

# No-take Zones as a Management Tool for Artisanal Fisheries in Martinique, FWI

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## ABSTRACT

No-take zones implementation has started in Martinique in 1999. Eight areas protected from artisanal fisheries have been created until late 2005. Political decision was taken together with the local Regional Fishery Committee and Fishermen associations, the Regional Council and the Maritime Administration. No-take zones were created to allow build-up of fish stocks over 3 years and were to be reopened after the fishery closure. In the end, most of them were maintained closed to fishery for another 3 years period. One survey was conducted over 3 of the 8 sites between March 2004 and April 2006 using visual census methods for fish population characterisation. Only recently (end 2006) a protocol was developed to assess the efficacy of 2 of the no-take zones based on experimental fisheries (Caribbean and Atlantic). While scientific information was being collected, decision to reopen one no-take zone for 6 months was first taken in April 2006. In 2007, lobby from the Regional Fishery Committee led to the reopening of 5 of the no-take zones. We discuss the efficacy of the policy developed in Martinique for coastal marine resources management in the absence of a scientific and social survey program and the objectives of a global framework for no-take zones development based on a scientific approach.

KEY WORDS: Martinique, no-take zone, small scale fisheries – Martinique, cantonnement de pêche, pêcheries artisanales.

## Reservas Marinas Como un Instrumento de Gestión para la Pesquería Artesanal en Martinica, Mar Del Caribe

La implantación de reservas marinas (zonas prohibidas a la pesca) ha empezado en 1999 en Martinica. Ocho áreas protegidas contra las pesqueras artesanales fueron creadas hasta al final de 2005. La decisión política fue tomada en concertación con el Comité Régional de la industria pesquera y las asociaciones de pescadores, el Consejo Regional y la Administración Marítima. Estas zonas protegidas fueron creadas para permitir la reconstitución de los recursos de peces sobre un período de 3 años y la reapertura de la pesca después. Finalmente, la mayor parte de las zonas fue mantenida cerrada a la pesca por 3 años más. Un estudio utilizando censos visuales fue realizado sobre 3 de los 8 sitios entre marzo de 2004 y abril de 2006 para determinar la estructura de las comunidades de peces. Otro protocolo con pescas experimentales fue desarrollado recientemente (final de 2006) para apreciar la eficiencia de 2 zonas protegidas (Caribe y Atlántico). Mientras que las informaciones científicas eran recogidas, la decisión de abrir una zona durante 6 meses fue tomada en abril de 2006. En 2007, una presión del Comité regional de la industria pesquera condujo a la reapertura de 5 zonas protegidas. Presentamos la eficacia de la política actual desarrollada en Martinica para la gestión de los recursos marinos costeros en ausencia de programa de estudio científico y social y los objetivos de una estructura global de creación de reservas marinas elaboradas teniendo como base de un enfoque científico.

PALABRAS CLAVES: Reservas marinas, pesquería artesanal, Martinica, gestión de la pesca, recursos marinos

## INTRODUCTION

Marine resource management is a major issue for small scale fisheries, particularly in the context of the Martinique island, where 1.300 fishermen are registered and a total of 17.000 tons of marine products are consumed every year (6.000 tons from local fisheries and 11.000 tons imported – DRAM 2005). It has been demonstrated throughout the world that marine resources are intensively exploited (Munro 1996, Pauly *et al.* 2002, Myers and Worm 2003) and impact from artisanal fishing can be significant (Adam *et al.* 1997, Coblentz 1997), among demersal species such as reef fishes (Robichaud *et al.* 1999, Campbell and Pardede 2006), sea urchins (Lafferty and Kushner 2000) lobster and conch. Management tools have been developed and tested and new marine resource management policies experienced (Chakalall *et al.* 1998, 2007), especially marine areas protected from fisheries (Roberts and Hawkins 2000, Russ 2002, Gell and Roberts 2003a, 2003b, Roberts 2001, Roberts *et al.* 2001) to support fisheries sustainability (Grafton *et al.* 2005, Pitchford *et al.* 2007).

Small scale fisheries in Martinique (fish traps and bottom nets) concentrates near coast and has not really evolved since the introduction of outboards motors (Gobert 1989). The fishing effort concerns a wide range of species and catches are usually multi-species (Gobert 1990, 1991a, 1991b) as well as in the neighboring islands (Gobert 2000). As a result, many juveniles are captured and fish population are threatened. Marine area protected from fisheries have been widely used as a community-based management issue (Amar *et al.* 1996, Thompson *et al.* 2003, Wiber *et al.* 2004, Jentoft 2000, Thompson 2007) and has led to various project, one of the most famous in the Caribbean region being the Soufriere Marine Management Area (SMMA) in Sainte Lucia (George 1996, Goodridge *et al.* 1997).

A set of decrees developed in the 1990's allowed the Martinique island to adopt new direction in marine resource management. Late 1990s several no-take zones were created to sustain local small scale fisheries. With the help of the Regional Fishery Committee, nine marine areas were closed to coastal fisheries, but misunderstanding of

the objectives and inadapted regulation have led to a confused situation, together with the absence of a board committee to adjust decision making based on scientific and economic data.

### Marine Resources and Fisheries Management Policy in Martinique

Antillean fisheries are characterised by multi-species catches. This complex system does not stand for a precise marine resources evaluation or assessment. Indeed, many techniques and gears are used and many landing sites are numerous.

It has never been demonstrated that these resources were overexploited, probably because of the low number of fishery statistics in the area. Recently a specific Fishery Statistic System has been set up in Martinique by IFREMER.

However, the fact that the marine resources are limited, especially those from the shallow waters is quite well accepted. It is also clear that the level of exploitation of these benthic and demersal resources is high in spite of the fact that fish traps and fishing techniques in general remain small-scale fisheries. This context has led to marine resource management policy development with the principal objective being the sustainability of small scale fisheries.

Several institutions and administrations (Secrétariat Général pour les Affaires Régionales, Direction Régionale des Affaires Maritimes, Comité Régional des Pêches) have concentrated particularly on two main orientations:

- i) Fish aggregating devices (FADs): floating objects that are designed and located to attract pelagic fishes, and
- ii) Coastal Protected Marine Areas.

### Non-permanent No-take Zones in Martinique

Marine environment protection in Martinique would have probably not been possible through the actual policy and reglementation in 1999 (Nature protection law 10/07/1976 – L.332-1). Using that law would have given a fully and permanent protection status to the nature reserves scheme. The fact that resources would then not be accessible to fishermen would have been a curb on fishery management process through marine resource protection. The innovation in the implementation of the no-take zones in Martinique has been the entailment of the professional fishermen and the reversibility concept of the fishery closure. Fishermen could decide the location of the no-take zone, the closure dates and reopening dates, through administration decrees proposed by the Regional Fishery Committee to the Prefet Administration. The way of doing so has convinced the fishermen to support the idea of a necessary marine resource protection towards exploited species.

In the late 1990s, the Maritime Administration (DRAM) initiated the approach based on the Corsica case

where similar no-take zones were created in the late 70's (Pelaprat 2000): the objective is to create a marine area totally banned from both professional and recreational fisheries to limit the fishing effort on the coast, with compensation through the development of FADs (Law: decree 04/06/1963).

In Martinique, a set of new decrees from the 1990s has been used to develop a local/regional policy:

- i) Decree n°90-94 25/01/1990: a decree that gives the Prefect the authority with regard to fisherie
- ii) Decree n°90-618 11/07/1990: a decree on recreational fisheries regulation
- iii) Decree n°92-335 30/03/1992: a decree that defines the Regional Fisheries Committee authority

The reversibility of the fishery closure was made possible because of this local authority in terms of fisheries management and, policy could be developped to fit the local fishermen claim.

As a result nine non-permanent no-take zones were created between 1999 and 2002 following a local demand from fishermen communities. In 2007, eight zones are still in use and one was abandoned. (Figure 1).

From the fishermen point of view, they clearly see a decline in catches since many years and species they do not catch anymore. They also realized that past fisheries relied more on season with changes in the fishing techniques employed: fish traps and then the Miquelon fisheries (December to July) while the seine fisheries was only used during specific period of time when the fishermen knew that seine target species were catchable. Today fish traps are used all along the year. Their motivation to protect the exploited marine resources was based on economic and sustainability aspects: allow fish reproduction and growth within the no-take zones (sort of biological rest period) for three years and reopen to small scale fisheries to access the new resources and benefit from the three years protection.

Eight marine areas protected from fishing and anchoring have been created, covering a total of 32km<sup>2</sup> over a continental shelf of 1.110 km<sup>2</sup>. The total of non permanent marine protected areas in Martinique is of 3%. At the end of the first three years, the closure was maintained for another three years (DRAM decision), and the no-take zone "Petite Anse" was abandoned (march 2005) (Table 1).

Two specific areas have been the focus of a few research and assessment projects: Ilet à Ramiers and Robert Bay. Between 2001 and today, three reports were produced. The studies were based on scuba-diving fish visual census:

- i) 2001: first assessment of fish population within and outside the no-take zone "Ilet à Ramiers" (Impact Mer). A first rapid assessment of fish population was done at "Ilet à Ramiers" showing a difference in fish diversity between the

- inside and the outside of the protected area (Table 2).
- ii) 2004 - 2006: protection effect on fish assemblages at Ilet à Ramiers, Case Pilote and Sainte Luce (BioMer Environnement). The same site (Ilet à Ramiers) was sampled and 58 fish species were counted in the end. A specific study dedicated to the lobster fishery was carried on in the Robert Bay by IFREMER, showing that 80% of the catches within the no-take zone and 56% of the catches outside were juveniles, meaning that shallow waters (no more than 15 m) are dominated by juveniles.
  - iii) 2007: effects of resources protection on fish traps catches at "Ilet à Ramiers" and "Robert bay" (undercourse).

During the past six years, no before and after project evaluation has been conducted, no fishing campaign, no socio-economic evaluation, no survey or assessment (except the three focused projects mentioned above), no buoys to delimit the no-take zones. This context illustrates a lack of clear objectives and management plan to support the initiative at this period of time.

Since 2006, the Marine Environment Observatory of Martinique has started a data acquisition program on major marine environmental issues in Martinique:

- i) 2006 - Marine Habitat Mapping project (PhD),
- ii) 2007 - Marine habitat health and fish population structure relationship (PhD)

Those data will be of valuable use for marine environment protection policy development in Martinique.

While clear policy and objectives were not really well defined, the local Fishery Committee decided to re-open some of the no take zone (Table 1) under specific conditions:

- i) A licence must be asked by the professionals to the DRAM. Professional must be up to date with taxes assessment and have an unexpired boat licence,
- ii) Fish traps and hand lines fisheries only,
- iii) Fish traps must have a minimal mesh of 38mm,
- iv) Number of fish traps is limited to 8 traps per boat / day,
- v) Fish traps must have a sign with name and nb of the boat. Each traps must also be clearly visible at the surface with the same information,
- vi) Catches must be transferred to paper sheet and send to the DRAM before the 15th of each month during the reopening. Extension of the reopening will depend on the IFREMER statistics from these data.

The no-take zones were re-opened in 2006 (April to September) and 2007 (July to October) for a period of six months. After the experimental fishing season, it was clear that the level of participation in the statistics was very poor, leading to the inability to conclude on the trend in catches or days at sea. From these data, the number of days at sea per month seems to decrease over time (Figure 2). It has already been demonstrated that the closure / opening balance does not work really well and the benefits from the marine resource protection does not last under these conditions (Roberts and Hawkins 2000).

### **Research That Supports No-take Zones in Martinique in 2006/2007**

Several research projects are undercourse and will provide reference knowledge in Martinique.

Two no-take zones have been selected to conduct experimental fishing using local fish traps (Z shape - Guillou and Lagin 1997): Ilet à Ramiers and Robert Bay. Two campaigns will be conducted during a period of two years (2007 – 2008) during the wet and the dry season to consider seasonal variation. Each sampling is done during four weeks with traps placed within (two traps) and outside (two next to the border, two in the fishing area) the no-take zone to evaluate several parameters: fish species diversity, biomass, maturity stages. Otoliths are collected to run microchemical analysis and evaluate growth rates in and out of the marine protected areas. Preliminary results show significant biomass differences between the no-take zones and the outside for both sites (Figure 3).

Marine habitat is a crucial information to examine potential future no-take zones. A current marine habitat mapping program is done for the whole island of Martinique providing fundamental data on the location of major marine ecosystems. Such knowledge will be used soon to identify nurseries and fish aggregation sites in Martinique.

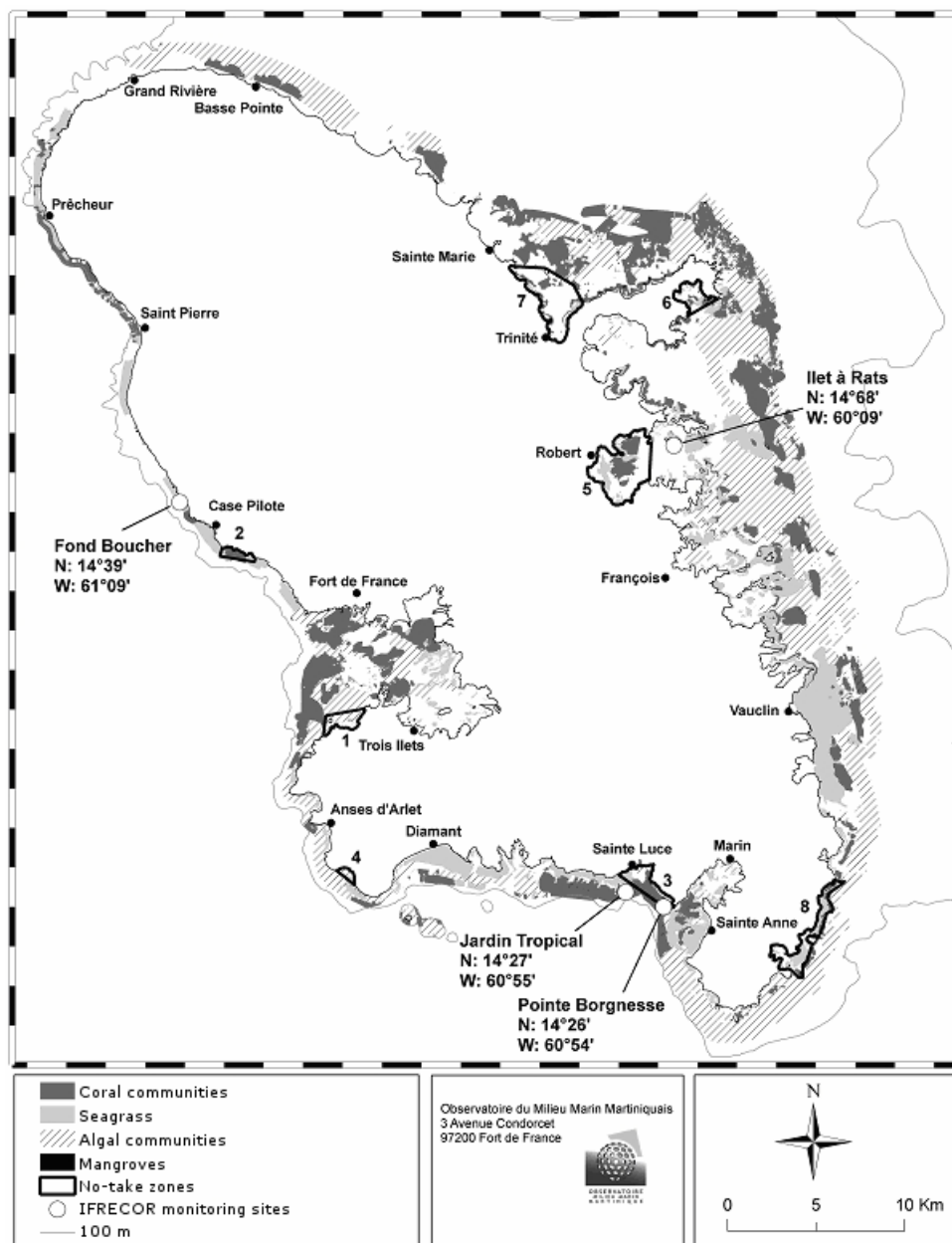
A particular attention is also given to the relationship between fish assemblages and habitat health status. Twelve sites have been partitioned into two coral reef habitat types 1) bank reef and 2) fringing reef. Within these two groups benthic community health is assessed according to a four health index grid (very good, good, degraded, very degraded) and selected sites are typical of each of the four categories. Fish and benthic communities quantitative data are collected using visual census methods at an average depth of 10 m. Fish counting is performed along a 50 m long transect: 1) 1<sup>st</sup> pass – number and size class of mobile and fearful species – 50 x 4 m belt transect and 2) 2<sup>nd</sup> pass – number and size class of territorial species – 50 x 2 m belt transect. Point intercept is used for benthic community characterisation, one point being recorded every 50 cm (100 pt / transect). Each site will be sampled twice a year in triplicate during the wet and dry seasons.

**Table 1.** no-take zone details for the Martinique island – 2007.

No-Take Zone	Date	Area protected	Status
Baie du Trésor	01/08/1999	228 Ha / 653 acres	Experimental fishing campaign 04/01/2006 to 09/30/2006 (Decree n°06-1049 03/27/2006) 07/01/2007 to 09/30/2007 (Decree n°07-2041)
Ilet à Ramiers	06/27/1999	184 Ha / 455 acres	Experimental fishing campaign 07/01/2007 to 10/31/2007 (Decree n°07-2042 06/29/2007)
Sainte Luce	12/29/1999	290 Ha / 717 acres	Experimental fishing campaign 04/01/2006 to 09/30/2006 (Decree n°06-1048 03/27/2006) 07/01/2007 to 10/31/2007 (Decree n°07-2043 06/27/2007)
Baie du Robert	03/23/2000	953 Ha / 2.355 acres	Closed since beginning
Trinité/Sainte Marie	02/01/2002	799 Ha / 1.974 acres	Experimental fishing campaign 07/01/2007 to 10/31/2007 (Decree n°07-2043 06/27/2007)
Petite Anse	03/12/2002	46 Ha / 114 acres	End March 2005
Case Pilote	09/12/2002		Closed since beginning
Sainte-Anne/Cap Chevalier	10/22/2002	447 Ha / 1.105 acres	Experimental fishing campaign 04/01/2006 to 09/30/2006 (Decree n°06-1047 03/27/2006) 07/01/2007 to 10/31/2007 (Decree n°07-2043 06/27/2007)
Baie du François	10/24/2005	91 Ha / 225 acres	Closed since beginning
<b>TOTAL</b>		3.038 Ha / 7.507 acres	

**Table 2.** fish population assessment using visual census methods inside and outside the no-take zone "Ilet à Ramiers" in Martinique (2001-2006).

Ilet à Ramiers	Within NTZ	Outside NTZ	Protocol
Impact Mer – 2001	62 sp / 25 F	28 sp / 14 F	Visual census 1 site inside / 1 site outside
BioMer Environnement – 2004/2006	58 sp / 25 F	65 sp / 25F	Visual census 3 sites inside / 1 site outside

**Figure 1.** Coral reefs, seagrass and mangroves along the coast of Martinique and location of the 8 no-take zones. The IFRECOR (French Coral reef Initiative) monitoring sites are also visible.

## Orientation and Future of the No-take Zones in Martinique

While beginning of 2007 a first bilan was drawn after six years of marine resources protection through no-take zones, decision to reopen the protected area was taken for the second time. In the absence of relevant data and statistics and based on the fact that the protected areas should be reopen after three years, a majority of professional fishermen supported the idea of accessing important resources. Again, participation to statistic was minor. It was then decided to formalize a board Committee bringing together the main organisation and administration involved in the process to define objectives based on the fishermen wishes, develop a management plan based on new knowledge and the result of the research projects and review or redesigned the actual no-take zones to define better evolution options. At the same time a decision was taken to have a scientific committee beside the board to follow-up with a scientific program and to evaluate or assess the decision taken by the committee. The steering committee – DRAM, CRPMEM, IFREMER, OMMM, CR – was initiated end 2007 with the responsibility of being in charge of the no-take zone management and orientation policy (Figure 4).

The next step is the re-examination of the recommendation suggested at the Conference on Fisheries and Aquaculture held in Martinique in 2005 (Table ronde sur la pêche et l'aquaculture 2005):

- i) Adapt the policy to protect relevant fishing area in the no-take zone,
- ii) Limit the number of gears,
- iii) Change the fishing policy for lobster and queen conch,
- iv) Increase the minimum mesh size for fishing gears and change the regulation of damaging fishing techniques on habitat and resources,
- v) Protect fish aggregation area and nurseries / adapt the fishing period.

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