

**No-take areas, either as zones within MPAs or as entire MPAs, are important tools for biodiversity conservation and fisheries management especially when implemented in close consultation with the stakeholders. This sheet describes the issues involved and how MPA managers can most effectively promote establishment of no-take areas.**

No-take areas (sometimes called marine reserves in the literature) are marine areas that are closed to all forms of extraction including fishing. In the WIO, they include the Marine Parks in Kenya and all the MPAs in Seychelles, as well as no-take zones within multiple use Marine Parks in Tanzania, Comores, Mozambique and Madagascar, and other management areas.

## BENEFITS OF NO-TAKE AREAS

An extensive literature exists on the role of no-take areas in protecting biodiversity and contributing to fisheries production. The details are still being debated by the scientific and conservation specialists but no-take areas are nevertheless internationally accepted as an essential conservation and management tool.

### Protecting biodiversity

Research around the world has shown that species richness, biomass, and size and abundance of organisms are higher inside no-take areas than outside, or compared with the area before it was closed, even after a period of as little as three years. In the WIO, the no-take MPAs of Chumbe (Zanzibar) and Kisite (Kenya) have larger fish and a higher diversity of fish species than fished reefs nearby. The abundance of triggerfish, surgeonfish and parrotfish in particular is higher. No-take areas at Malindi, Watamu, Mombasa, Kisite and Chumbe appear to have led to partial recovery of the heavily overfished triggerfish *Balistapus undulatus* within 5-10 years.

Higher biomass and diversity could be because the MPAs were selected because they were naturally more species-rich, but similar effects have been seen in areas closed for other reasons. For example, the closed reefs in the six collaborative management areas in Tanga Region, Tanzania, were selected by local communities for fishery stock replenishment and reef recovery and now show higher biomass and biodiversity than surrounding areas. Terrestrial protected areas (e.g. many national parks) where extraction is prohibited have similar biodiversity benefits.

### Increasing fisheries production

Common sense dictates that no-take areas should be beneficial for this purpose, and FAO recommends them as a tool. They allow fish to grow older and larger (thus producing more eggs and juveniles) and fish density to increase. Together, these should result in replenishment of adjacent fished areas through export of larvae and movement of adults (the 'spillover' effect) across the MPA boundary. A few studies have demonstrated spillover, but some have been inconclusive. However, many fishers perceive catches to increase following establishment of

closed areas, for example in Tanga Region, Tanzania and Quirimbas National Park, Mozambique. The extent of spillover may depend on the size of the no-take area, the species taken outside, and the number of fishers displaced who may increase pressure on adjacent fishing grounds.

## ESTABLISHING NO-TAKE AREAS

The WIO closed areas have been implemented with varying degrees of ease and success. Three key points to consider are adequate consultation, location and size.

### Stakeholder consultation

Closing an area to fishing inevitably means that some people will either have to cease fishing or move their fishing effort elsewhere. Without adequate sensitisation and participation, communities may view no-take zones as a form of disenfranchisement. This can lead to unrest and the situation can become politicised making it more difficult to resolve, as seen in some places in Kenya and Tanzania. Establishing no-take areas therefore needs to take account of the economic interests of fishers and other users. It is important, in advance, to spend time raising awareness of the potential economic benefits, such as increased fish catches or tourism revenue. Where stakeholders are receptive this process can be accomplished relatively quickly, but if there are entrenched negative perceptions it could take considerably longer. Either way, the time spent is an investment in conflict prevention. Study tours to meet fishers who already appreciate the benefits of closure are useful for communicating the message.



Large schools of fish, such as these snappers, can rapidly increase in no-take areas, boosting diving tourism.

### Location

Protecting biodiversity versus enhancing fisheries productivity may involve closing different areas. For

fisheries, habitats important for the target species, such as spawning aggregation sites and nursery grounds, may be the priority (and will also contribute to biodiversity protection). A full scientific study is rarely possible but fishers may provide helpful information if they are confident that it will be used for good management (see sheet B4). For example, in Moheli Marine Park in the Comores, some of the no-take areas selected were subsequently found to be inappropriately located for protecting fish populations. Discussions were held with the fishers and the boundaries have now been changed.

## Size

The optimal area to close will probably depend on local conditions although scientists and conservation organizations have recommended that networks of no-take areas should cover 20-30% of all marine habitats. The research on which these figures are based is not yet conclusive, but nevertheless MPA managers should look at the feasibility of increasing no-take areas. It is essential to develop a clear plan for this in collaboration with stakeholders. Where closed areas exist already, it may be as important first to ensure that these are well managed and to gather data to demonstrate their positive impact. In addition, other forms of fishery management, such as eliminating the use of damaging gears (see sheet I2), must not be overlooked.

### KEY POINTS FOR THE MPA

- ❑ Actively promote the establishment of no-take areas, in all habitats, with the full involvement of local communities, leaders, and fishers.
- ❑ Ensure that there is a good understanding of fishing patterns, practices and potential conflicts within an area before considering closing it.
- ❑ Establish a rigorous and verifiable monitoring programme as soon as a no-take area is implemented, designed to demonstrate its impact, and involving local fishers; data should be analysed regularly and made available to all stakeholders.
- ❑ No-take areas must be well demarcated, with the involvement of the fishers, to assist with enforcement and compliance; the boundaries should be visited with community representatives during the consultation, to ensure full agreement.

## Sources of further information

Agardy, T. et al. 2003. Dangerous targets: differing perspectives, unresolved issues, and ideological clashes regarding marine protected areas. *Aquatic Conservation: Marine and Freshwater Ecosystems* **13**: 1-15.

Gell, F. & Roberts, C. 2003. *The Fishery Effects of Marine Reserves and Fishery Closures*. Report available from WWF-US, 1250 24th St., N.W., Washington D.C., 20037, USA. 89pp.

Halpern, B. 2003. The impact of marine reserves: do reserves work and does reserve size matter? *Ecological Applications* **13**: S117-S137.

Horrill, J.C., Kalombo, H. & Makoloweka, S. 2001. *Collaborative Reef and Reef Fisheries Management in Tanga, Tanzania*. Tanga Coastal Zone Conservation and Development Programme, IUCN Eastern Africa Programme, Nairobi, Kenya.

McClanahan, T.R. 2000. Recovery of a coral reef keystone predator, *Balistapus undulatus* in East African marine parks. *Biological Conservation* **94**: 191-198.

Palumbi, S.R. 2002. *Marine Reserves: a Tool for Ecosystem Management and Conservation*. Pew Oceans Commission, Arlington, Virginia, USA. 45pp.

Roberts, C.M. & Hawkins, J. 2000. *Fully Protected Marine Reserves: a guide*, World Wildlife Fund, Washington D.C.

Ward, T. & Heineman, D. 2002. *The role of marine reserves as fisheries management tools: a review of concepts, evidence and international experience*.

[www.affa.gov.au/corporate\\_docs/publications/pdf/rural\\_science/fisheries/brs\\_marine\\_report.pdf](http://www.affa.gov.au/corporate_docs/publications/pdf/rural_science/fisheries/brs_marine_report.pdf)

*The Science of Marine Reserves* – video and booklet available from PISCO (a consortium of US universities) [www.piscoweb.org](http://www.piscoweb.org)

## CASE STUDY

### Impact of a no-take area in Kenya - Mombasa Marine National Park

Mombasa MNP was gazetted in 1986, initially without enforcement of the regulations banning fishing. An annual monitoring programme was implemented by CRCP (Coral Reef Conservation Project) in association with KWS, starting in 1987 when fish biomass was estimated at 180 kg/ha. The fishing ban was eventually enforced in 1991, and shortly after, populations of surgeonfish, triggerfish, butterflyfish, wrasse, emperors, parrotfish started to increase. By 2004, fish biomass in the MNP had reached 1,000 kg/ha. In the surrounding Marine Reserve, where certain forms of fishing are allowed, biomass has remained lower, and at Vipingo, a site outside both the Park and Reserve, biomass was lower still (70 kg/ha in 2000).

After 1991, catches per fisher in the Reserve increased by about 50%, and were highest at landing sites closest to the MNP. Nevertheless, total fish catch was about 30% lower than before the MNP was enforced due the number of fishers decreasing from 100 to 35, as many had to move fishing grounds or find other livelihoods. Pressure from fishers in 1994 resulted in an 'informal' reduction in the size of the MNP from 10 to 6 km<sup>2</sup> which resulted in total catches increasing to levels close to those before the initial area was closed. Reductions in the use of damaging forms of gear (notably beach seines) have also increased total catches.

This example demonstrates the benefit of a no-take area to biodiversity and fish biomass, and also illustrates the complexity of its impact on a fishery. A good monitoring programme to track trends in fish catches at different distances from the closed area is essential; the size of the closed area must balance fishers' needs with ecological requirements; and other fishery management measures (such as eliminating damaging gear) must be maintained.

McClanahan, T.R. & Arthur, R. 2001. The effect of marine reserves and habitat on populations of East African coral reef fishes. *Ecological Applications* **11**(2): 559-569.