FAD Trials in East Africa

FMSP R8331

Annex 7.

Tanzania FAD Programme Updates 1-3

Tanzania FADs Programme
Update - April 2005

BACKGROUND

Preparations for the introduction of deep-water Fish Aggregating Devices (FADs) in Tanzania were initiated in late 2003 by Samaki Consultants, Dar es Salaam. The objective of the trial is to attract tuna and other oceanic fish for capture by local fishers. Principal funding comes from the British Dept. for International Development (DfID), with contributions from WWF through the Mafia Island Marine Park (MIMP) and Conservation Corporation Africa through Mnemba Island Lodge, Zanzibar. The Zanzibar Dept. of Fisheries and Marine Resources and the MIMP are actively involved in the trials. The Mbegani Fisheries Development Centre (MFDC) and the Institute of Marine Sciences (IMS) are potential future collaborators in gear promotion and data gathering. Under the DfID-funded arrangement, monitoring of the programme ends in October 2005.

FAD Design – The design includes a float section of 22-25 pressure floats (16 lt. vol.), along a 30 m, 16 mm PVC-coated steel wire, with streamers attached (see opposite). The 12-ply rope (part polypropylene part nylon) is attached to a one tonne concrete anchor. A 2-3 m marker pole with radar reflector is attached to the end of the float section.

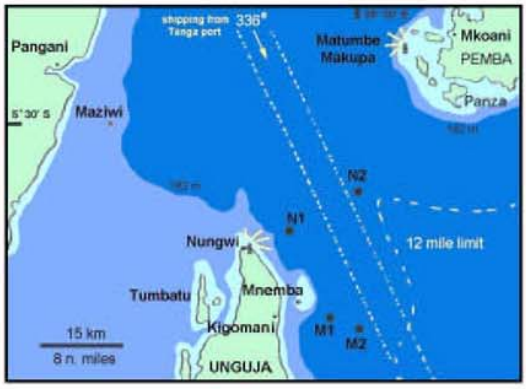
FAD DEPLOYMENT

On March 23, four FADs were deployed off NE Unguja Island, Zanzibar, and on March 24, two FADs at Mafia were set (see table/maps). Site selection, including detailed bathymetric survey, aimed to optimise depths, distance from shore, avoid shipping lanes and allow access by local vessels. Tanzania's FADs are sited 5–11 miles from the shore.

FAD Name	ID	Lat.	Long.	Depth m
Nungwi 1	N1	5 ° 40.350′	39 ° 24.000′	300
Nungwi 2	N2	5 ° 37.200′	39 ° 30.500′	650
Matemwe 1	M2	5 ° 51.000′	39 ° 27.700′	400
Matemwe 2	M2	5 ° 52.500′	39 ° 30.700′	650
Kinasi	K1	7 ° 56.800′	39 ° 55.000′	500
Juani	J1	8 ° 01.800′	39 ° 52.500′	530

The Mbegani fisheries training vessel "MV Mafunzo" used in 2004 for trial FAD deployment was unavailable this year. The "MT Solsky" (3,000 HP, 170 GRT tugboat) from Alpha Logistics was chartered for three days to load and deploy approx. 9 tonnes of equipment covering 350 miles.

Start of FAD deployment in Tanzania from MT Solsky



FAD positions off northern Unguja, Zanzibar
Inspection trip from Mnemba to all four FADs is a 40 nautical miles (73 km) journey.

After deployment, some FADs were seen on the ship's radar an hour later. Three and nine days later, all FADs were floating at Mafia and Unguja respectively. Under the float sections of some FADs, schools of hundreds of fish had gathered after nine days. Species included juvenile rainbow runners ('kisukari') and jacks ('kolekole'). Attached goose barnacles were 2 mm long. These features confirm that the FADs have started working. They must also now be maintained.

Participants – Present for all six deployments were Capt. A.A. Mohammed and crew of "MT Solsky", Matt Richmond (MD, Samaki Consultants), Nicas Mbandi (MFDC) and Suleiman Jaffer (Zanzibar Fisheries Dept.). Three local boats were mobilised and the following (mostly fishers), were also present during deployments:

Peter Siebert (Mnemba)	Boatman Uledi (Mnemba)
Abdallah Mohamed (Samaki)	Tawakal Rajab (Chole)
Steve Hobbs (Hands On)	Miwadi Juma (Chole)
Makame Hamza (Nungwi)	Hasan Nahodha (Chole)
Makame Juma (Nungwi)	Miwadi Hamad (Juani)
Abdulrahim Juma (Nungwi)	Ahmad Miwadi (Juani)
Ally Makame(Nungwi)	Mwinjuma Adam (Juani)
Seif Hamza (Fisheries BR)	Salum Said (Utende)
Ally Kundi (Kigomani)	Masoud Kipanga (MIMP)
Makame Kundi (Kigomani)	Mohamed Shamte (MIMP)
Uchungu Makame (Kigomani)	Ramadhani Nyumba (MIMP)
Koko Mwiga (Kigomani)	

Weather Conditions – As forecast by Tanzania's Meteorological Agency: "winds.. north-easterly 10 km/hr.. showers and thunderstorms.. sunny periods. State of sea: slight." Currents were light at Zanzibar but approx. 3 knots northerly at Mafia.

Publicity - Notification to captains of local shipping companies was initiated during deployment by radio and a formal Notice to Mariners under the UK Admiralty service is being filled. A Swahili "Notice to Mariners" has been widely distributed, two radio broadcasts were made on Radio Zanzibar (March 22 and 25) and a newspaper article is being drafted. The UK-based Hands On company are producing a video based on deployment footage, to be shown internationally and a longer, more detailed version is planned for national broadcast.

FUTURE ACTIVITIES

Monitoring FAD Behaviour – The first inspection at Mafia (3 days later), found half the floats submerged (see opposite) while on Zanzibar (after 9 days) there were only 2-5 floats below. Some slippage of the wire through end clamps was noted but the expectation is movement should settle and clamps lock tighter as the pressure against the floats increases. Monitoring continues. FADs are predicted to submerge in the coming weeks as the influence of the East Africa Coastal Current increases, but the floats (800 m test pressure) should re-surface when the current eases. The inspection also revealed three of Zanzibar's FADs have suffered loss or theft of radar pole and floats. Discussions have begun with local airlines to assist monitoring FAD status and with a cellphone provider for use of towers at Nungwi and Utende for FAD observation (with telescope). Close collaboration between the many stakeholders (local and foreign fishers, shipping, scuba or sport fishing companies and research and resource institutions) is vital to guarantee success of the trials.

FAD positions off east coast of Mafia Island
Inspection trip from Utende to both FADs is 25 nautical miles (46 km), about a third inside Chole Bay.

Juani FAD (J1) three days post deployment
Half the floats were submerged at both Mafia FADs in late March due to the strong currents.

Fishing Trials & Training – These are planned for June-October 2005, focusing on hook and line gears.

Interest in FADs has been received from Mnazi Bay Ruvuma Estuary Marine Park in southern Tanzania and from a fishing company in northern Mozambique.

SHUKRANI Samaki Consultants are very grateful to DfID, WWF, CC Africa, the Zanzibar Dept Fisheries and MIMP for their support and encouragement to conduct this trial of FADs in Tanzania. We also wish to thank the "MT Solsky" crew for FAD deployment; MFDV for storage, work space and docking facilities; Jim Anderson and Paxton Wellington for design and technical input, plus several colleagues for recent useful comments on FAD behaviour; and Matemwe Bungalows for all their past support. We hope to rely on the increased enthusiasm and interest of all the above now that the FADs have begun to perform.

CONTACTS Samaki Consultants 022 2602766, 0748 740254; Zanzibar Fisheries Officer 0747 460172; MIMP Fisheries Officer 0745 345400, 0745 671004, or VHF Channel 9; Tanzania MCS Project at Mbegani 0745 507248.

Tanzania FADs Programme
Update No. 2 - June 2005

BACKGROUND

Preparations for the trial of deep-water Fish Aggregating Devices (FADs) in Tanzania began in late 2003. Coordinated by Samaki Consultants Ltd., the objective is to attract tuna and other oceanic fish for capture by local fishers. DfID, WWF and CCAfrica provide financial support, and the Zanzibar Dept. of Fisheries and Marine Resources (DFMR) and the Mafia Island Marine Park (MIMP) are active partners in the Programme. The Mbegani Fisheries Development Centre (MFDC) and the Institute of Marine Sciences are potential collaborators in gear promotion, fisheries and oceanographic studies. Funding under DfID extends to the end of October 2005.

The first Update reported on progress in April, mainly on FAD construction and deployment. This report covers FAD monitoring and forthcoming fishing trials.

One of the participating fishing 'mashua'
A typical 9 m vessel from Nungwi, with FAD (N1) in background showing full set of 25 buoys (March 23).

FADs on FAD MONITORING

The six FADs deployed in late March 2005 were inspected within nine days of deployment. At that time, half of the 25 buoys on Mafia's FADs where submerged, due to the strong northerly current. The four FADs off northern Unguja (see map) had few buoys underwater. A month later, April 28, an attempt to inspect FAD off Kigomani (M1), was aborted within half a mile of the position, at about noon, due to deteriorating sea conditions. Two weeks later, on an early and calm morning of June 13, the FAD north of Mnemba (N1) was found and inspected (see photo), with half the buoys submerged. On June 21, this FAD was visited by Ras Nungwi's sport fishing boat, whose skipper noted schools of small fish. However, three days later (June 24), a morning search failed to find the FAD. Sea was moderate with 2.5 m swell. The fishers asserted that the current was so strong it had submerged the FAD. As forecast, these months will fully test the design and materials, and temporary submersion is expected.

The last visit to Mafia FADs was in early April. Sea conditions are reported to be generally too rough for access off Mafia during this season, and a confirmation visit is planned in the coming weeks.

Coastal Aviation Ltd. are interested in supporting the programme with aerial observations expected to begin soon. Their flight from Chake Chake (Pemba) to Zanzibar passes almost directly over Mnemba Island and it is hoped that with some guidance, pilots should be able to spot the line of yellow FAD buoys from 1,500 feet. The use of cellphone towers for telescope viewing of FADs has not yet been pursued.

FAD positions off northern Unguja, Zanzibar
Depths N1 300 m; N2 650 m; M1 400 m; M2 650 m.

FAD N1 off Nungwi 80 days after deployment
On June 13 there were 12 buoys on the surface and the current estimated at 2 knots. Note the thick growth of goose barnacles on the undersides of the buoys (3 species, of 28 mm max. length) and the Manager of Mnemba Island (CCAfrica).

FAD Fishing Gear
The main components are Samoan reels, 4 mm braid-line (as the main-line), tuna snaps, monofilament branch-lines and circle hooks. Gears were purchased in Victoria, Seychelles and reels built in Tanzania.

Testing the Samoan reel
On June 23, two reels and a mounting were tested in preparation for July trials. Additional footage was also taken for the Earth Report documentary. Two vertical long-lines (200 m with 6 hooks and 5 kg weights) were set for ½ hour with squid bait, but no fish caught.

FISHING TRIALS

Expert training - The gear technologist of the Seychelles Fishing Authority (SFA), Mr. Antoine Polite, will be visiting Tanzania to teach participating fishers from Nungwi, Matemwe and Mafia in the use of various FAD gears. Mr. Polite has over 15 years experience with SFA, much of which has been training fishers in the use of FAD gears, in Seychelles, Comoros, Reunion, Madagascar and Mauritius. This will be his first visit to Tanzania.

Fishing gears - The main focus will be on hook and line gears, rigged as vertical long-lines, designed for depths of 50-300 m. Trolling gears for surface fishing will also be covered. Training will include gear choice and assembly, techniques with bait, the use of gears specifically around FADs and post-harvest treatment (e.g. bleeding of tunas and use of ice).

Phase One (July 1–21). Three weeks of training are scheduled from a base in Nungwi, chosen for this occasion because of the more sheltered conditions compared to Mafia. At this time of year, access from Nungwi to the nearby FAD (N1) takes about 1½ hours. Each morning, two 'mashua' will motor out the 5 miles to the FAD and fish while conditions allow. Mafia fishers, MIMP and MFDC staff will also be brought to Nungwi to participate in the trials. If **sea conditions in July around FAD (N1) prevent safe access, fishing training will continue in the more sheltered, western waters, towards Pangani.**

The trial is planned to coincide with new moon (July 6) thus ensuring a supply of fresh bait from the seine-net fishery. The main fishery for large pelagic species (using gill-nets) will also be active during this phase, with over 100 vessels using the main base at Nungwi, thus allowing for collection of fisheries data for the same period as the FAD gear trials.

Phase Two – A September visit by Mr. Polite is now being considered, including a Mafia stay. Objectives will include follow-up of July training plus a focus on post harvest treatment. September is reportedly the best fishing month for the largest yellow-fin tunas.

Data Collection – A fisheries data collection system (including the gill-net fishery) will begin in July at Nungwi and continue to the end of October.

PUBLICITY

A "Notice to Mariners" showing Tanzania's FAD positions was published (Hydrographic Office Weekly Edition 20, 19 May 2005) and the Swahili edition was distributed by the Tanzania Harbours Authority to all ports, companies, agents, etc. associated with local shipping. Two newspaper articles were published in *Zanzibar Leo* and BBC World's Earth Report will air a 4.5 min clip on the FAD programme in July.

FUTURE ACTIVITIES

The economic (and social) implications of opting for line-fishing and FADs instead of other gears will be investigated during the coming months, together with an analysis of fisher behaviour and gear costs.

SHUKRANI Samaki Consultants are very grateful to DfID, WWF, CC Africa, Zanzibar DFMR and MIMP for their continued support for this trial of FADs in Tanzania. CCAfrica has further helped with boat and fuel for FAD inspections. Asanteni.

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Tanzania FADs Programme
Update No. 3 - November 2005

BACKGROUND

The objective of the Tanzania FAD Programme was to test the ability for deep water FADs to attract tuna and other oceanic fish for capture by local fishers. DfID, WWF and CC Africa provide financial support, and the Zanzibar Department of Fisheries and Marine Resources (DFMR) and the Mafia Island Marine Park (MIMP) are active partners. The Mbegani Fisheries Development Centre (MFDC) and the Institute of Marine Sciences (IMS) are potential collaborators in gear promotion, fisheries and oceanographic studies.

The programme began in September 2003 and can be divided into 5 main components:

1. Site surveys
2. Importation of FAD equipment
3. FAD construction and deployment
4. FAD monitoring
5. Offshore fisheries training

Following difficulties with importation and the original FAD design, successful deployment of six FADs eventually took place in March 2005. The effective delay of one year, plus the main donor project end-date of October 2005, meant that the bulk of the activities and outputs were restricted to the last seven months. This is the 3rd Update, reporting on FAD performance, accessibility, fishing trials and future options.

FAD PERFORMANCE

Over seven months, 28 visits were made to check on FAD performance and status. Currents velocities were high (estimated at 3-4 knots) and variable. At times, currents were so strong that all floats were submerged one day but the same time the flowing day 22 of the 25 floats were at the surface. By the end of October, the Juani FAD at Mafia could not be visited due to poor weather; however, there is no reason to suspect that this FAD has behaved any differently from the other five. The design survived the SE Monsoon and the latest positions of the floats are shown in the table below (Juani FAD estimated).

FAD Name	Lat.	Long.	Depth m
Nungwi 1	5° 41.011'	39° 23.791'	300
Nungwi 2	5° 37.079'	39° 30,055'	650
Matemwe 1	5° 50.716'	39° 27.570'	400
Matemwe 2	5° 52.135'	39° 30.794'	650
Kinasi	7° 56.330'	39° 55.078'	500
Juani	8° 02.300'	39° 52.570'	530

The latest recorded GPS positions of the FADs

FAD ACCESSIBILITY

By June, increasing southerly winds on many days prevented access using local 'mashua'. In July and August winds were predominantly southerly, between 10-12 knots, reaching 17 knots. Unfavourable conditions continued throughout the entire SE Monsoon period, until late October. By end of October the wind was mainly easterly, 8-15 knots, and finally in mid-November the wind began shifting to northeast. The large swells associated with these easterly winds hampered access especially in Mafia.

Travel time and fuel use to FADs were carefully monitored. In all cases (under calm conditions), the time from the main ocean access (e.g. the Muyuni Pass through the lagoon for Matemwe fishers, or Kinasi Pass at Chole Bay on Mafia), to the nearest FAD is about one hour. Depending on wind, 30-40 litres of petrol were used for each trip.

Inspecting the Nungwi 1 FAD in July
Moderate currents resulted in 14 floats at the surface.

Kinasi FAD on Mafia in October
Strong currents submerged all but three floats.

FISHING TRIALS

The gear technologist of the Seychelles Fishing Authority, Mr. Antoine Polite, visited to teach participating fishers from Nungwi, Matemwe and Mafia in the use of gears for use around FADs, including vertical long-lining with circle hooks, at depths to 300 m. Trolling gears for surface fishing were also used.

Fishing trials were conducted over 50 days, of which 33 days were spent at sea. In July, trials were conducted from Nungwi and included participation of Matemwe and Mafia fishers and MIMP staff. In October, trials took place at all three sites.

Weather conditions limited access to FADs for fishing on about half the sea days. For the remaining, the gear was modified for mid-water and bottom fishing, thus allowing fishers more practice with the long-line gear. This was conducted at sites around northern Unguja and south-east Mafia Islands.

Fresh bait and ice were obtained at all sites, though with difficulty at times. Catches included over 30 species of fish, ranging from oceanic (e.g. yellowfin tuna) to deep-water demersal (e.g. red snapper). From the 33 days at sea, some of which did not allow fishing, about 400 kg of fish were caught. Absence of significant tuna catches prevented much training in post-harvest treatment, e.g. bleeding and storage.

Data Collection – Fisheries data were collected from the gillnet tuna fishery and for all fish caught during the trials. Average yellowfin length at Nungwi landing site was 68 cm in July and 91 cm in October.

FUTURE ACTIVITIES

This is the last update under the main donor-funded life of the programme. To meet the DfID project deadline meant the best season for FAD fishing was not tested, hence the true value of the FADs as effective tools for attracting fish for access by local fishers has yet to be concluded. Means are being sought to extend the Programme for at least another six months, to allow:

1. Continuation of the monitoring of the pelagic fishery and a third phase of fishing trials over the next few months (i.e. during the NE Monsoon) to fully test whether the FADs attract tuna that can be caught with the long-line gears.

2. The October video footage of trials to be combined with the previous footage (of FAD construction and deployment, used for the Earth Watch 3:44 min. video), to produce a final product of the whole trial, ideally in Swahili.

3. Designing a FAD monitoring and maintenance schedule for implementation by project partners.

Hands-on fisheries training at sea
Gear technologist demonstrating vertical long-line fishing at the Nungwi FAD N1, Zanzibar, July 2005.

Yellowfin tuna caught trolling on Mafia in October
At Mafia, and Matemwe, close in on the reefs, schools of small (7 kg) surface-feeding yellowfin tuna were seen.

Red snappers caught with longlines at Mafia
Deep-water bottom fishing was conducted when access to FADs was restricted by the weather.

SHUKRANI Samaki Consultants are grateful to DfID, WWF, CC Africa, MFDC, Zanzibar DFMR and MIMP for their support for this trial of FADs in Tanzania. The SFA, Mr. Antoine Polite, Mafia Island Lodge, Ras Nungwi Hotel, Alpha Logistics and Mnemba Lodge are thanked for their participation in the trials.

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