



***Monitoring of Crown-of-Thorns-Starfish
on the reef and in the lagoon of Jambiani, Zanzibar***

Project Proposal

Authors: Fabian Bumbak, Christian Vaterlaus

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Project Lead: *marinecultures.org*, Switzerland

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Summary

Over the last couple of years villagers and fishermen of Jambiani have noticed a decrease in fish and coral populations. Crown-of-thorns-starfish (COTS) and their feeding traces can be spotted on the majority of the larger coral blocks within the lagoon. *marinecultures.org* is collaborating with the local NGO JAMABECO and local dive organizations to establish a sustainable COTS monitoring program. The objectives are:

- Establishment of an overview of the condition of the COTS population and the status of the reef in general.
- Establishment of a local control-taskforce for quick action in case of an epidemic outbreak.
- Collection in case of emergency.
- Establishment of a long-term monitoring program.
- Collection of data for scientific analysis.

The Project is divided in two phases. The first phase (August / September 2009) is characterized by an inventory and is fully financed by *marinecultures.org* using existing facilities in collaboration with project partners. Depending on the results and findings of phase one an additional funding phase will be necessary to finance a second phase.

Background

Villagers and local fishermen report an increasing number of crown-of-thorns-starfish (COTS) in the lagoon spreading across the southeast coast of Zanzibar. For most fishermen the lagoon and the connecting reef are the main sources of income since they don't manage to go much further with their small sailboats. The presence of a large number of COTS and/or feeding traces on the larger coral blocks could be verified through talking to dive operators and diving in the lagoon.

JAMABECO, a local NGO in close contact with the fishermen is determined to act upon the COTS-situation but does neither have the knowhow nor the means.

COTS outbreaks have regularly been reported for a number of coastal areas worldwide (Wilkinson C, 2004) especially regions that show a high degree of fishery use (Wilson *et al.*, 2008). Focusing on the Zanzibar situation, it is known that from early 2003 to August 2004 the number of COTS have increased a hundredfold on Zanzibar's west coast (Obura *et al.*, 2004).

Problem

COTS (*Acanthaster planci* L.) population outbreaks are one of the most significant threats to coral reefs in tropical regions (Bellwood *et al.*, 2004). COTS preferably feed on tubular coral species (particularly *Acropora* sp.) but will, in case of intense competition (i.e. when appearing in large numbers), feed on most coral species available (Pratchett *et al.*, 2009) which may have a mayor effect on the overall coral coverage of coral reefs. A reef surface coverage of 25 – 40% can be reduced to a mere 1% in case of a mayor outbreak taking a reef up to 10 years to recover (Harlott *et al.*, 2003). Reasons for mayor COTS population outbreaks are reported to be natural fluctuations in populations, the hydrodynamic situation (currents), the removal of natural predators and/or the increasing human population density in costal zones (Black *et al.*, 1992; Harlott *et al.*, 2003). Although neither of these reasons is definitely proven, it seems likely, that the true reason is a combination of the three making population control a rather difficult task. As a matter of fact the human use of Zanzibar's costal zones is steadily increasing which inevitably leads to increase of planktonic food for COTS-larvae and the overfishing of natural predators like reef fish (feeding on larvae), the much sought after triton shells and octopus.

Apart from these forms of natural control (including considerate exploitation of the coastal zone) eventual COTS population outbreaks can only be absorbed by consequent management strategies on a local as well as on a regional basis (Harlott *et al.*, 2003; Obura *et al.*, 2004).

Objectives

The scope of this project is the establishment of an ongoing COTS monitoring program in cooperation with the local NGO JAMABECO and local dive operators.

This includes the following steps:

- (1) Gain an overview over the actual COTS population and the status of the reef in general (covers a confined area of 5ha in the lagoon off Jambiani).
- (2) Setup of a local control-taskforce for quick action in case of an outbreak.
- (3) Conduction of a trial-collection of COTS to study efficiency and feasibility of methods.
- (4) Setup of a long term monitoring program.
- (5) Education and organization of local staff.
- (6) Collection of scientifically relevant data.
- (7) Exchange with other organizations/regions especially WIOMSA (Western Indian Ocean Marine Science Association) and the Chumbe reef sanctuary – both already having COTS monitoring and collection initiatives established on Zanzibar.

This first project will be completed with a written documentation containing (a) a report on the actual COTS population including a recommendation whether immediate action is necessary or not, (b) a summary of the monitoring and collection techniques to be applied, (c) an overview over the local organization, (d) estimates for the financials and personnel needed for activities on a regular basis.

Methods

Surveys

There are two practicable survey methods known to date: large areas can be monitored by towing divers using manta board behind a small boat over the reefs while small areas can be searched by divers directly at the bottom (Harlott *et al.*, 2003).

marinecultures.org is planning to allocate a 5ha area in the lagoon off Jambiani that will be searched by divers and snorklers on a regular basis. The COTS situation will

then be extrapolated to the lagoon in general. Manta tows might then be considered as an additional means to confirm the bottom searches. An expansion to the reef itself is not planned within the first phase of the project and might be part of the second phase (end of 2009).

Trial collections

Divers will conduct collection and poisoning methods as proposed by Harlott *et al.* (2003). Disposal and/or possible exploitation of collected COTS will also be part of the project.

Education of local staff

A group of local fishermen organized by JAMABECO will receive training in COTS biology as well as in the fore mentioned survey and collection methods. The course will take place at Jambiani Tourism Training Institute and will be held by *marinecultures.org* if possible with cooperation with WIOMSA and the Chumbe reef sanctuary.

Two locals of JAMABECO will receive scuba diving courses from Buccaneer Divers in Paje.

Time schedule

August 2009	Divers ready, initial monitoring, education of local fishermen
October 2009	Interims analysis
January 2010	Second monitoring, trial collections
February 2010	Progress report on behalf of <i>marinecultures.org</i>

Facilities

Buccaneer Diving will provide initial scuba dive training for two local fishermen and will support the COTS monitoring activities by providing boats, fuel and staff. Other local dive operators have also mentioned their interest in supporting the project.

Training facilities will be provided by the Jambiani Tourism Training Institute (Hands Across borders Society).

marinecultures.org provides transportation (pick up) and lodging for overseas staff.

Budget

Phase 1:

- Personnel: no costs
- Equipment and supplies:
 - Bags, tongs, rope, buoys US\$ 100
 - GPS, cables: US \$ 415
 - Map's: US \$ 160
- Services:
 - 10 transports Jambiani <-> Paje: car and fuel US \$ 75
 - 2 PADI licenses for JAMABECO dive courses US \$ 140
- Other: copies & prints US \$ 20
- Reserves: US \$ 60

Total Budget phase 1: US \$ 700

Phase 2:

To be done. Depending on results of phase 1.

Funding

The association itself can finance the first phase of the project. For the second phase new fundings will be required.

Project Team / Participants / Partners

The project team includes (1) local volunteers (mainly fishermen from Jambiani), (2) two persons from the local partner NGO JAMABECO (with scuba diving licenses acquired through Buccaneer Divers prior to project kick-off), (3) Buccaneer staff (i.e. captain and/or diver), (4) one field worker from *marinecultures.org*.

The following companies/organizations have assured their support of the project:

- Buccaneer Diving, Paje, Zanzibar, www.buccaneerdiving.com
- JAMABECO (Jambiani marine and beach conservation), Jambiani, Zanzibar, db.ngorc.or.tz/sw/csos/1
- Jambiani Tourism Training Institute (Hands Across borders Society), Zanzibar, www.handsacrossborderssociety.org

References

Bellwood, D.R., Hughes, T.P., Folke, C. and Nyström, M. 2004. Confronting the coral reef crisis. *Nature* **429**:827-833.

Black, K., Moran, P., Burrage, D. and De'ath, G. 1992. Are the hydrodynamics guilty of causing or stimulating outbreaks of crown-of-thorns starfish on the Great Barrier Reef? In: *The Possible Causes and Consequences of Outbreaks of the Crown-of Thorns Starfish; Proceedings of a workshop held in Townsville, Australia, June 1992*:95-102.

Harlott, V. 2003. CRC Reef Research Center Ltd, Townsville, Australia. Downloaded from: http://www.reef.crc.org.au/publications/brochures/cots_web_Nov2003.pdf

Obura, D., Church, J., Daniels, C., Kalombo, H., Schleyer, M. and Suleiman, M. 2004. Status of Coral Reefs in East Africa 2004: Kenya, Tanzania, Mozambique and South Africa. In: *of Coral Reefs of the World 2004 (Volume 1)*:171-211. Australian Institute of Marine Science. Downloaded from: http://www.uicn.org/about/work/programmes/marine/marine_resources/marine_publications/?1252/Status-of-Coral-Reefs-of-the-World-2004

Pratchett, M.S., Schenk, T.J., Baine, M., Syms, C. and Baird, A.H. 2009. Selective coral mortality associated with outbreaks of *Acanthaster planci* L. in Bootless Bay, Papua New Guinea. *Mar Environ Res* **67**:230-236.

Wilkinson, C. 2004. Status of Coral Reefs of the World 2004. Australian Institute of Marine Science. Downloaded from: http://www.uicn.org/about/work/programmes/marine/marine_resources/marine_publications/?1252/Status-of-Coral-Reefs-of-the-World-2004

Wilson, S.K., Burgess, S.C., Cheal, A.J., Emslie, M., Fisher, R., Miller, I., Polunin, N.V.C. and Sweatman, H.P.A. 2008. Habitat utilization by coral reef fish: implications for specialists vs. generalists in a changing environment. *J Anim Ecol* **77**:220-228.