

The Socio-Environmental Responsibility in Brazilian Coastal Areas: The Case of the Fishing Sector

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ABSTRACT

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The coastal-marine extractive fishery activity in Brazil has been going through a moment of crisis because of the decline in the fish stocks due to over-exploitation and to negative environmental impacts. In search of a better comprehension of the fishery's panorama, an integrated analysis of bibliographical was carried out. The management of the fisheries activities by the governmental agencies has always been done under a lot of distress, thus provoking a series of conflicts. Regarding the production data, it was possible to identify the decline in the fishery resources throughout time and the importance of the traditional fishery in the context of the Brazilian fishery activity. Besides this, a serious conflict between the latter and the industrial fishery was observed, which results from the developmental model adopted. A series of guidelines for the management of the resources are proposed in this research: a greater responsibility of the fishery companies; the valorization of the traditional knowledge regarding the management of natural resources; the attribution of value to the products of traditional fishery by stimulating fishermen's organization; and, the attribution of value to the products of the industrial fishery increasing harvest selectivity and better utilization of the fish. Thus, a policy of Socio-Environmental Responsibility for the fishing sector should contemplate such guidelines so as to assure the success of the Integrated Management Plan of the Marine Resources, which in turn should be elaborated and managed in a participative manner, respecting local specificity and guaranteeing ecosystem biodiversity.

ADDITIONAL INDEX WORDS: *Socio-environmental responsibility, fishery management, marine fisherman.*

INTRODUCTION

Brazilian coastal areas have been going through a strong process of populational and economic expansion, which includes an increase in the activities that cause serious negative impacts in coastal and marine ecosystems. Urgent measures of protection and management of these areas and its living resources have to be formulated on the basis of public policies and supported by an organized civil society.

The expansion of the national fishing sector based on disordered and explosive harvest and industrialization, especially on the 70's decade, and the form of occupation and degradation of the coastal zone, has been affecting decisively the equilibrium of aquatic populations and compromised the main fishery resources. In the last years, the fishery activity in Brazil has been going through a sustainability crisis, characterized by a steep decline in total production and productivity, because of the expansion process that lead to the over-dimensionment of the means of production and, consequently, to the over-exploitation of the majority of the resources (BEZERRA and MUNHOZ, 2000).

The collapse of the fisheries resources is a phenomenon that has been observed in the entire world. Even the Peruvian anchovy *Engraulis ringens*, considered the largest fishing stock of the planet, that in the 70's decade reached 12 million tons/year, harvested exclusively for the production and exportation of flour, suffered a large reduction in the fishing stock, reaching 2 million tons/year (MANN and LAZIER, 1991), thus increasing the price of the fish flour in the market.

However, it's important to mention that the reduction in fishing stocks is not only related to the intensification of the fishing effort, but also to all environmental changes (pollution, habitat degradation, among others) that have been occurring throughout these last years.

Reinforcing the fact that the variety of problems found in coastal regions and small islands require transdisciplinary research and the formulation of coherent public policies for

integrated actions that aim at improving the management of the resources in these environments, UNESCO (2000) identified as a priority the necessity in the next five years to protect coastal ecosystems and coral reefs of pollution and over-fishing.

The Code of Conduct for Responsible Fisheries elaborated by FAO (Food and Agriculture Organization) states principles and standards applicable to conservation, management and the development of all fisheries. In accordance to relevant international law rules, for responsible fishing and fisheries activities, the code takes into account biological, technological, economical, social, environmental and commercial aspects. This stands out because it promotes the contribution of fisheries to food security and quality, prioritizing the nutritional needs of local communities.

According to BELIK and WEINGRILL (2003) companies can support and take part in the fight against hunger by participating in food security policies in the surrounding community, as an integrated Social-Environmental Responsibility Program.

In accordance to the Code of Conduct for Responsible Fisheries, the Marine Stewardship Council (MSC), a non-profit non-governmental organization, developed an environmental label for the products of responsible fishery that assure the sustainability of global fish stocks and the health of the marine ecosystems.

Apart from the international conduct codes, at present time policies for the administration of fishing resources can be elaborated based on the Brazilian 21 Agenda, on the II National Coastal Management Plan and on the Management Plans of the protected marine areas through the National System of Conservation Units. These documents are in accordance with the National Environmental Policy, which aims at associating socio-economic development with preservation of environmental quality.

The principles and objectives of the II National Coastal Management Plan enforce the importance of an integrated management and planning, decentralized and participative of the natural resources of the coastal region, through its own

instruments, aiming at improving the quality of life of the local populations and protecting the coastal ecosystems, adjusting human activities to the environmental support capacity, assuring environmental quality and sustainable development (Federal Law 7.661/88).

It is important to mention, still, the existence of various communal forms of access to spaces and resources in traditional communities, different from urbane-industrial societies, that can guarantee the adequate and sustainable use of the natural resources, thus conserving ecosystems and generating more socially equitable ways of life (MCCAY and ACHESON, 1987; OSTROM, 1999). In this sense, information on the ways traditional fishermen use the resources can help the management of complex and dynamic ecosystems, in a conception of adaptive management (GUNDERSON and HOLLING, 2000).

However, problems of decline of the fishing stocks in Brazil persist due to the lack of political will for the application of the law in vigor and the valorization of big companies of the fishing sector in detriment of small producers. Another relevant factor is the absence of public policies directed specifically to the ordering of fishing resources, taking into account the local environmental and social aspects.

In this context, the present paper elaborates a panorama of the extractive fishery situation in Brazil, searching for guidelines for the establishment of a socio-environmental integrating policy between the several fishing sectors.

METHODS

For the elaboration of this manuscript an extensive bibliographical review concerning historical data of the fishing activity in Brazil was carried out. Estimates of production and of fishing stocks related to the traditional and industrial fisheries, their inter-relations and conflicts throughout the years were searched.

Harvest data were obtained from the archives of the government agencies responsible for the fisheries monitoring in Brazil: IBGE, IBAMA, Special Secretary of Aquiculture and Fisheries and the São Paulo State Fisheries Institute.

Moreover, bibliography regarding the effective legislation and public policies that regulate fishery in Brazil, as well as studies previously carried out that show the state of use and conservation of the resources was obtained.

In light of this information, a panorama of the Brazilian fishing sector can be obtained, evaluating the marine productive process derived from extractive activity and its social and environmental consequences.

Unfortunately, the search for continuous and reliable data regarding industrial fishery and, above all, traditional, was made difficult because of the disorganization of the Brazilian public agencies responsible for monitoring the fishing sector, which is historically debilitated, as will be shown next.

RESULTS AND DATA ANALYSIS

To improve the understanding of the panorama that has been proposed, bibliographical search results were separated in historical-political aspects of fisheries in Brazil and quantitative fisheries data.

Historical-Political Aspects

Initially there was no one responsible for the fishing resources in Brazil (*res nullius*) and the State would act upon it

¹Traditional fishing is described by SMITH (1979) as a productive activity carried out by coastal or riverine communities throughout all the Brazilian national territory; carried out by a single individual or by his family altogether, using manual methods and small-scale fishing techniques, being the production sold informally to intermediaries, with no involvement of the industry for the commercialization and the processing of the product.

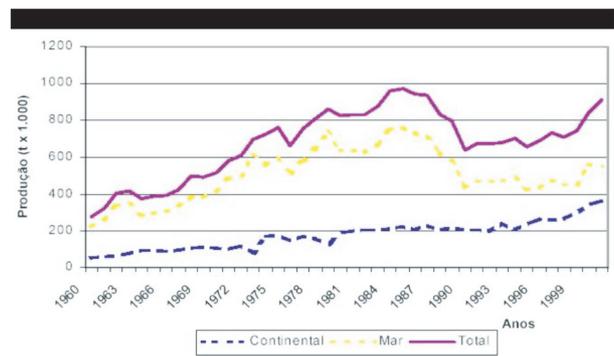


Figure 1. Brazilian production (tons) of continental, marine and total fisheries, from 1960 to 2001 (IBGE and IBAMA). Sources: Dias-Neto and Marrul Filho (2003).

with eminent sovereignty through the use of administrative and police wrights in the jurisdiction inherent to the national territory (DIAS NETO and MARRUL FILHO, 2003).

The management of the fisheries activities through the federal agencies, since the beginning, was always very problematic, causing a series of conflicts. In 1962, SUDEPE (Superintendency for the Fisheries Development) was created, linked to the Ministry of Agriculture, and its function was to execute and coordinate actions of research and ordering of fishery exploitation.

The industrialization in fisheries was, from 1967 onwards, strongly propelled by Law Decree n°. 221, which established fiscal incentives that aimed at consolidating a base industry in the fishing sector (MMA *apud* WAHRLICH, 1999), and, the FISET/PESCA (Fisheries Sectorial Investment Fund) program in 1974 (TAHA, 1996), which largely facilitated the implantation of industrial enterprises. This plan was characterized by a bad distribution of the resources among geographical areas, favoring the industrial fishing sector over the traditional, giving incentives to unprepared companies and resulting in deviations and frauds in the use of the financial resources (DIAS NETO and MARRUL FILHO, 2003).

In 1982, the United Nations Convention on the Law of the Sea defined legal norms for the seas and oceans, which should be respected by all signatory countries. Signed by Brazil, together with 118 other countries, it consecrated the concepts of Territorial Sea, Economic Exclusive Zone (EEZ) and Continental Shelf.

In article 20 of the Federal Constitution (1988), the fisheries resources of the territorial sea, of the Continental Shelf and of the EEZ became property of the State, being the latter responsible for the management and for guaranteeing access to everyone. According to the constitution, the environment is a goods of common use and of social responsibility.

In 1989, law n° 7.735 extinguished SUDEPE and the

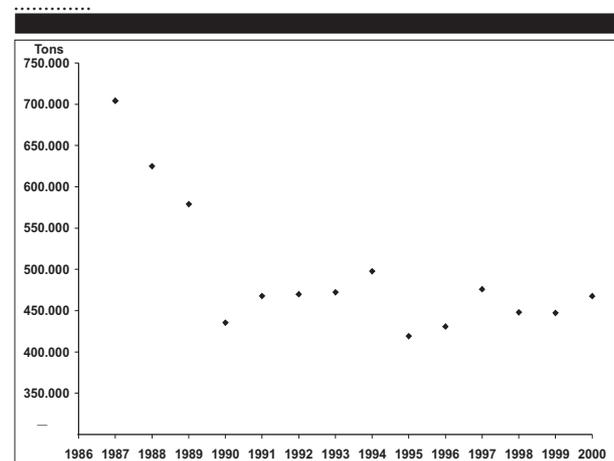


Figure 2. Brazilian production (tons) of cultivated and extractive fisheries, from 1987 to 2000 (IBAMA, 1999 and 2000).

fishery activity started to be administrated by the recently created IBAMA (Brazilian Institute of the Environment and of the Natural Renewable Resources), linked to the MMA (Ministry of the Environment), aiming at the recovery of the stocks that were depleted due to over-exploitation as well in ways of economizing them.

Nevertheless, a dispute between several agencies of the Executive power for the administration of these resources was initiated, which lead the government to the division of the administrative responsibilities between two Ministries (Agriculture and Environment). Law n^o. 9.649, of 1998, transferred the responsibility of the production and funding of the fisheries activities to MAPA (Ministry of Agriculture, Cattle Breeding and Provisioning), whilst IBAMA/MMA remained responsible for the policies of preservation, conservation and sustainable use of the natural resources.

Still in 1998, decree n^o. 2.681 created the Department of Fishery and Aquaculture (DPA) in the structure of the MAPA, intensifying the political disputes between MMA and MAPA. Decree n^o. 2.840 confirmed the conflict in the division of competences and facilitated the entrance of foreign boats in the Brazilian coast, which resulted in disloyal competition with the national companies.

In 2001, decree n^o. 3.833 created the Direction of Fauna and Fisheries Resources of IBAMA, without, however, correcting the conflicts of competencies of the previous one.

Recently, in 2003, law n^o. 10.683 created the Special Office of Aquaculture and Fishery (SEAP), linked to the Presidency, which assumed the duties of MAPA and maintained the competency of MMA.

Quantitative Fisheries Data

Despite its 8,500 km of coast, 3.5 million of km² of the EEZ and important hydrographic basins, in the last years Brazil has occupied the 24^o place in the world's fisheries production (FAO). In the year 2000, the more recent estimate made available by IBAMA, the production reached 843,376.5 tons, being 506,061.5 tons from marine fishery and 337,315.0 tons from continental fishery (IBAMA, 2000). The low productivity in Brazil is due mainly to the predominance of warm waters with high salinity and low nutrient concentrations along the coast, which compromises the food chain and diminishes the fish stock.

Analyzing the Brazilian production of marine fisheries one might note that it varied considerably from 1960 to 2001 (Figure 1). A continuous increment in the production happened during the 60's and 80's decades, reaching approximately 760,400 tons in 1985 (DIAS-NETO and MARRUL FILHO, 2003), followed by an accentuated decrease after this date (figure 2), of 704,229.0 tons in 1987 to 506,061.5 tons in 2000 (IBAMA, 1999 e 2000).

The last estimate of fisheries production made available by IBAMA (2000) indicates that the quantity of resources exploited by the extractive marine fishery reached 467,687.0 tons in 2000 (Table 1), which corresponds to 55.4% of the total Brazilian fishery production.

DIAS NETO and MESQUITA (1988) carried out an estimate of the potentiality for exploitation of the marine and estuarine fishery resources for each region of Brazil (Table 2).

Upon confronting the values of marine fishery production in each region (Table 1) with the potentialities encountered by Dias Neto and Mesquita (*op. cit.*, Table 2), it is possible to observe a very big numerical variation, that may indicates a sub-exploitation of the fishery resources in Brazil. This variation is more expressive in the southern region.

Nevertheless, the ZEE estimate of living resources, initiated in 1999 and unfinished up to this moment, through the V PSRM (Sectorial Plan for Marine Resources), indicates that although there is a possibility of an increase in the national fisheries production, it is improbable that large stocks of the resources currently explored will be found, being the only possible alternative a diversification of the exploitation so that new resources are included (MMA/IBAMA *apud* DIAS NETO and MARRUL FILHO, 2003).

Table 1. Estimate of the 2000 Brazilian fisheries production (IBAMA, 2000).

	Total fishery (extractive fishery and aquiculture)		
	(tons)	Marine	Continental
N	225,911.0	105,146.5	112,428.5
NE	219,614.5	136,893.5	50,159.5
SE	155,130.0	101,997.0	19,089.0
S	215,860.0	123,650.0	5,699.0
CW	26,861.0	0	11,783.0
Sum	843,376.5	467,687.0	199,159.0

Between 1980 and 1994, the Brazilian average annual fishery production was of 600,000 tons/year, being 240,000 tons/year (40%) from traditional fishery and 360,000 tons/year (60%) from industrial fishery (PAIVA *apud* DIAS NETO and MARRUL FILHO, 2003). According to the author, industrial fishery is more important in the southeast and southern regions, which are the richest in the country and received more fiscal incentives; on the other hand, the traditional fishery is more represented in the northern and northeastern regions.

The estimate of fishery production carried out by IBAMA (1999) determines the traditional and industrial marine extractive limits for the Brazilian states (Figure 3). In 1999, traditional fishery corresponded to 55.9% (233,903.0 tons) of the total harvested. Pará was the state in which the traditional fishery activity presented the greatest production, 80,099.5 tons. However, Santa Catarina was the state with the greatest extractive industrial production, 80,060.0 tons. In six states (Maranhão, Alagoas, Piauí, Sergipe, Amapá and Paraná) traditional fishery was observed as the sole extractive marine fishery activity.

Presently, the national fleet encompasses approximately 25,000 boats, being around 2,000 correspondent to the industrial fleet and 23,000 to the traditional (or small scale) fleet (DIAS NETO and MARRUL FILHO, 2003).

The example of the Rio Grande do Sul state illustrates the conflicts that exist between these two fishing modalities, aggravated by the disappearance of the natural resources, specially due to industrial over-exploitation. A progressive diminishment of the fishery production can be observed in Table 3, having reduced approximately 24.2% from 1992 to 2001. This reduction can be verified in an even more accentuated manner in the analysis of the traditional production, which varied from 21,971t in 1992 to 7,126t in 2001 (67.6%).

DISCUSSIONS

The obtainment and analyses of historical data were made difficult due to the lack of organization of the Brazilian governmental agencies that have been in charge of the management of the fisheries resources through time. The change in power prevented a continuous monitoring of the activity, making it impossible to apply a constant data collection methodology adequate to the Brazilian reality. Besides, the

Table 2. Estimate of the potentiality for exploitation of marine and estuarine fishery resources for each region of Brazil (DIAS NETO e MESQUITA, 1988).

Regions	Potentiality (tons)
N	Between 385 and 475 thousand
NE	Between 200 and 275 thousand
SE	Between 265 and 290 thousand
S	Between 550 and 660 thousand

documents that contain the fishery statistics are of difficult access, being still unavailable, even after the creation of SEAP.

The first information regarding the fishery situation was raised during the period in which SUDEPE was in charge of the management. At that time, the developmental model adopted by the Brazilian government, reflected in SUDEPE's policy, favored the industrialization and technological advance of the fishing sector through fiscal incentives. However, the funds and concessions created were directed solely to big companies, making it easier for foreign companies to establish themselves and thus disfavoring small-scale fishery. The 60's decade, therefore, is marked by the beginning of social inequality in fishery and by the intensification of the fishing effort, resulting in an increase in the fisheries production until 1985 (Figure 1). After this, a period of decline in the fishery (Figure 2) is initiated due to the maintenance of the fishery exploitation models throughout the following years.

With the creation of IBAMA, a conservationist preoccupation emerges, albeit not altering the political aspect or the production system of the fishing sector. Supervision becomes more intense with small-scale fishermen, initiating a continuous process of privileging big companies. The division of responsibilities between IBAMA/MMA and MAPA, in 1998, attributing the maintenance of the stock to the MMA, through a conservationist approach, and granting the responsibility to fund the fishery activities to MAPA, according to an economicist approach, favored the breaking of the man-nature relationship in the fishing activities. The knowledge and management of the natural resources, characteristic of the traditional fishermen, besides being disregarded by this compartmentalized vision, were not taken as models for the fishery management.

The current economic model in the fishing sector favors target species with high market value. The technology is developed only for the harvest with no concern whatsoever to the environmental quality, resulting in a high volume of discharge (accompanying fauna), and without the care for a better usage of the fishery. The conditioning of the fishes on board should be done according to the code about food norms: Codex Alimentarius (FAO/WHO) that states the necessary hygiene of the productive process for several items of human consumption; thus preventing the wastefulness of the product and guaranteeing quality. Based on this model, the HACCP - Hazard Analysis Critical Control Point is a regulation of the FDA (Food and Drugs Administration) that imposes rules regarding the quality of the exported fish products (BROOKS, 1997). Such procedures should serve as a basis to project Brazilian companies to the international market, which is exerting increasing pressure on the organizations regarding the quality of their products and services. According to Brooks (*op.cit.*), whilst this seems theoretically impossible, the majority of the small and medium sized companies of the developing countries have not achieved such stages of sophistication, which might make this initiative inadequate for

Table 3. Disembarkation of marine fishery in Rio Grande do Sul from 1992 to 2001. Source: CEPERG/IBAMA.

Year	Traditional (kg)	Industrial (kg)	Total (kg)
1992	21,971.283	35,180.601	57,151.884
1993	16,942.395	49,797.194	66,739.589
1994	18,255.801	47,529.204	65,785.005
1995	18,856.671	40,731.393	59,588.064
1996	13,441.762	34,302.958	47,744.720
1997	12,295.414	28,716.090	41,011.504
1998	7,162.932	28,779.072	35,942.004
1999	5,691.496	20,168.368	25,859.864
2000	13,694.070	33,830.508	47,524.578
2001	7,125.833	36,237.532	43,363.365

a secure implementation of the HACCP.

Besides this, the problem of wastefulness is also found in the processing sector of the fishery. STORI (2000), analyzing 22 industries in the towns of Itajaí and Navegantes in the state of Santa Catarina verified the generation of approximately 30,000 t/year of solid residues derived from the fish processing. Processing the residues could reduce the idleness of the sector and increase the number of jobs and income; diversifying the by-products market, through the valorization of the low commercial species that are the harvest discharge, productivity would be stimulated in contraposition to the increase in harvest of fishes.

Thus, in the confrontation between the year 2000 marine fishery production values with the potentialities found by DIAS NETO and MESQUITA (1988), it is not possible to affirm that the fishery resources are under-exploited in Brazilian coastal regions, since the production statistics do not consider the several deficiencies of the productive sector. The fishery of the "sete-barbas" shrimp (*Xiphopenaeus kroyeri*), in which around 90% of what is harvested is thrown away, is an example (SCHVEITZER, *apud* WAHLICH, 1999), as well as the fishery of the "rosa"-shrimp (*Farfantepenaeus brasiliensis e F. paulensis*), in which 60% is thrown away (KOTAS, *apud* WAHLICH, 1999). Besides, the statistical sampling of the production underestimates the volume of fishes harvested in the traditional form due to the difficulties in monitoring the quantity harvested in several places. MEDEIROS (1997), upon completing a survey of the traditional fishery production in Barra Velha, Santa Catarina, verifies a great discrepancy with the data supplied by IBAMA/CEPSUL. It is important to mention that Santa Catarina was the state with the greatest industrial production (Figure 3), having the traditional fishery certainly been underestimated.

As the industrial fishing technology advances there is an intensification of the fishing effort that results in maintenance of the production at a commercially representative value, which leads to a wrong impression that the resource is still abundant. The exacerbated utilization of the resources by industrial fishery creates a conflict between this and the traditional fishery, characterized by a more rudimentary technology that has suffered few transformations throughout the years. Consequently, there is a crescent abandonment of the traditional ways of fishery, as many small-scale fishermen, due to the scarcity of resources, modify their way of life in search of new survival alternatives. They direct their effort to tourism, become targets of the real estate speculation or end up doing illegal practices (that were not traditionally common) due to the demands of the market. For example, the fishery activity in Rio Grande do Sul has been suffering a decline as it can be verified in Table 6. Another example is the direct conflict between industrial and traditional fisheries in Pará, the Brazilian state with the greatest traditional production in 1999 (Figure 3). In this state, there is dispute for the production space, which results in conflict because of the destruction of the nets, the paternoster lines and the sinking of small boats that belong to small producers (DIAS NETO and MARRUL FILHO, 2003).

This socio-economic conflict in the Brazilian fishing sector

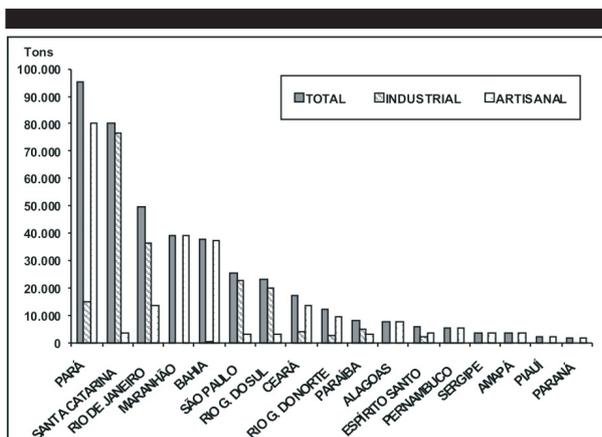


Figure 3. Estimate of the traditional and industrial fisheries production of the Brazilian states in 1999 (IBAMA, 1999).

is also a consequence of the protectionist policy of the government, through the fiscal incentives to only one part of the sector, and the devaluation of the traditional activities by the management agencies. This devaluation happens through barriers like the difficult access to the closed-season insurance, intense monitoring, difficulty in accessing the market (by the intermediaries), and mainly by not recognizing the management ways of these fishermen, which involves a rich knowledge of the environment in which they live and is often in accordance to the environmental dynamics, thus preventing wastefulness. Besides this, traditional fishery is frequently ignored by the public agencies that do not consider its important participation in the fishing sector (Figure 3).

According to BEZERRA & MUNHOZ in the Report on Subsidies to Elaborate the Brazilian 21 Agenda: Management of Natural Resources (2000), the qualitative improvement in the fishery production can come from various sources. The first one concerns the fishery administration and involves the reduction of the fishing effort for those stocks that have been maintained in an over-exploitation regime, which, in a medium and long range, might increase sustainable harvests. The second source is related to the control of the rejection measures and wastefulness throughout the productive chain. The third one is the possibility of harvesting under-explored resources. There remains, still, the development of technologies to recycle the industrial production residues and the development of aquaculture.

Nevertheless, the ways to improve the fishing resources are not efficient when not immersed in the social and regional contexts. A participative management of the resources between the different levels that compose the fishing sector is necessary, observing the specific needs of each region.

Although many systems of access to spaces and resources of common use (communitarian) have been destroyed by the capitalist expansion, there are actual examples that show the capacity of the 'communitarians' to react and reorganize, creating ways of life and territories of common use. An example are the fishermen of the Buritizeiro rapids, São Francisco River (MG), studied by THÉ (2003), that present a complex organization of the rules of resource use, including temporal and spatial shifts and gaps of time with no fishing activity in the rapids.

Therefore, having evidenced the importance of the traditional fishery in Brazil it is proposed that the management that should be carried out by the local communities is taken into account in the management of the socio-economic policies.

CONCLUSIONS

In light of the panorama presented for the Brazilian fishing sector, some suggestions can be put forward to help the establishment of a responsible management:

- establish a greater compromise of the companies to improve the conditions of the national fishing sector, in the scope of environmental conservation, on a better utilization of the resources and consequent diminishment of the conflict with the traditional fishery, thus attenuating social inequalities;
- valorize the knowledge and forms of management of the resources that the traditional fishery has, through the reformulation of the government's fishery management policy, as well as with a new posture of the entire society in a recognition of the intrinsic cultural character of the activity;
- stimulate the organization of the traditional fishermen so as to reduce the pressure of the intermediaries, stimulating the formation of cooperatives, thus aggregating value to the product;
- aggregate value to the product of the industrial fishery by developing more selective harvest technologies, minimizing the accompanying fauna; as well as improving the usage of the target species and elaborating by-products from the residues of processing and of the harvest.

These guidelines can subsidize a Socio-Environmental Responsibility Policy for the fishing sector so as to assure the success of an Integrated Management Plan of the Marine

Resources, participative and respectful of local specificities, thus guaranteeing the biodiversity of the ecosystems.

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