

## Long-term spatiotemporal variations in coral-reef fish community structure and fishing at a South Pacific atoll



In many atolls of the South Pacific, a shift has occurred in the past couple of decades from traditional to more intensive fishing practices. Increasing fishing pressure on coral reefs raises the need for long-term studies to understand how fish communities react to fishing practice changes. The objective of this study was to analyse the variations of reef fish communities (in terms of species richness, diversity, density and structure) during a long time lapse at Tikehau atoll (Tuamotu archipelago, French Polynesia). The same eight lagoon pinnacles were sampled in 1987 and 2003 at 6 and 12 m depth. Quantitative data were collected by visual census techniques (UVC) on 50 m × 5 m belt transects. Analyses were conducted using a multiple spatial scale (depth, pinnacle and whole lagoon) approach with a particular attention on commercial species such as Scaridae (parrotfish), Acanthuridae (surgeonfish), Lutjanidae (snapper), Lethrinidae (emperor), Serranidae (grouper). Despite an increased sampling effort between 1987 and 2003, the mean species richness per transect decreased significantly from  $26.2 \pm 6.2$  to  $21.6 \pm 9.6$ . The mean diversity varied similarly.

A stronger decrease happened at pinnacles close to the village, where fish density also decreased. Conversely, fish density, species richness and diversity increased at pinnacles less visited by inhabitants. The community structure shifted from commercial species to small site-attached species e.g. Pomacentridae (damselfish), Ptereleotridae (dartfish) as fishing reduced the abundance (and biomass) of targeted stocks. We argue that these spatiotemporal variations resulted from a drastic change in fishing practices over the 16 years period, that shifted a sustainable fishery using traditional fish traps to an unbalanced, species-threatening, selective fishery. This study underlines the need for management and for the implementation of marine protected areas (including no-take zones) in order to protect the coral reef ecosystem and favor sustainable fisheries at Tikehau atoll.

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