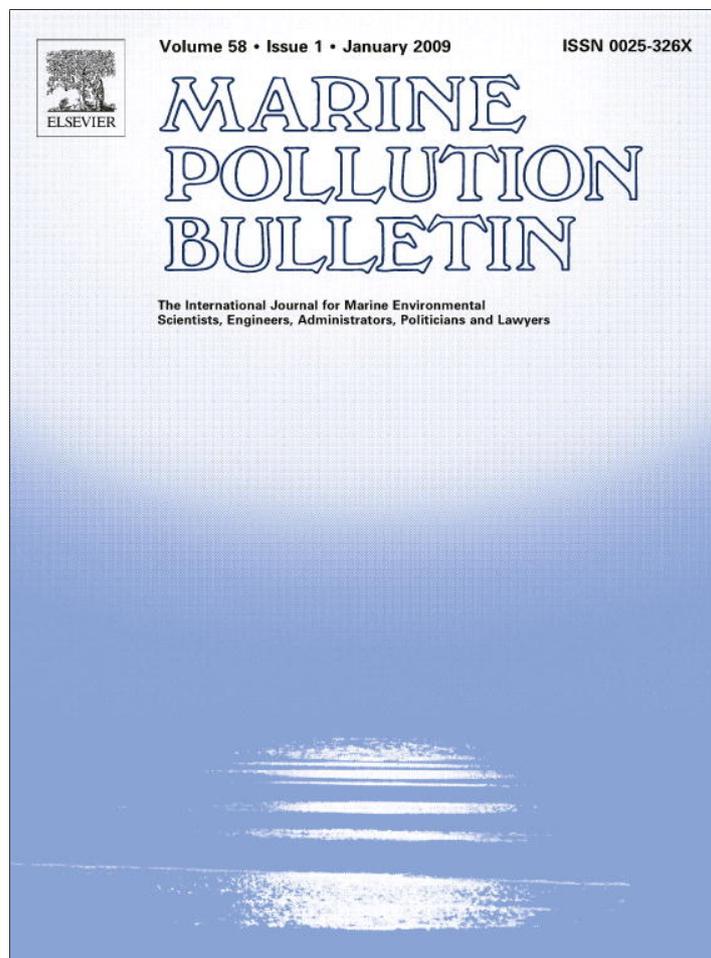


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Focus

Dynamite fishing in northern Tanzania – pervasive, problematic and yet preventable

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ABSTRACT

Dynamite fishing, although illegal, has resurfaced in recent years as a major threat to the reefs of northern Tanzania. This is despite the fact that institutional arrangements for co-management of the inshore fisheries by local communities and the district governments have been put in place and, through a 12-year donor-funded programme, numerous activities undertaken to build capacity for effective fisheries management. The use of dynamite is having widespread negative impacts, including damage to the reefs and their long-term productivity, deterrence of tourism investors, and potential threat to the large population of coelacanths in the area. The dynamite fishers are able to continue, even though enforcement efforts have been stepped up, because they are members of influential families or otherwise well-connected. Previous similar cases in Tanzania, and examples from elsewhere in the world, suggest that a major initiative is now needed to develop a zero-tolerance approach on the part of fishers and local and national leaders, that will shame the dynamiters through peer pressure, promote full implementation of sanctions and penalties by the judiciary, and lead to public recognition of and support for the work of the enforcement agencies.

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Dynamite fishing is causing untold damage to coral reefs in Tanzania, a practice that needs to be stamped out in 2008, the International Year of the Reef. Common in Tanzania since the 1960s, dynamite fishing was banned nationally in 1970, but continued to resurface on a regular basis (Jiddawi and Öhman, 2002; Muhando and Mohammed, 2002). In the mid 1990s, a high profile national campaign involving local initiatives, hotel operators and the media, brought international attention to the issue and the Navy was enlisted to assist with enforcement. For a few years between 1997 and 2003 blasting was rare and, when it did start up, it was relatively quickly halted (Wells et al., 2007). Since 2003, dynamite fishing has returned with increasing vengeance.

Despite the fact that under the revised Fisheries Act of Tanzania 2003, the penalties for dynamite fishing and possession are five year and 12 month minimum sentences respectively, blasting resurfaced four years ago in Tanga Region in the north. From 1994 to 2006, this area was the focus of the Tanga Coastal Zone Conservation and Development Programme (TCZCDP) which resulted in the establishment of management plans for fisheries and mangroves over an area of 750 km², developed jointly by local government and 48 village communities (Fig. 1). Through this co-management approach, six Collaborative Management Areas (CMAs), running the 150 km length of Tanga Region coast, were set up, each with two reefs closed to fishing under village bye-laws. In

addition, damaging beach seining was reduced, training was given to district officers and villagers in coastal management, institutional arrangements were set up, support provided for livelihood activities, and dynamite fishing was halted through the introduction of fisheries patrols that involved local communities and the Navy (Wells et al., 2007).

As with many such integrated conservation and donor programmes, the TCZCDP had its successes and failures, with the greatest challenge being the development of capacity to sustain coastal management without external support. The weak capacity in local government for planning, reporting and financial management, and the lack of firm political commitment to implementation – probably due to individual interests over-riding the TCZCDP's approach combined with lack of understanding of the full economic and social value of marine resources – meant that the TCZCDP's activities were not fully mainstreamed into the district natural resource plans (Wells et al., 2007). When financial support from the Irish Government and technical assistance from IUCN came to an end, unfortunately coinciding with the withdrawal of the Navy's support to the fishery patrols, dynamite fishing escalated rapidly although patrol boats, enforcement equipment, and funding for fuel and allowances had been provided.

Since then, blasting has been monitored by the Tanga Dynamite Fishing Monitoring Network (TDFMN), a group of local residents that includes hoteliers, the owner of a seafood processing factory and some villagers. A monthly average of about 20 blasts has been recorded in the worst affected areas since 2006, with sometimes

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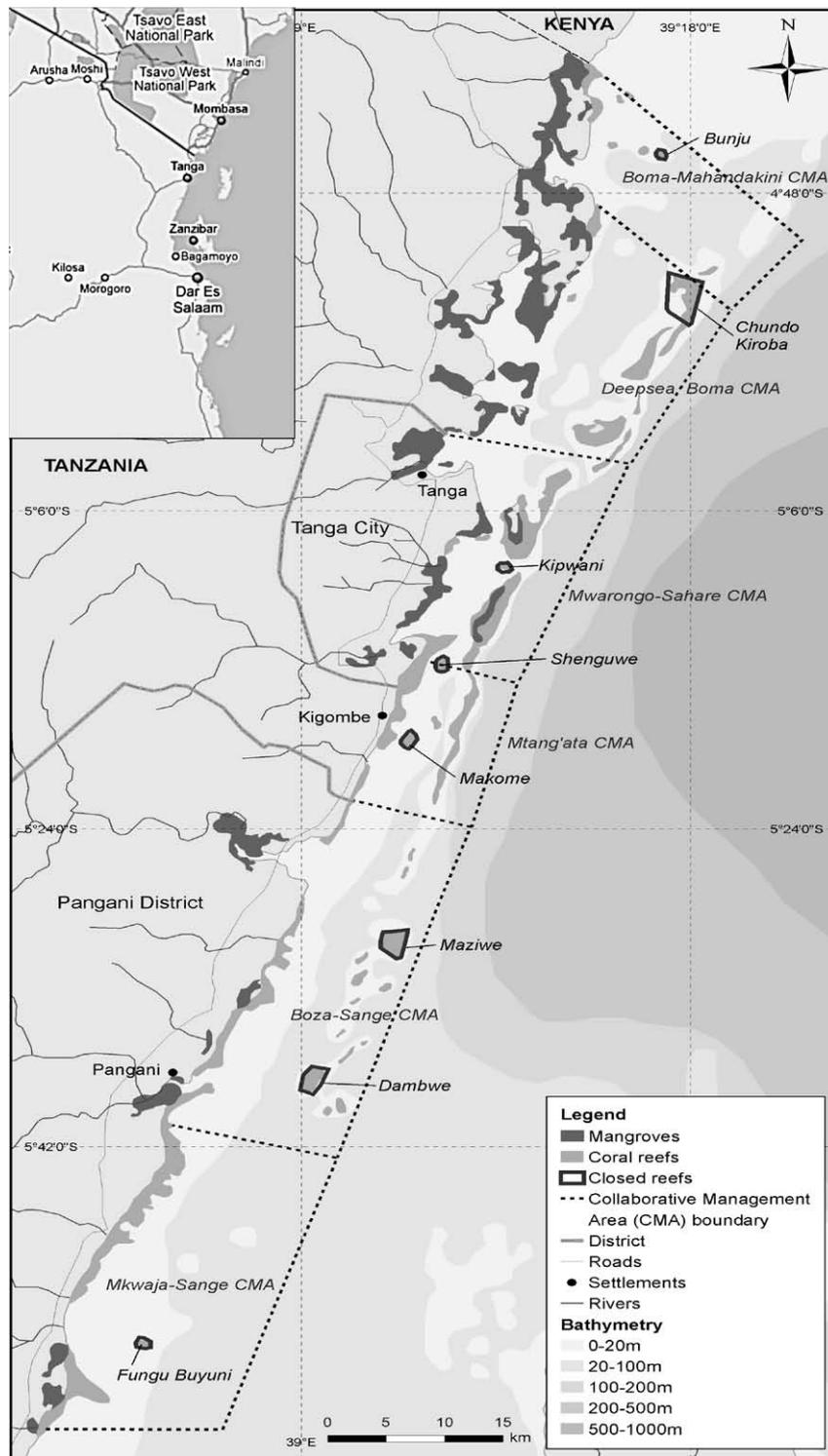


Fig. 1. Map of Tanga Region coastline showing Collaborative Management Areas.

over 50 (TDFMN, email updates; Feike News, 2007). Explosives are sourced from quarries and enterprises involved in mining, demolition, and road construction, but are also increasingly made from ammonium fertilizers and diesel. More sophisticated bombs, reportedly sourced from the army, are also used. In 2006, dynamite for a single blast cost Tsh 6000–7000 (US\$ 5–6) and could lead to a catch of 150–400 kg of fish. With fish prices of Tsh 3000–4000 (US\$ 2–3)/kg, dynamiters may be making Tsh 500,000–2,000,000 (US\$ 400–1800) per blast. A group of fishermen can undertake

ten blasts a day, and so this form of fishing has become a lucrative business.

Local communities generally know the dynamiters and their supporters (i.e. those who provide explosives, boats and freezers, and the buyers of the blasted fish), but they are afraid to 'out' them. Most village elders strongly disapprove of dynamite and many, if not most, villagers would like to see an end to it. Several village leaders and fishers have reported blasting to the district officers and the TDFMN anonymously, using mobile phones. The dynamiters

themselves are invariably young, usually unemployed males, but local leaders play key roles. Whilst dynamiters constitute a small proportion of any given fishing community, they are able to escape sanctions by being locally well-connected, a member of an influential family, or having well-placed patrons. This often obstructs enforcement efforts, and there are numerous examples of arrested culprits not being effectively prosecuted, receiving light fines or charges being dropped.

In 1968, reefs in Tanga Region were described as being “among the best along Tanzania’s coastline” (Ray, 1968). At the beginning of the TCZCDP, in 1995, only 24% of reefs surveyed were found to be in good condition (with over 20% coral cover). Subsequently, there was a gradual improvement in the health of several reefs, despite bleaching in 1998 as a result of the El Niño event, and a disease outbreak in 2003. Coral cover had reached over 40% on several closed reefs, particularly those that had been closed for longest, i.e. since 1996 (Wells et al., 2006, 2007). By 2007 however, many reefs showed signs of dynamiting, and some are now little more than rubble fields. A detailed comparison of a reef ‘closed’ to fishing since the mid 1990s with one left open to fishing, revealed that the former had a greater diversity of corals and few areas damaged by dynamite compared with the latter where dynamite use had changed benthos and fish composition (Hempson et al., 2007).

Dynamite fishing has other impacts. There are reports that people have died or lost limbs as a result of blasting incidents. The Tanzanian Tourism Master Plan (Ministry of Natural Resources and Tourism, 2002) classifies the north of the country as a “priority area”, on account of its relatively pristine beaches, uninhabited islands, coral reefs, historical towns and sites, and lively Swahili culture. At present there are few tourism operators but there is growing awareness of the potential, particularly for snorkeling and scuba diving. However, one potential investor has reportedly backed out because of the dynamiting, and several tourists have indicated that they would be unlikely to return to the area, or recommend it to friends, for the same reason. Another emerging concern is that Tanga is the location of a recently discovered large population of the coelacanth *Latimeria chalumnae*, categorised as Critically Endangered on the IUCN Red List. Some 40 coelacanths have been caught incidentally in the area since 2003, with large-mesh gillnets (jarifes) or hand lines. Fishermen are being discouraged from putting jarifes out in deep waters, but say that they have no alternative, as dynamiting, combined with overfishing, has destroyed the shallower reefs and reduced fish catch.

Over the past four years, dynamiting has also been on the increase elsewhere in the country. Lobbying by the TDFMN, combined with pressure from WWF, IUCN and the British High Commission in Dar es Salaam, finally led in December 2007 to a meeting hosted by the Ministry of Natural Resources and Tourism, and attended by four Government Ministers, Regional Commissioners from 11 coastal regions and senior officers from the Ministry of Defence, the Navy and the police. A resolution to adopt a zero tolerance policy against dynamite fishing was passed and the meeting received extensive media coverage nationally. A National Task Force was proposed to oversee a range of measures including raising the profile of the issue nationally, increasing investigation and enforcement efforts, tightening the accountability of officials involved in enforcement and prosecution, reviewing legislation and mobilising communities to tackle the problem at the grass-roots.

The meeting resulted in new energy within some of the enforcement agencies, and some genuine efforts on the part of some individuals, although the National Task Force has not yet materialised. For example in June 2008, a land based enforcement operation by the Fisheries Division, the Navy and the Police, with support from WWF, apprehended known dynamiters in Tanga and Temeke, an area south of Dar es Salaam, from a list of over 200 names gathered from a variety of sources. Over 40 people were

taken into custody, and cases are being brought against some of these, particularly in Tanga Region.

But the dynamiting is continuing, with regular reports of blasts from many parts of the coast. The southern coast of Tanzania is the one area where dynamiting is not a problem, and past experience here may provide some lessons. In the 1990s, dynamite fishing was rampant in Mtwara and Lindi Regions, reportedly led by politically influential people in Dar es Salaam. As in the north now, dynamite was cheap, initial returns were high, the risk of getting caught and convicted in court was negligible, and fines were inadequate. In 1996–1997, a hard-hitting enforcement campaign was undertaken by the Navy and Army, with the involvement of the Prime Minister’s office, through a process facilitated by a community-based rural development programme funded by the Government of Finland. Crucially, local fishers, local government and other stakeholders were involved, and an NGO, named Shirikisho, was formed from the group of affected fishers. Video was used to record discussions between fishers, District Fisheries Officers and other key players, which gave legitimacy to the process, and allowed the views of the villagers to reach national policy makers and the wider public. Shirikisho helped to lobby members of parliament who took the issue directly to the Prime Minister; he subsequently visited the region and publicly exposed the names of the dynamiters (Guard and Masaiganah, 1997).

In the Philippines, where dynamiting was a problem at Danajon Bank in Bohol, a similar approach was taken. A Fishers Alliance, numbering over 700 fishers, was set up and now operates over a large area, providing intense peer pressure within villages, with members reporting incidences to the police on their mobiles. This was combined with strengthening of the more formal law enforcement units through networking, training and providing them with national recognition (Christie et al., 2006). As with Shirikisho in Southern Tanzania, this approach has not only empowered fishing communities to take the initiative and responsibility for their marine resources, but also encouraged them to work with the authorities. Uganda also provides an example: this year the Uganda Fish Processors and Exporters Association organised a three-month campaign with the Lake Victoria fishers to ensure that they know the legislation and understand how it relates to sustainable fisheries management; enforcement exercises will then be undertaken, involving both the enforcement units and members of the Association.

Could these experiences provide a model for addressing blasting in Tanga? The oversight bodies for each CMA are the relevant Village Environment Management Committees (VEMCs) and a Central Co-ordinating Committee (CCC), comprised of representatives of each VEMC. The CCCs represent the views of villagers and marine resource users but there is no organization equivalent to Shirikisho. The Tanga Coastal Consultative Forum, established during the TCZCDP and comprising representatives of all stakeholders including government and private sector should, in theory, be playing a major role but appears to have been inactive. But perhaps there is a need for a process along the lines of that used in the 1990s in the south, to work directly with fishers, key local leaders, and other community members so that peer pressure is applied and the blast fishers shamed into halting their activities.

Equally important is the need to encourage the judiciary to enforce existing penalties and improve formal enforcement. Possession and use of explosives could be made offences under the Treason Act or Terrorism Act, as is the case in Kenya, which would help to give the issue a higher profile amongst the judiciary. A major problem is the lack of awareness among those in the legal system of the importance of the issue and the poor prosecution of cases. During the TCZCDP, the judiciary was trained in coastal management which helped build capacity to carry through prosecutions, and further training of this nature is urgently required. A well

trained enforcement unit, staffed by individuals who understand the issue, are adequately paid, and are nationally recognized for their work is ultimately essential. A culture of zero tolerance for blasting must be developed at both community and official level so that it becomes an unacceptable practice.

The existing and potential economic loss to fisheries and tourism from the blasting must also be quantified, and this information made widely available. In Indonesia, the cost of blast fishing to society has been estimated to be four times higher than the benefits to the individual fishers, resulting in a net loss after 20 years of over US\$ 300,000 per km² of coral reefs in areas with high value of tourism and coastal protection (Pet-Soede and Cesar, 1999). The fish and reefs that are being dynamited in Tanzania would clearly be more valuable alive rather than dead, and could sustain benefits for numerous stakeholders over years and decades.

The outbreak of dynamite fishing has come at a time when donor funding in marine and coastal management is higher than ever in Tanzania. This includes a US\$ 63 million World Bank and GEF funded national Marine and Coastal Environment Management Programme (MACEMP); and substantial other investment in marine and coastal resources management within the past five years by donors and NGOs including Irish Aid, GEF/UNDP, the Governments of France, Japan, Sweden and Norway, WWF and IUCN. If dynamite fishing was halted in the 1990s, with far fewer resources, it should certainly be possible now, and the donors must themselves play a role. Tanzania has been one of the leaders in promoting coastal management in sub-Saharan Africa, and it is inconceivable that the interests of a small group of dynamite fishers should be allowed to turn potential tourist revenue, regionally rich biodiversity, and a source of food security, into substantial losses instead.

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References

- Christie, P., Armada, N.B., White, A.T., Gulayan, A.M., de Dios, H.H.Y., 2006. Coastal environmental and fisheries profile of Danajon Bank, Bohol, Philippines. Fisheries Improved for Sustainable Harvest (FISH) Project. Cebu City, Philippines, pp. 63.
- Feike News, 2007. Dynamite Fishing in Tanzania. FEIKE Natural Resource Management Advisors.
- Guard, M., Masaiganah, M., 1997. Dynamite fishing in Southern Tanzania, geographical variation, intensity of use and possible solutions. *Marine Pollution Bulletin* 34 (10), 758–762.
- Hempson, T., Porter, S., Sink, K., 2007. Tanga Shore-based Expedition 2007: Scuba Diving Team Report. African Coelacanth Ecosystem Program (ACEP) project progress report 2007, pp. 28.
- IUCN, 2005. Completion and Assessment Report for Tanga Coastal Zone Conservation and Development Programme. IUCN Eastern Africa Regional Programme, 54pp.
- Jiddawi, N.S., Öhman, M.C., 2002. Marine fisheries in Tanzania. *Ambio* 31 (7–8), 518–527.
- Ministry of Natural Resources and Tourism, 2002. Tourism Master Plan – Strategy and Actions. United Republic of Tanzania Ministry of Natural Resources and Tourism April 2002, pp. 118.
- Muhando, C.A., Mohammed, M.S., 2002. Coral reef benthos and fisheries in Tanzania before and after the 1998 bleaching and mortality event. *Western Indian Ocean Journal of Marine Science* 1 (1), 43–52.
- Pet-Soede, L., Cesar, H., 1999. An economic analysis of blast fishing on Indonesian coral reefs. *Environmental Conservation* 26, 83–93.
- Ray, G.C., 1968. Marine Parks of Tanzania. Conservation Foundation, Washington D.C.
- Tanga Dynamite Fishing Monitoring Network (TDFMN) – email updates and personal communication.
- Wells, S., Samoilys, M., Anderson, J., Kalombo, H., Makoloweka, S., 2006. Collaborative Fisheries Management in Tanga, Northern Tanzania. In: McClanahan, T., Castilla, J.C. (Eds.), *Fisheries Management: Progress toward Sustainability*. Blackwell Publishing, Oxford, UK, pp. 139–165. (Chapter 7).
- Wells, S., Makoloweka, S., Samoilys, M. (Eds.), 2007. *Putting Adaptive Management into Practice: Collaborative Coastal Management in Tanga, Northern Tanzania*. IUCN Eastern Africa Regional Office.