Muir, C. E. and Abdallah, O. 2002. Communitybased Marine Turtle and Dugong Research & Habitat Protection Programme, Mafia Island. Annual Progress Report 2002. 13pp.

Muir, C.E. 2005. The Status of Marine Turtles in the United Republic of Tanzania, East Africa. Report commissioned by the National Tanzania Turtle Committee. 40pp.

Muir, C.E. 2007. Community-based endangered marine species conservation in Tanzania. Sea Sense Annual

Report 2007. 13pp.

Okemwa, G.M., S. Nzuki & E.M. Mueni. 2004. The Status and Conservation of Sea Turtles in Kenya. *Marine Turtle Newsletter* 105: 1-6.

Sea Sense & S. Mwangi. 2008. Dar es Salaam Turtle Product Survey. Unpublished, 3pp.

West, L. 2009. Community-based endangered marine species conservation in Tanzania. Sea Sense Annual Report 2008. 24pp.

## Discovering behaviour of open sea stages of sea turtles: working flipper on hand with fishermen in Réunion

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Sea turtles are under pressure from a number of natural and anthropogenic factors, both in the terrestrial phase of their life as well as in marine environment. Conservation efforts will only succeed if the major threats can be managed, and fisheries interactions constitute one of these. The small offshore longline fishery of the French islands of the Indian Ocean (30 offshore longliners) seems to have a limited impact on sea turtles (Bourjea *et al.*, 2008). In 1999, a three-year study showed that less than 0.004 turtles per 1000 hooks were by-caught by this fishery (Miossec & Bourjea, 2003). Trawling and gillnets are not used in Réunion. However, in order to be able to further reduce current and future interactions between sea turtles and fisheries, it is necessary to gain as much understanding of the biology of turtle species during the pelagic stages of their lifecycle as possible.



**Figure 1:** Size and weight of marine turtles in by-catch from 2004 to 2008 by longliners in the waters of Réunion.



**Figure 2 (a, b &c):** Surgical operation, under anaesthesia, to withdraw a fishing hook from a sea turtle found in Réunion longlining bycatch. Photos: S.Ciccione, 2009



**Figure 3:** One month long travel of two *Caretta caretta*, in October 2008 (red) and March 2009 (green), from Réunion longlining bycatch. (Source: J. Bourjea, 2009)

# Cooperation with fishers for research and best practice

By working together, scientists and open sea fishers can work towards reducing sea turtle by-catch and mitigating its impacts. For example, fishers can remove hooks from turtle esophaguses before they release them, or keep the turtle alive on board until assumption of responsibility for them by a health center. Additionally, data collected when turtle by-catch occurs (e.g. boat position, time and date, turtle weight and length, and genetic sample) or after the release (e.g. movement and diving behavior of turtles fitted with satellite tags) can help increase understanding of the biology of sea turtles and their interaction with open sea fisheries.

To this end, in 2004 a cooperative program was established by Kelonia, IFREMER and Reunionese volunteer fishers to monitor by-catch of sea turtles in the Réunion longline fishery and to reduce bycatch mortality. By-catch turtles (Figure 1) are kept onboard by fishers, and given to the Kelonia health centre to recover after hook removal. Modern surgical techniques and anaesthesia sees more than 60% of turtles recovering (Figure 2). In September 2008, this program was included as part of the French sea turtle component of the South West Indian Ocean Fisheries Project (SWIOFP) supported by the Global Environment Facility (GEF). The issue is to study the open sea behaviour of marine turtles and the interactions with fisheries within an ecosystem approach. The program is led from Réunion and works together with volunteer Réunionese drifting longliners. Turtles are released with a location/depth recorder satellite tag, in order to study their open sea behavior.

The partnership with the fishermen is a long-term job, but the partnership is going well and has continued to involve the same four boats since 2004.

In October 2009, two *Caretta caretta* were fitted with satellite transmitters (Figure 3), and three other turtles will be released with satellite tags in the next six months.

In the framework of the SWIOFP, 80 satellite tags will be deployed in the French Exclusive Economic Zone of the West Indian Ocean to have a regional vision of the oceanic displacements of the sea turtle. Results will be taken into account in fisheries management. Acknowledgements: Thanks to the Local Initiative Fund of Credit Agricole Bank and the Regional

#### Literature cited

Bourjea, J., R. Nel, N.S. Jiddawi, M.S. Koonjul & G. Bianchi. 2008. Sea turtle bycatch in the west Indian Ocean: review, recommendations and research priorities. *Indian Ocean J. Mar. Sci.* 7(2): 137–150.

Council of Réunion for their financial support, and to Dc Francis Schneider for his surgical expertise.

Miossec, D. & J. Bourjea. 2003. Longline fishery evolution in La Réunion. Focus on the exploitation level of swordfish (*Xiphias gladius*). Report of the 3rd Session of the IOTC Working Party on Billfish. Perth, Australia 10-12 Nov. 14 p.

## **Project Profile**

### Blue Ventures Conservation Community marine turtle conservation in Southwest Madagascar

#### Background

Southwest Madagascar's remote Toliara region contains some of the most biodiverse coral habitats in the Indian Ocean, but also supports Madagascar's largest traditional fishery, with 20,000 fishers operating in the province. Artisanal fishing is one of the primary causes of direct reef damage (Nadon *et al.*, 2007; Ahamada *et al.*, 2008) and unsustainable biomass removal but is also the principal source of income for the indigenous Vezo coastal communities. Protecting the region's biodiversity is therefore inextricably linked to promoting more sustainable resource use. Blue Ventures Conservation and the local community are currently leading efforts to protect and manage marine turtle fisheries in the region.

## The traditional marine turtle fishery in Madagascar

Five species of marine turtle inhabit Madagascar's coastal waters, green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*), olive ridley (*Lepidochelys olivacea*) and leatherback (*Dermochelys coriacea*) turtles. The Vezo population of southwest Madagascar actively fish for and consume all five. Decline in turtle populations in this region has been documented previously by Rakotonirina (1987), who reports

declines in numbers of nesting green, loggerhead and hawksbill turtles. The fishers exploit both the nesting populations as well as the foraging aggregations.

Turtle hunting is considered an important cultural Vezo activity and has several associated ancestral rituals. Traditionally turtle fishing had several restrictions that had to be observed by the hunters in order to catch turtles, although many of the rituals related to the preparation of the meat. Whilst some still observe the traditions or parts of them, there has also been a relaxation of traditions and restrictions, especially where new methods have been used. There are also currently no conservation strategies in place to monitor or manage the traditional subsistence turtle fishery.

#### **Project Objectives**

In October 2006 the first phase of turtle research and conservation programme was initiated in Andavadoaka region, 200 km north of Toliara.

The project objectives are to:

- 1. Profile the regional turtle fishery;
- 2. Locate and monitor any nesting sites in the region;
- 3. Increase awareness of marine turtle conservation issues;