FAO
FISHERIES AND
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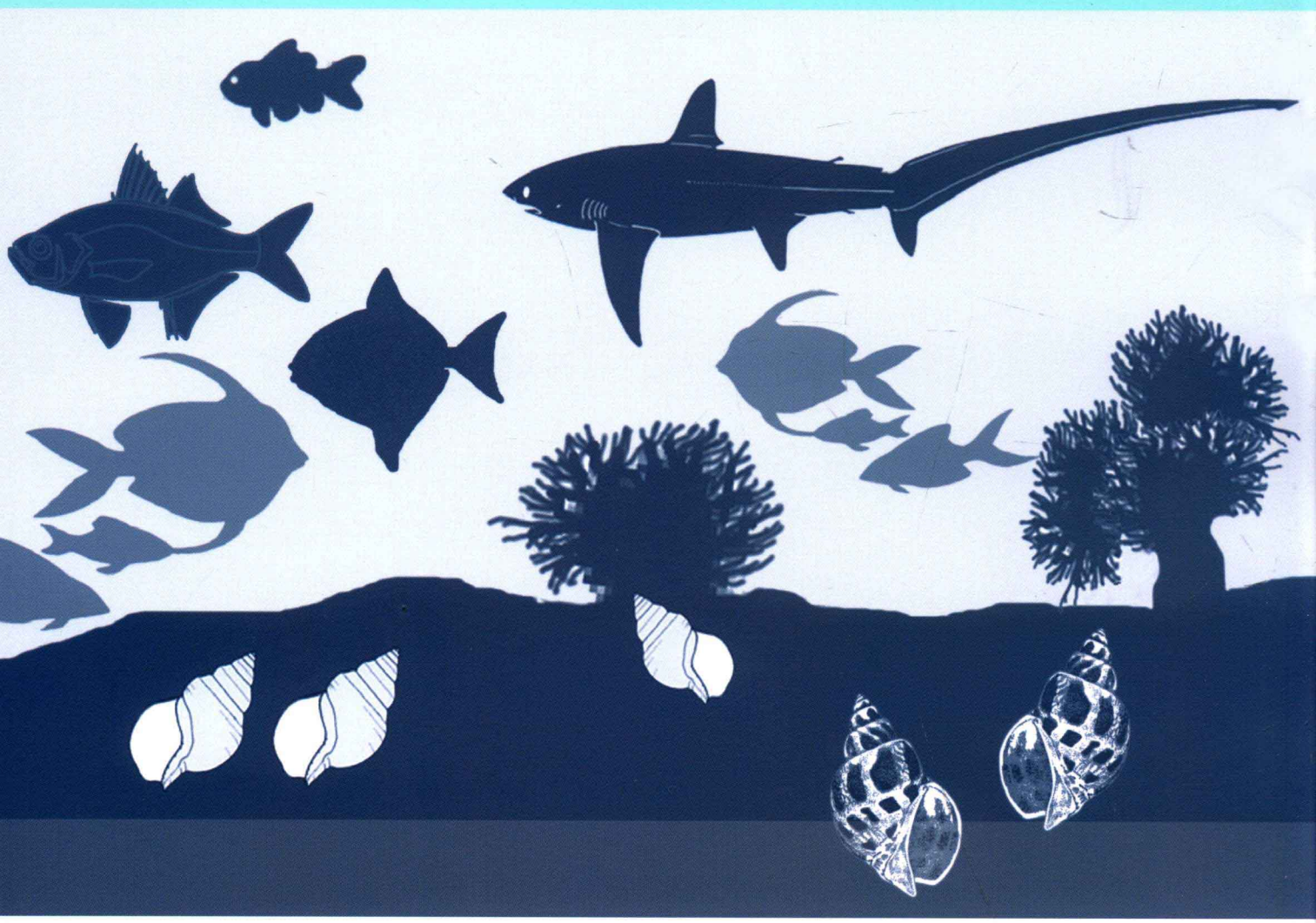
TECHNICAL
PAPER

556/1

ISSN 2070-7010

Marine protected areas

Country case studies on policy, governance and institutional issues



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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2011

ISBN 978-92-5-106857-1

Preparation of this document

The four case studies from Brazil, India, Palau and Senegal were prepared as part of a set of 16 studies gathering national experiences from around the world. The studies are intended to ground the FAO Technical Guidelines on marine protected areas (MPAs) and fisheries[1] in practical experience and to inform the use of MPAs globally.

The planning and development of the case studies were carried out by a team including Dominique Gréboval, Patrick Christie, Antonia Hjort and Jessica Sanders. The case studies were carefully reviewed by Katrina Ole-Moiyoi, Oliver Schultz and Clotilde Bodiguel. Ariane Acqua was instrumental in project operations and the publication of this document. Final editing of the case studies was provided by Lynn Ball and Sacha Lomnitz.

The maps of each country were prepared by Fabio Carocci using the following sources: (i) the Centenary Edition of the General Bathymetric Chart of the Oceans (GEBCO) Digital Atlas; (ii) the Database on Protected Areas (WDPA); and (iii) the FAO Global Administrative Unit Layers (GAUL).[2]

The case studies were funded by the Government of Japan through the projects "Promotion of sustainable fisheries: support for the Plan of Implementation of the World Summit on Sustainable Development" (GCP/INT/942/JPN) and "Fisheries management and marine conservation within a changing ecosystem context" (GCP/INT/253/JPN).

[1] FAO. 2011. *Fisheries management. 4. Marine protected areas and fisheries.* FAO Technical Guidelines for Responsible Fisheries No. 4, Suppl. 4. Rome. 199 pp.

[2] (i) IOC, IHO and BODC, 2003. Centenary Edition of the GEBCO Digital Atlas, published on CD-ROM on behalf of the Intergovernmental Oceanographic Commission and the International Hydrographic Organization as part of the General Bathymetric Chart of the Oceans, British Oceanographic Data Centre, Liverpool, UK. (ii) UNEP-WCMC. 2011. Data Standards for the World Database on Protected Areas. Cambridge, UK, UNEP-WCMC (available at: www.protectedplanet.net, accessed 20 April 2011). (iii) FAO. 2009. Global Administrative Unit Layers (GAUL). Rome.

Abstract

This Fisheries and Aquaculture Technical Paper presents case studies of the policy, governance and institutional issues of marine protected areas in Brazil, India, Palau and Senegal. It is the first of four in a global series of case studies on marine protected areas (MPAs). An initial volume provides an analysis and synthesis of all the studies.

The set of global MPA case studies was designed to close a deficit in information on the governance of MPAs and spatial management tools, within both fisheries management and biodiversity conservation contexts. The studies examine governance opportunities in and constraints on the use of spatial management measures at the national level.

They were also designed to inform implementation of the FAO Technical Guidelines on marine protected areas (MPAs) and fisheries, which were developed to provide information and guidance on the use of MPAs in the context of fisheries.

Sanders, J.S.; Gréboval, D.; Hjort, A. (comp.)
Marine protected areas: country case studies on policy, governance and institutional issues.
FAO Fisheries and Aquaculture Technical Paper. No. 556/1. Rome, FAO. 2011. 118 pp.

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Senegal (in English)

1. Introduction

Marine protected areas (MPAs) are currently much discussed and often strongly promoted from a biodiversity conservation perspective, particularly in response to international calls to safeguard the marine environment. Many countries have agreed to international targets or goals, such as the Plan of Implementation of the World Summit on Sustainable Development (WSSD-POI), which called on countries to use:

> *... diverse approaches and tools, including the ecosystem approach, the elimination of destructive fishing practices, the establishment of marine protected areas consistent with international law and based on scientific information, including representative networks by 2012 and time/area closures for the protection of nursery grounds and periods ....*
>
> – WSSD-POI, paragraph 32(c)

Recently, the Convention on Biological Diversity's (CBD) tenth Conference of the Parties (COP 10) encouraged parties and other governments to "achieve long-term conservation, management and sustainable use of marine resources and coastal habitats, and to effectively manage marine protected areas..." (Decision X/29, paragraph 15).[1] During the same COP, a CBD decision also recommended that MPAs for conservation and management of biodiversity could, when in accordance with management objectives for protected areas, also be established as fisheries management tools (Decision X/31, paragraph 24).[2]

In fisheries management, spatial management tools, including MPAs, have been used for centuries and do not constitute a new management tool. Protection of specified areas through bans or types of gear or fishing activities have long been part of the fisheries management toolbox and have been practised by communities employing traditional management arrangements around the world. The FAO Code of Conduct for Responsible Fisheries (the Code) mentions the use of spatial management measures, for example in Article 6.8, which emphasizes the importance of protection and rehabilitation for all critical habitats, and particularly protection against human impacts such as pollution and degradation. In an effort to promote its goal – sustainable fisheries – the Code addresses protected area measures:

> *States should take appropriate measures to minimize waste, discards, catch by lost or abandoned gear, catch of non-target species, both fish and non-fish species, and negative impacts on associated or dependent species, in particular endangered species. Where appropriate, such measures may include technical measures related to fish size, mesh size or gear, discards, closed seasons and areas and zones reserved for selected fisheries, particularly artisanal fisheries.*
>
> – Article 7.6.9

A convergence of interests has taken place as fisheries managers emphasize healthy ecosystems, and conservation groups have become increasingly aware of the necessity to include human needs and interests in designing and implementing MPAs. However, despite the long-term, widespread use of spatial management tools in fisheries

[1] COP 10 Decision X/29, Marine and coastal biodiversity.
[2] COP 10 Decision X/31, Protected areas.

management and conservation, there remains significant confusion regarding the establishment of MPAs with varying objectives, as well as the general role of MPAs meeting multiple objectives within fisheries management. Views on how and when to use MPAs and what they can achieve differ significantly among diverse political, social and professional groups, and also among individuals. A shift towards broader ecosystem considerations in fisheries management and the ecosystem approach to fisheries (EAF) has led to the increased use of tools such as MPAs to pursue multiple objectives. However, multiple-objective MPAs have not been as thoroughly studied in recent literature or case studies.

The FAO Fisheries and Aquaculture Department was asked to further explore the role of MPAs in relation to fisheries at the Twenty-sixth Session of the FAO Committee on Fisheries (COFI) in 2005. This request resulted in the FAO Technical Guidelines on marine protected areas and fisheries, which discuss MPAs in relation to fisheries management and aspire to enhance understanding of how MPAs can contribute to bridging fisheries management and biodiversity conservation objectives within broader management frameworks (i.e. the EAF).

Despite the many studies and guides on MPAs, there is a dearth of information and research on MPAs in a fisheries context, and particularly in relation to governance of MPAs for multiple objectives or the involvement of many institutions. The MPAs invariably affect fisheries when designated with biodiversity or other primary objectives, and vice versa. Thus, an understanding of governance regimes for spatial management measures and the coherence or confusion within countries are crucial aspects in understanding the use and improving the effectiveness of MPAs.

The set of global MPA governance case studies was designed to address a deficit of information on the governance of MPAs and spatial management tools, within both fisheries management and biodiversity conservation at the national level.

The studies were conducted using a consistent research framework to facilitate their eventual analysis, which is presented as the initial volume of the series.[3] All authors were provided with a background and outline for their case study, including the goals, objectives, working definitions, framework for the study and list of relevant literature.

The goals were to:

- describe the means and outcomes of MPAs for fisheries management planning and implementation in various contexts, in particular emphasizing developing countries;
- identify the ability of MPAs, as implemented, to meet both biodiversity conservation and fisheries management objectives (and others);
- identify key governance opportunities in and constraints on MPA implementation; and
- ground the MPA Guidelines in current practice.

To create a common understanding among the authors, a working definition of 'governance' was provided:

> *... the concept of governance conceived of as "the formal and informal arrangements, institutions, and mores which determine how resources or an environment are utilized; how problems and opportunities are evaluated and analyzed, what behavior is deemed acceptable or forbidden, and what rules and sanctions are applied to affect the pattern of resource and environmental use."*
>
> – Juda (1999)[4]

[3] FAO. In review *Marine protected areas: a global overview of national approaches*. FAO Fisheries and Aquaculture Technical Paper No. 556. Rome.

[4] Juda, L. 1999. Considerations in the development of a functional approach to the governance of large marine ecosystems. *Ocean Development and International Law*, 30: 89–125.

A definition and a characterization of MPAs were developed. The definition was taken from the CBD, and the characterization of MPAs for fisheries was adapted from a 2006 FAO workshop:

> *"Marine and coastal protected area" means any defined area within or adjacent to the marine environment, together with its overlying waters and associated flora, fauna and historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings.*
>
> – CBD, COP 7, Decision VII/5, paragraph 10, note 1(a)

An MPA used as a fisheries management tool:

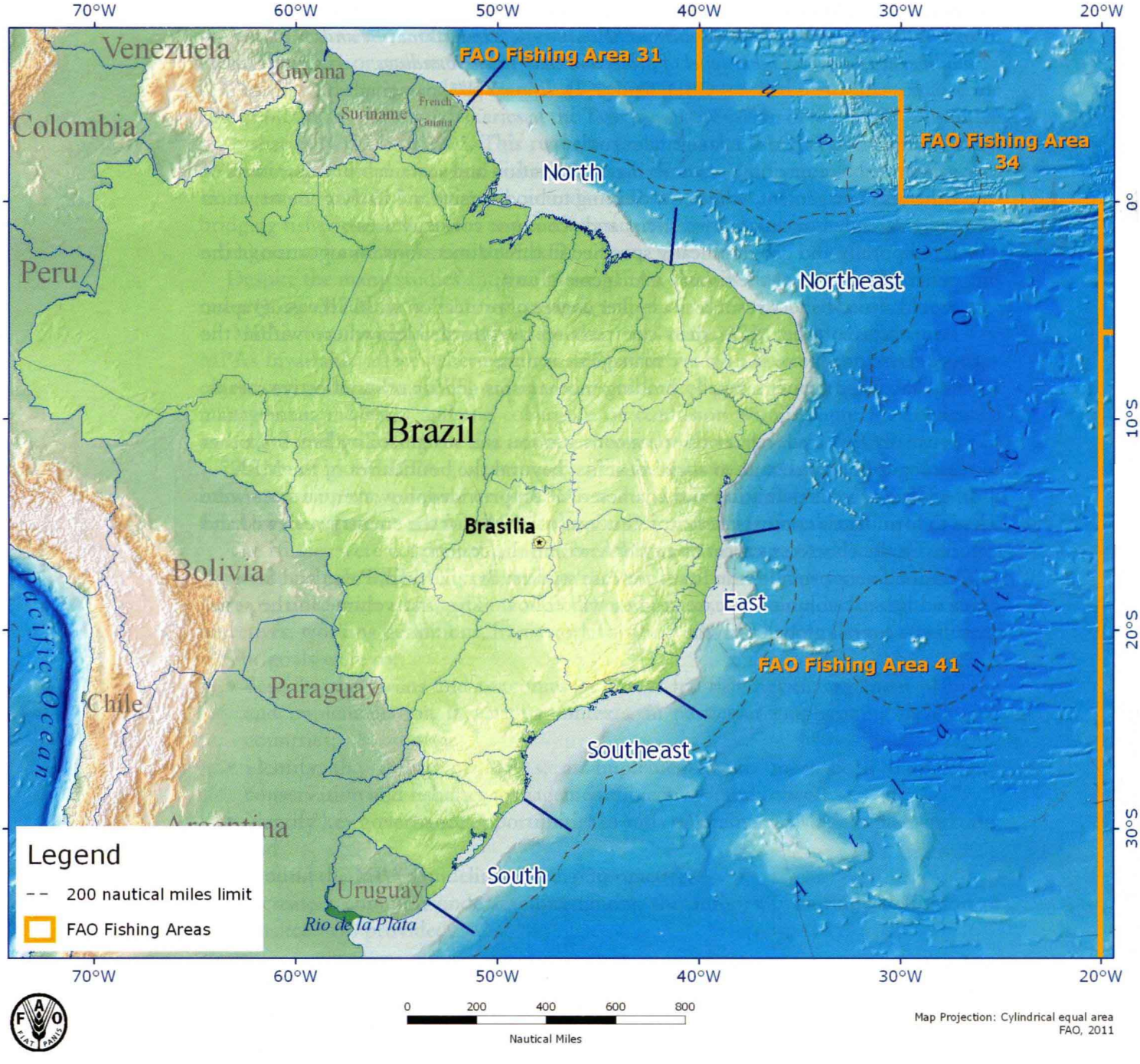
- is intended to contribute to achieving conservation and sustainability objectives of fisheries management, while contributing to biodiversity and habitat conservation (with intended or unintended social and economic consequences);
- is temporally and geographically specified in three dimensions for a portion of the geographic range of the fishery management unit;
- would afford fishery resources a higher degree of protection within the geographic boundaries of the MPA than the resource is afforded elsewhere within the geographic range of the fishery management unit;
- is established through legally binding mechanisms and/or other effective means; and
- is usually expected to have resource conservation and sustainability benefits, other ecological benefits, and/or social benefits, beyond the boundaries of the MPA.[5]

In addition to the definition and characterization provided, however, authors were asked to formulate a context-specific definition for MPAs for the country reviewed and to focus on the characterization of an MPA within the country.

This document provides the first four case studies: Brazil, India, Palau and Senegal. Three additional volumes of case studies will follow. The first volume in the series presents an overall global analysis.

[5] FAO. 2007. *Report and documentation of the Expert Workshop on Marine Protected Areas and Fisheries Management: Review of Issues and Considerations, Rome, 12–14 June 2006.* FAO Fisheries Report No. 825. Rome. 332 pp.

Map 1
Map of Brazil and FAO Fishing Areas



Brazil

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1. INTRODUCTION

The use of protected areas as tools in the conservation of biodiversity is not new in Brazil. It dates back to the first half of the twentieth century, when the first territorial park was created. The country now presents a relatively extensive system of protected areas covering about 8 percent of the national territory (Brito, 2003; Prates *et al.*, 2007). However, the use of protected areas in aquatic environments is more recent (Atol das Rocas, the first marine biological reserve, was created in 1979). The first marine protected areas (MPAs) were created mainly with the goal of conserving biodiversity and protecting essential marine habitats. More recently, protected areas have also been proposed and implemented as tools for managing fisheries, particularly in areas of conflict over the use of coastal and sea spaces. Currently, two categories of terrestrial and marine protected areas are recognized in the legislation: those for total protection, aimed at protecting fragments of ecosystems from any human interference; and those for sustainable use, where the controlled exploitation of resources is permitted. There are examples of both types of protected areas in the marine environment.

This paper focuses on the dual role of MPAs – for fisheries and for conservation. It starts by highlighting the differences and objectives of the two categories in Brazil and provides a brief history of their implementation. Discussion follows of the lessons learned from a few examples of MPAs, and the main challenges, impacts and opportunities in Brazil for their effective implementation.

2. FISHERIES AND SPATIAL MANAGEMENT

2.1 General condition of marine fisheries

Two main fish production systems coexist in Brazil: industrial and artisanal. Industrial fisheries are defined as fish-harvesting undertaken by large boats belonging to a fishing company. The social and technical division of labour is high, and catches are sold to processing companies operating within highly commercialized global markets. Industrial fisheries concentrate their harvesting on high-market-value species such as lobster, shrimp and tuna, or on highly abundant stocks such as sardine. Another type of industrial fishery that has gained importance in recent years is fishing in slope waters for deeper-water species such as monkfish and crab. This fishery is mainly operated by foreign vessels under license agreements with Brazil.

Artisanal fisheries are operated by independent fish harvesters, whose livelihoods are based on fishing on a part- or full-time basis. They use labour- and knowledge-intensive fishing techniques, and employ family or community labour for harvesting in coastal habitats, often on a sharing basis. The fish caught are normally sold in local markets, usually through intermediaries, although some of the catch is kept for home consumption. The artisanal fisheries sector has a long-standing tradition in Brazil. Before governmental incentives to develop industrial fisheries in 1967, artisanal fisheries accounted for more than 80 percent of fish production in the country. Now, they are responsible for approximately half of the 540 000 tonnes of marine species landed annually in Brazil (IBAMA, 2007).

2.2 Socio-economic aspects and conditions

Socio-economic data on coastal fisheries are generally scarce. There are several reasons for this. One is the wide dispersion of fishing communities along the coast, which makes the task of collecting information extremely difficult. Another factor that has hampered the development of programmes to evaluate the socio-economic status of artisanal fisheries is the Government of Brazil's priority on and support to industrial fisheries, to the detriment of the artisanal sector. Among the main data deficiencies are those concerning economic aspects of the fishery, such as employment and income levels, types of technologies employed, and organizational aspects of fishing communities. Some small improvements in data availability have been observed in recent years, as government welfare programmes have begun to collect and disseminate information on the fishers who apply for state benefits, such as the unemployment benefit received during fishing closures.

The number of active fishers is uncertain. It is estimated that fisheries generate some 800 000 jobs. Of this total, 540 000 are artisanal fishers (Vasconcellos, Diegues and Kalikoski, 2010). Taking into account direct and indirect jobs, it is estimated that approximately 4 million people depend on the fisheries sector (MMA, 1997).

The infrastructure for landing, storage and commercialization of fish in the artisanal sector is precarious. Large ports generally have no infrastructure to accommodate landings from artisanal fisheries. In many fishing communities, especially in the northeast, fish are landed on the beach and from there enter a long chain of dealers, until they arrive at local and regional markets. The situation seems to be even worse in fishing communities close to urban centres, because they lack adequate structures to land and process fish in urban conditions. Production facilities for landing and cold-storage associated with cooperatives – funded during the 1980s by the Inter-American Development Bank (IDB) and constructed in the northeast – did not work satisfactorily. The vast majority of these facilities ended up in the hands of intermediaries. At the same time, many cooperatives failed because they were formed in a hurry, without proper evaluation of the administrative capacity of fishing communities or of market demand.

More recent experiences in the northeast with the government's Pro-Renda programme, which aims to increase the income level of poorer communities, seem to be more successful than the previous experiences with cooperatives. The programme is based on strengthening existing fishers' guilds, improving techniques to maintain the quality of fish on board through the use of freezers, and developing new markets for artisanal fishery production. Marketing, improved product quality and processes of intermediation within the market chain continue to be the critical points in development of artisanal fisheries and in increased income levels for their fishers.

Fishing livelihoods are not homogeneous along the coast (Vasconcellos, Diegues and Salles, 2007). Along the north coast, many fishers combine fishing with agriculture. In the northeast, most fishers depend exclusively on fisheries. Their livelihoods are under threat from the rapid expansion of shrimp aquaculture, tourism and urban development, as well as from overfishing of important stocks. Along the south and southeast coasts, there are clear signs of depletion of most stocks, as well as environmental degradation requiring mechanisms of control and regulation. In the past, many fishers living in coastal villages also maintained other activities, such as small-scale agriculture, forestry and the production of hand-made arts and crafts. Given the increasing level of conflict with industrial fisheries, and the expansion of urbanization and tourism, many artisanal fishers have turned to aquaculture or to working in general services in the cities.

The move of artisanal fishers from rural to urban areas is a phenomenon evident in many states, but particularly in the southeastern and southern regions. Even in the 1970s, approximately 70 percent of fishers in these regions lived in or around urban

centres, whereas in the northern and northeastern states, most fishers lived in coastal villages, with only 44 percent found in urban centres. Although there is a general lack of information, it is probably correct to assume that today most coastal artisanal fishers live in or close to urban areas, with the exception of fishing communities in northern Brazil and in the states of Maranhão and Piaui. According to data available in the Brazilian Institute of Geography and Statistics (IBGE) database for 1991, the level of urbanization reaches 22 percent in certain areas of Maranhão, 48.5 percent in Ceará, 62.5 percent in Paraíba, 70 percent in Rio de Janeiro, 83.5 percent in Santa Catarina and 98 percent in São Paulo.

The increasing level of urbanization of artisanal fisheries has many drivers, including: mounting economic pressure from the tourism industry, which has led to appropriation of coastal areas from fishing communities; a shift from agriculture and other extractive activities; lack of basic infrastructure to support fishing activities (e.g. supply of ice and diesel); lack of access to basic social services (e.g. health and education) in coastal villages compared with urban centres; proximity to markets in cities; and implementation of environmental conservation units along the coast, which expelled many fishers from traditional fishing areas. Fishers who have moved to cities are often involved in urban activities (construction, general services, tourism, etc.) to complement their earnings during fishing closures.

Fishers' access to infrastructure and social services is normally as tenuous in coastal communities as it is in urban zones. For example, access to treated water varies from less than 5 percent of the households in fishing communities of the northern state of Maranhão to 71 percent in São Paulo. The educational level of fishers is extremely low and well below the national average. The illiteracy rate is 44.6 percent among men and 53.5 percent among women. Only 9 percent of men and women have completed elementary-level education and only approximately 1 percent have completed high school.

Most of the frozen fish sold in supermarkets in large cities is imported or is supplied by commercial fishing industries. Artisanal production is generally traded in coastal towns and regional centres. The network of fish trade in artisanal fishing villages is complex, often involving intermediaries on several levels, from the beach to the neighbouring cities and the central markets in state capitals. Most of the crabs, mussels, oysters and other shellfish originate from artisanal fisheries, and marketing is sometimes done through cooperatives.

2.3 Fishery production and status of stocks

Fishing is conducted in a variety of marine and coastal ecosystems, including estuaries, coastal lagoons, shelf and slope waters. The characteristics of habitats, fauna, productivity and oceanography of these ecosystems greatly influence the way fishing activities are developed. The Brazilian coastline can be divided into regional ecosystems with distinct environmental characteristics of importance to capture fisheries (Matsuura, 1995; Vasconcellos, 2000, and Map 1). Biological production is high along the north coast as a result of continental runoff from the Amazon River. The wide continental shelf and the rich benthic community have favoured the development of industrial trawling activities in this region, mostly for shrimps and demersal fishes.

The northeastern and eastern regions present oligotrophic conditions related to the influence of tropical waters from the Brazil Current. These regions enclose the only coral reef formation in the South Atlantic. Rocky bottoms and a mostly narrow continental shelf led to the development of hook-and-line and longline fisheries for rockfishes, sharks and tunas. In the southeast, primary production is mainly driven by seasonal welling up of nutrient-rich, cold subtropical waters, while the southern part of the Brazilian coast is under the influence of the subtropical convergence between the southward Brazil Current and northward Falkland (Malvinas) Current. The confluence

of water masses and the high volume of continental runoff provide the physical and chemical conditions for high biological production on the shelf. Trawling is the main type of industrial fishing activity in the southeastern and southern regions, although the presence in the southeast of highly abundant pelagic stocks, mainly sardines, has also led to the development of an important purse seine fishery since 1950.

Within each of these major ecosystems, there are a variety of inshore and coastal ecosystems in which diverse fishing communities live and work. Coral reefs, mangroves, estuaries and coastal lagoons are particularly important ecosystems. Coral reefs occur along 3 000 kilometres (km) of the northeast and east coasts and off oceanic islands. Mangroves extend along almost the entire coast of Brazil, from Oiapoque (Amapá) to Laguna (Santa Catarina), occupying an area of about 25 000 km^2. The most extensive areas of mangrove are associated with the mouth of the Amazon River in the north of Brazil. Coastal lagoons are found in the southern, southeastern and northeastern regions, and are especially important in the states of Alagoas, Rio de Janeiro, Santa Catarina and Rio Grande do Sul. The Patos Lagoon, located in Rio Grande do Sul, southern Brazil, is recognized as one of the most important centres in the country for artisanal fisheries.

Fisheries present distinct regional characteristics. Artisanal fisheries account for a higher proportion of marine catches in the northern and northeastern regions. In contrast, in the southern regions, it is the industrial fisheries that sustain the largest part of marine capture fishery production (Vasconcellos, Diegues and Salles, 2007). Since 1980, the regions also present diverse trends in production, with an increase in artisanal landings observed in the north and northeast and a decrease in the southeast and south (Table 1). On the other hand, industrial fisheries show a decrease in production in all regions.

The status of major fishery resources – such as sardine, lobster, shrimp, croaker, weakfish and tuna – has been assessed regularly since the 1980s through technical working groups created by the government. There has been little systematic and continuous assessment of the status of the various less-abundant fish stocks targeted by artisanal fisheries. This is in part owing to a lack of data, but also to lack of attention by government agencies. However, some localized research initiatives have been carried out by universities and research institutes. Table 2 summarizes available information on the status of stocks targeted by industrial and artisanal fisheries in each of the coastal regions. Analysis of the development stage of stocks targeted by artisanal fisheries – carried out by Vasconcellos, Diegues and Salles (2007) – further indicated

TABLE 1
Catches by artisanal and industrial fisheries in Brazil in 1980 and 2007

Region		Industrial		Artisanal	
		Tonnes	%	Tonnes	%
North	1980	19 424	18.0	88 427	82.0
	2007	18 882	8.9	193 120	91.1
Northeast[a]	1980	20 182	29.6	48 014	70.4
	2007	8 203	3.7	215 919	96.3
Southeast	1980	202 150	87.2	29 734	12.8
	2007	99 125	62.0	60 742	38.0
South	1980	163 728	74.1	57 334	25.9
	2007	151 154	85.5	25 576	15.5
Total	1980	405 484	64.5	223 509	35.5
	2007	277 364	35.4	505 812	64.6

[a] Statistics for states in the northeast and east are merged under northeast.

Sources: Freire, 2003; IBAMA, 2007.

TABLE 2
Exploitation status of marine stocks assessed previously in Brazil

Region/stock	Exploitation status	Classification IN No. 5/2004
North		
Pink shrimps, *Farfantepenaeus* spp.	Intensively exploited; decreasing production	II
Seabob shrimp, *Xyphopenaeus kroyeri*	Underexploited	II
Catfish, *Brachyplatystoma vaillantii*	Recovering	II
Lobsters, *Panulirus* spp.	Fully exploited	II
Southern red snapper, *Lutjanus purpureus*	Risk of overfishing	II
Mangrove crab, *Ucides cordatus*	Unknown; decreasing production	II
Northeast		
Lobsters, *Panulirus* spp.	Overexploited; decreasing production	II
Yellowtail snapper, *Ocyurus chrysurus*	Overexploited	II
Vermilion snapper, *Rhomboplites aurorubens*		II
Dog snapper, *Lutjanus jocu*, and silk snapper, *L. vivanus*	Fully exploited	–
Mutton snapper, *Lutjanus analis*, and lane snapper, *L. synagris*	Overexploited	I
Groupers, Serranidae	Overexploited	I, II
Mackerels, *Scomberomorus* spp.	Moderately exploited	–
Mangrove crab, *Ucides cordatus*	Probably overexploited; decreasing production	II
Seabob shrimp, *Xyphopenaeus kroyeri*	Moderately exploited	II
Southeast		
Sardine, *Sardinella brasiliensis*	Collapsed	II
Broadband anchovy, *Anchoviella lepindentostole*	Overexploited	–
White croaker, *Micropogonias furnieri*	Fully exploited or overexploited	II
Royal weakfish, *Macrodon ancylodon*	Fully exploited or overexploited	II
Weakfish, *Cynoscion jamaicensis*	Fully exploited or overexploited	–
Grey triggerfish, *Balistes capriscus*	Moderately exploited or fully exploited	II
Skipjack tuna, *Katswonus pelamis*	Moderately exploited	–
Anchovy, *Engraulis anchoita*	Unexploited	–
Seabob shrimp, *Xyphopenaeus kroyeri*	Overexploited	II
South		
White croaker, *Micropogonias furnieri*	Fully exploited or overexploited	II
Longspine drum, *Umbrina canosai*	Fully exploited or overexploited	II
Royal weakfish, *Macrodon ancylodon*	Overexploited	II
Mullets, *Mugil* spp.	Fully exploited	II
Catfish, *Genidens barbus*	Collapsed	II
Black drum, *Pogonias cromis*	Collapsed	–
Guitafish, *Rhinobatus horkelii*	Collapsed	I
Anchovy, *Engraulis anchoita*	Unexploited	–
Pink shrimp, *Farfantepenaeus paulensis*	Overexploited	II
Seabob shrimp, *Xyphopenaeus kroyeri*	Overexploited	II

Note: Species are classified according to IN No. 5/2004, 'I' being species threatened by extinction and 'II' being species that are overexploited or threatened by overexploitation.

Source: Adapted from Vasconcellos, Diegues and Salles, 2007.