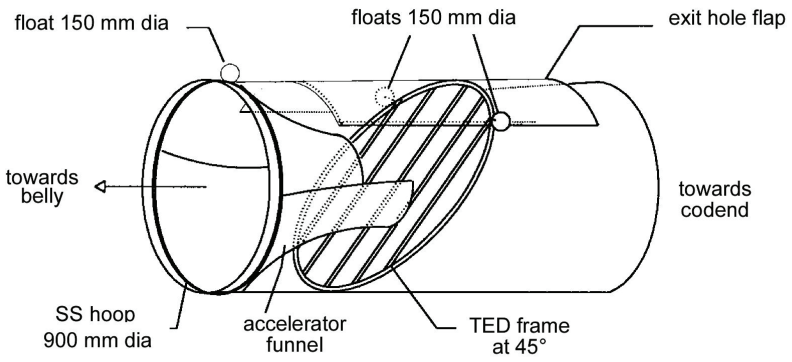

Figure 1. Design of a CIFT-TED.

be drowning in fishing gear. On 22nd February 2014 and 7th March 2014, there were two widely recorded mass strandings, one in Nellore, Andhra Pradesh, and the second close to the Vellar estuary, Tamil Nadu by TREE Foundation. The combined mortality of those two events was estimated at over 2,000 olive ridley turtles.

Under current regulations, mechanised trawl boats are not allowed to operate within 8km of the shore in Andhra Pradesh, 5.5km in Tamil Nadu, and 5km in Odisha. Trawlers that target shrimp fisheries are required to be fitted with turtle excluder devices (TEDs), yet none of the boats currently use them due to concerns about reduction in catch.

DEMONSTRATION OF TEDs TO FISHERS

A three day event (20-22 January 2015) was held to introduce trawl boat owners and workers operating from Kasimedu Chennai fishing harbour to the benefits of using TEDs. The demonstration and trials were organized by TREE Foundation in conjunction with the Fisheries and Forest Departments. The members of the trail team comprised of Dr. R Raghu Prakash (principal scientist), V.Kamaraju (TED net-maker) and S. Policeu (technician) from Central Institute of Fisheries Technology (CIFT); Dr. Supraja Dharini, P. Sundeep, V. Hari, and A. Yesudoss from TREE Foundation; N.S.Prem Raj (Fisheries Foreman) and S. Bakthavatsalam from the Coastal Security Group Commandos, Tamil Nadu; Vinod and Nishant (volunteers from Student Sea Turtle Conservation Network (SSTCN)); N. Devarajan (camera-person) and Sekar (assistant cameraman). The Trawl Boat Owners Association was represented by members Arasu, C. Desingu, and 12 trawl fishermen.

After a brief welcome address from G. Ezhulumalai (TREE Foundation senior Sea Turtle Protection Force member), Dr. R Raghu Prakash introduced and explained the use of CIFT-TEDs (Figure 1).

The CIFT-TED has a circular stainless steel (316 marine grade) hoop with a diameter of 900 mm at the front end of the device. The accelerator funnel attached to the front hoop propels fish and shrimp catch faster towards the cod end. There is an elliptical 1000 x 800mm stainless steel ring (10mm thick) fitted with vertical 8mm deflector bars 150mm apart a further 19m back in the accelerator funnel, at an angle of between 30° and 55°, to assist trapped turtles to the escape flap fixed at the top of the grill. The rings are connected with webbing to a single piece of polythene netting of 40mm stretched mesh size. The single piece of netting that forms the outside of the TED measures 150 x 60 mesh.

Designed by Dr. R Raghu Prakash and a team of CIFT scientists and produced at the Central Institute of Fisheries Technology, Visakapatnam, Andhra Pradesh, the advantages of this indigenously designed TED is that it is interchangeable within 20 minutes among the various net types used by local trawlers. When used, there is a significant reduction in unwanted by-catch so operators do not have to free trapped turtles and sort through by-catch, activities which reduce their fishing effort. The quality of catch is also improves as there are no trapped turtles to crush the fish, and fishers can command a better market price for their catch.

Dr. Prakash's presentation was followed by a question and answer session. A member of the Trawl Boat Owners Association was apprehensive about the use of the TEDs, not convinced that there would only be a loss of 5% of captured fish. Dr. Prakash explained that he had derived the results from ~500 trawl samples with the TED over 15 years of research (Prakash, pers.comm.).
Other workshop participants, including Mr. M. Mohamed Nainar (Assistant Director, Fisheries Department, Tamil Nadu); Mr. G. Balasubramaniyam (Deputy Superintendent, Coastal Security Police, Tamil Nadu), Dr. S David Raj (Forest Range Officer, Chennai), Commandant S.E.D Anand Kumar (Indian Coast Guard, Region East), encouraged the trawl fishers to have an open mind and trial the TED. They explained that the number of stranded sea turtles have increased dramatically over the last few years, and that the TED would only require seasonal operation between November and March. A short video from 'Scubazoo' of a TED in operation and pictures of the two mass strandings of sea turtles that occurred in Andhra Pradesh and Tamil Nadu in 2014 were used as illustrations. The Chennai Chengai Singaravelar Trawl Boat Owners Association, Kasimedu Fishing Harbour, volunteered to provide boats for a trial so fishers could observe the deployment of TEDs at sea.

A CIFT-TED was fitted to the standard trawl net in a trawl boat and two hauls with a 1hr drag period, and a gap of two hours and 5km between hauls, were conducted. No turtles

were captured in either deployment, however, a trawl boat operating ~60m from the trial boat caught a live olive ridley turtle (subsequently released unharmed and observed by the author) in the same time period. The sea trial illustrated that minimal loss of fish occurred when using the TED, a concern of many fishers. The scientist present for the trial estimated the likely fish loss during the TED deployment, engaging the fishermen on board for the valuation of weight of each catch. It was estimated that only between 2-3% of the catch escaped from the net fitted with a TED, which surprised the fishers.

After another one hour trawl time, an adult male olive ridley (70cm curved carapace length, 66cm curved carapace width) was observed trapped in the bag attached to the escape flap. This capture provided the observers with an opportunity to understand a TED in operation. The turtle was allowed to recuperate for a few minutes before being gently lowered from the boat and released back into the ocean, much to the delight of those present who observed the turtle to swim off uninjured. Another individual turtle and a pair of mating turtles were also sighted (N:13-11-330, E:080-21-230), demonstrating that the trawler operation area is both an important mating and foraging area and the need to implement TEDs in the fleet.

Outcome of the TED sea trials

Having observed both the simplicity and effectiveness of the device, trawl operators are now considering implementing TEDs on their boats. The trials clearly demonstrated that the benefits of using a TED outweighed the initial installation cost of Rs.1,000 that would have to be borne by the operators. The loss of catch for the demonstration was <5%. To date, all TED trials have had a 0% turtle capture rate.

The demonstration and sea trials have been hailed as a positive step towards success by all parties involved, and could mark a turning point in sea turtle conservation in Tamil Nadu. TREE Foundation proposes to conduct surveys measuring the success of the sea trials before the next season. There is a superstition among fishers that catching a turtle brings bad luck, and boats will usually return to the fishing harbour, cutting short their fishing activities for the day, in a turtle is caught then conduct a costly religious ceremony to cleanse their nets and boat. Subsequent awareness and interactive programs with fishing communities have been held since the initial TED demonstration and sea trials (see Table 2).

Further actions to reduce sea turtle bycatch and mortality

TREE Foundation urgently recommends the Fisheries Department and Forest Department to :

- All trawl nets be inspected by enforcement agencies when boats are landing their catch. Boats that are not fitted with TEDs should be impounded until such a time as they are installed.
- A closed trawl season be declared between November and March during the olive ridley breeding season.
- The Tamil Nadu Fisheries Department issue notices to all registered fishermen and trawl boats, with the penalties listed for the accidental or intentional capture or sale of sea turtles and their eggs.
- Nets set for Ray and Guitar fish are banned by the fishing welfare association however their use by some fishermen in a number of villages is widespread. This ban needs to be incorporated into the Marine Fisheries Regulations Act and enforced at all levels of fishing and any such nets confiscated on sight. Such enforcement should be conducted by the Fisheries, Forest Department and the Coast Guard. All areas where fish are landed need to be monitored as monitoring only the larger landing sites will lead to fishermen landing their catch in more remote areas.
- Fisheries personnel prepare the fishing communities for a complete and enforced ban on the illegal use of gill nets, ray fish nets and tuna fishing lines.
- Fishing limits in their current form be enforced with support from the Coastal Security Police and the Indian Coast Guard.

Table 2. Awareness programs to complement the TED sea trials in Tamil Nadu.

Date	Venue	Organized jointly with TREE Foundation
20-01-15	Jeevarathan Maligai, Kasimedu	Fisheries Dept., Forest Dept, Coast Guard, Coastal Security Group
23-01-15	Mahabalipuram, Kanchipuram	Fisheries Dept.
24-01-15	Pazhaverkadu, Thiruvallur	Fisheries Dept.
28-01-15	Vengambakkam, Kanchipuram	Coastal Security Group, Fisheries Dept.