Characterization of small-scale fisheries in the Camamu-Almada basin, southeast state of Bahia, Brazil

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(With 3 figures)

Abstract

In the Camamu-Almada basin, marine fishery is exclusively small-scale, with several structural deficiencies such as boats with low or absent navigational technology, lack of credit and low income. Local fishers complain that shrimp and lobster trawling fishing is the main factor responsible for low stock abundance, but they still persist in these activities as these two species command the highest market prices. So they feel that the target species are already over-fished. We suggest that proper management action, alternative ways of income generation and the payment of job insurance would help to mitigate the problem.

Keywords: tropical small-scale marine fisheries, tropical marine fishes, southeast state of Bahia, Brazil.

Caracterização das pescarias de pequena-escala na bacia de Camamu-Almada no sudeste da Bahia, Brasil

Resumo

Na bacia Camamu-Almada, as pescarias marinhas são exclusivamente de pequena-escala, com várias deficiências estruturais: com barcos quase sem nenhuma tecnologia de auxílio à navegação, falta de crédito e baixa lucratividade. Os pescadores locais reclamam que a pesca de arrasto dirigida a camarões e lagosta é a principal responsável pela baixa abundância dos estoques preferenciais, mas como eles ainda têm alto preço no mercado, essa estratégia de pesca ainda persiste. Assim, eles percebem que esses estoques estão sobre-pescados. Sugerimos que medidas apropriadas de manejo local, ocupações alternativas e o pagamento do seguro desemprego em dia para os pescadores ajudariam a mitigar essa situação.

Palavras-chave: pescarias tropicais marinhas de pequena escala, peixes marinhos tropicais, sudeste da Bahia, Brasil.

1. Introduction

The Camamu-Almada Basin is also known as the Cocoa Coast near the municipality of Ilhéus, and as Dendê Coast, near the municipalities of Camamu, Nilo Peçanha, Ituberá and Salvador (Figure 1). These different denominations of the study area illustrate the agricultural nature of the south Coast of State of Bahia, and reflect the pioneering nature of the colonization of the area.

Besides these characteristics, this region is characterized, in terms of occupation, by a typical and strong hierarchical political system locally know as "coronelismo", and by extractivist procedures as the main economical activity. Among these procedures, small-scale fishery stands out as one of the most important.

In the past decades the decrease in agriculture productivity and the absence of industries that could use the available labor force, has led to an increase in fishery activity. However, these new fishers are a minority in the area.

Communities of small-scale fishers in the area are present in all of the studied municipalities. These communities are characterized by being composed, in general, of remnants from quilombos (former slave villages in the interior countryside) and of indigenous villages, which constitute social groups with few financial resources, subordinate to other productive modalities, and alienated from the financial market (Diegues, 1983).

The logic of local production is the small-scale fishery, mainly with the use of line and trawling. Due to their financial, technological and spatial characteristics, this model presents a certain fragility and susceptibility.

Due to the susceptibility of the small-scale fishery in the area, as well as the overwhelming social and eco-

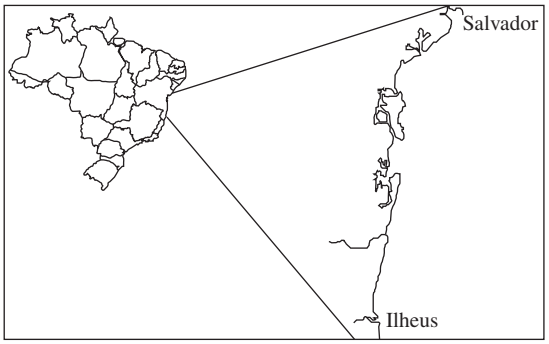

Figure 1. The study area.

nomical dependence of the local fishing community, the characterization of this activity and of its production in the area is pivotal to the establishment of income and productive politics that would be adequate to the real needs of the area.

2. Material and Methods

2.1. Study area: the Camamu-Almada basin

Data on the physical, biological and socio-economical characteristics of the area were gathered from the Environmental Impact Report elaborated by the private companies performing surveys of seismic data in the place (Grant Geophysical (2002) and PGS(2002)). These data were further complemented by information gathered in the field with the resident community.

2.2 Physical aspects

The Camamu-Almada Basin, located on the coast of the south-central region of Bahia State, occupies an area of 22.900 km^2 up to the limit of the batimetric quota of 3,000 m depth. Its southern limit is the Jequitinhonha Basin, through the Alto de Olivença and its northern limit lies at the Jacuípe Basin and the Recôncavo, through the transfer areas of Itapoá and Barra, respectively. The Camamu Basin, to the north, is separated from the Almada Basin by the Alto de Taipús.

The climate is characterized as tropical humid, with three dry months during the year (August, September and October). May is the wettest month, with a mean precipitation value of 8.3 mm per day. September is the driest month, with a mean precipitation value of 2.6 mm per day. The temperature varies from 23.7 °C in the winter to 26.7 °C during the summer.

2.3. Biological aspects

The study area presents a great diversity of ecosystems, such as sandbanks, beaches, mangroves, reefs, gravel and mud bottoms. Each of these habitats possesses unique faunal and vegetational characteristics.

Cetaceans, turtles, fishes, shrimps and lobsters occur along the Coast, and the fish fauna is also highly diversified. For example, 25 species of sharks and 9 species of rays were identified along the Coast of Bahia state.

Mangroves occupy the rivers margins, especially on the Boipeba and Tinharé islands, but also occur in other areas along the estuary. Some mangroves and sandbank areas showed some signs of human occupation. On the hand, this occupation allows some economical activities such as marine culture, but it also promotes the increase of pollution due to the production of domestic waste.

2.4. Socio-economical aspects

The study area encompasses about 9 municipalities, but the actual number is not exact due to imprecise delimitation of the west part of the Basin. However, for the purpose of this study, the area was delimited as the area between the municipalities of Ilhéus, to the south, and the municipality of Valença to the north. Within this limitation, the following municipalities were considered to lie inside the Basin: Itacaré, Taperoá, Camamu, Ituberá, Nilo Peçanha, Maraú and Cairú. The area harbors a population of approximately 430,000 inhabitants, with Ilhéus and Valença being the most important cities in terms of population density and economical productivity.

The main economical activities are agriculture (cocoa, palm oil, coconut, etc), small-scale fishery and the municipal public service sector. Boipeba and Tinharé islands are tourist spots, adding a further income for the municipalities of Ilhéus and Cairú.

Historically, the area is characterized by low values of life quality indexes. Most of the communities in the area do not have sewage or water treatment, public transport (in some cases only private boats make itineraries along the rivers), schools and medical services of adequate quality. These low developmental aspects are directly linked to the local political system and to the absence of adequate public policies in the area.

2.5. Data collection and presentation

The interviews were carried out during September 2005, in 5 chosen municipalities according to their location within the area.

Initially, the interviews were carried out at Ilhéus, in 4 landing points: São Miguel, Prainha, Copex and Pontal, under the supervision and administration of two fisher colonies (Colônia Z-19 and Colônia Z-34). Later, the resident communities of Barra of Serinhaém, in the municipality of Ituberá, and of Barra dos Carvalhos and São Francisco, both located in the municipality of Nilo Peçanha, were also visited. Finally, at the end of this study, the fishers of Valença and fisher village of Gamboa, on the Boipeba Island, municipality of Cairú, were also visited.

The choice of the interviewed fishers was simply related to their readiness and willingness to answer our questions. So at each landing point the fishers that were present were interviewed.

Interviews were done with affiliated and non-affiliated fishers in each colony. In order to better characterize the local fishing activity and to identify possible conflicts, local community leaders and Presidents of

fisher colonies were sought and, whenever possible, interviewed. In total, 58 fishers were interviewed.

To better characterize the local fishery activity, the interviews were directed at some specific points such as the age, family size and educational level of each fisher. Besides theses points, several questions about the fishing fleet were posed such as: boat length and load capacity, motor-board power, fishing effort, number of fisher per fleet, and procedures and capacity for fish storage. Finally, each fisher was also questioned about the decrease of the fishing stock and its possible causes.

The information obtained with these interviews was tabulated in an Excel spreadsheet program (Microsoft® Office Excel) for analysis. Mean, variance, and coefficient of variations were then calculated for each data set. Along with these analyses, information supplied by the fishers which was not included in the questionnaire was also used to provide a descriptive characterization of the local fishing activity.

3. Results

3.1. Characterization of the local fishing activity

The local fishery is characterized by being exclusively small-scale, managed by associations and colonies of local fishers.

The fishers of the Camamu-Almada Basin are represented by colonies located at the municipalities of Valença (Colony Z-15), Ilhéus (Colonies Z-19 and Z-34), Ituberá (Colony Z-40), and Cairú (Colony Z-55). The number of fishers involved in fishing and *marisqueiras* who peel shellfish (crustaceans and bivalve mollusks) ranged from 115 at Colony Z-40 to 2 300 at Colony Z-34.

A great diversity of fishing gear were used in the area, including beach trawling, caçoira (waiting net used in the lobster catch, also known as "lagosteira"), hand collection, "camarãozeira" (waiting net used in the shrimp catch), o covo camarão (cylindrical bottomed shrimp trap, open at one end), o covo peixe (cylindrical bottomed fish trap open at both ends), "covo siri" (cylindrical bottomed crab trap open at one end), "curral" (fish trap like a labyrinth using the tide movement to trap the fish in the low tide), the longline, the "jererê" (a net like a shallow sac with an open mouth with metal or wood used in shallow waters or at the boat sides), the gillnet, the "manzuá" (bottom trap with an entrance named "sanga" used in lobster catch), the trawling net, the encircling net. Usually more than one fishing gear was employed in the same type of fishing activity. The gillnet was one of the most important pieces of gear, being responsible for 31.57% of the total yield in 2002 (MMA/IBAMA, 2002).

The fish landing in the State of Bahia State has not been continuously registered in a standardized way during the last years. Thus, only the data for 2002 are available, and the fishing production of this year amounted to 47,374 t, from which fish were responsible for 86%, crustaceans 13,6% and mussels = 0.3% (Projeto Estatpesca, 2002).

3.2. Interviews

Interviews carried out with 58 fishers revealed that more than 70% were married, with an average age of 39.8 years and 2.4 children. In relation to education, nearly all of them had finished the primary school and, thus, are literate or semi-literate. Two fishers had university degrees.

On average, the interviewees have been exercising fishing activities for 18.1 years. Only 20% of the fishers interviewed exercised other activities such as small traders and other professions such as bricklayers, electricians, farmers, etc.

Fuel consumption varies accordingly to the type of boat used. Their majority are equipped with motorboards of 4 cylinders (locally called B18) and, on average, 226.6 litres of oil are consumed per week (n = 58; 30-2000 L).

These 4-cylinder boats usually catch fish with the line and hook and shrimps with trawling nets. Some of these boats are also involved with lobster fishery with the use of bottom trawling. However, the 6-cylinder boats (BT22) are used for lobster fishery, radio communication and GPS.

The main species captured are the pink-shrimp (small), the seven-beard shrimp (medium), the pistola shrimp (large), lobsters and some fish such as the *guaiuba*, the red and the sea bass (Table 1).

The absence of some scientific names, as well as the imprecision of the others, is due to differences regarding the popular names mentioned in Bahia state and those used in the southeast region, as the literature available only makes references to popular names used in the southeast region.

Some fishers leave and return from fishing on the same day, staying on average, 11 hours out in the sea for 6 days a week. More than 50% of the fishers, however, stay more than one day out at sea, with an average of 6.7 days (n = 58; 1-30 days). During these periods, fishing effort is mostly concentrated on shrimp capture. During lobster fishing, fishers stay 20 or more days out in the sea.

In relation to the gear used by these fishers, we corroborate the information of the Fishery Bulletin of Bahia, with nets being the most important gear, followed by fishing with line, gillnet, etc…

Considering all types of fishing, in 91.5% of the cases, the fish is conserved in ice, 5.2% in the freezer and 3.4% are sold directly, fresh.

According to all interviewed fishers, fishery in the area is a partnership activity, with all fishers setting out to sea with other fishers, irrespective of the amount of days spent out there. On average, 3 fishers (n = 58; 2-7 fishers) accompanied each boat.

Table 1. Main species caught in the Camamu-Almada Basin (Scientific names according to Menezes and Figueiredo, 1980).

Common name	Scientific name	Family
Albacora	*Thunnus* spp., *Thunnus atlanticus*, *Thunnus obesus*	Scombridae
Ariocó	*Lutjanus synagris*	Lutjanidae
Badejo	*Mycteroperca interstitialis*, *Mycteroperca bonaci*	Serranidae
Bagre	*Bagre* spp., *Arius* spp.	Ariidae
Barbudo	-	-
Barracuda	*Sphyraema barracuda*	Sphyraenidae
Boca torta	*Larimus breviceps*	Sciaenidae
Cação	*Ginglymostoma cirratum*	Ginglimostomatidae
-	*Sphyrna* spp.	Carcharhinidae
-	*Galeocerdo cuvier*	Carcharhinus
-	*Carcharhinus* spp.	Carcharhinus
Caçonete	-	-
Camarão	*Xiphopenaeus kroyeri*, *Farfantepenaeus subtilis*	Penaeidae
-	*Litopenaeus schimitti*	
Cariocó	-	-
Cavala	*Scomberomorus* spp., *Acanthocybium solandri*	Scombridae
Cioba	*Lutjanus analis*	Lutjanidae
Corvina	*Micropogonias furnieri*	Sciaenidae
Dentão	*Lutjanus jocu*	Lutjanidae
Dourado	*Coryphaena hippurus*	Coryphaenidae
Graçaim	-	Graçaim
Guaiuba	*Ocyurus chrysurus*	Lutjanidae
Guaricema	-	Guaricema
Lagosta	*Palinurus laevicauda*, *Palinurus argus*	Palinuridae
Mero	*Epinephelus itajara*	Serranidae
Olho de Boi	*Seriola dumerili*	Carangidae
Pescada	*Cynoscion* spp.	Sciaenidae
Raia	-	-
Robalo	*Centropomus* spp.	Centropomidae
Sororo	-	-
Vermelho	*Lutjanus* spp.	Lutjanidae

Also, according to the interviewed fishers, winter (July-August) is the most productive period, and summer (November–February) is the period with the lowest landing rates (Figure 2). The majority of the fishing boats in the region (Figure 3) are equipped with 4 cilinders engines (B18). The boats are classified as follows: B9 – up to 7 m long, 1 or 2 t capacity in the hold; B11 – up to 7 m, 1 to 3 t capacity in the hold; B18 – up to 8 m long, 4 t capacity in the hold; BT22 – 15 m long, 6-15 t capacity in the hold, 6 cilinders engine. B18 boats catch fish, using lines, and shrimps using surface trawling nets. Some of the boats may also operate in the lobster fishing, using bottom trawling. BT22 are the real lobster catchers

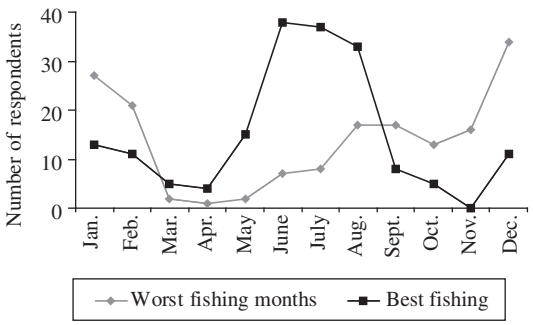

Figure 2. Best and worst fishing months according to the small-scale fishers.

with radio communication and GPS, absent in the other boat types.

The fishers defined the worst months as being those where the income was null or where a few captures were made. However, some fishers stated the profits were higher during the summer because the fish price increased during these months.

The shrimp ban was also mentioned as one of the worst fishing months. It starts on September 15th and lasts for three months. During this period fishers are on the dole, but they complain that this insurance is received with a time lag of two months or even only after the ban is over. As most of the fishers do not have an alternative activity during this period, the delay in the payment leads some of them to clandestinely engage in shrimp fishery.

Regarding the income obtained directly from fishing, there was a great variation in the profit, with an average value during the worst periods being equal to $ 178.85 (n = 58; 0-$ 696,86), and an average value during the best productive months being equal to $ 254.49 (n = 58; 0-$ 871.00).

The price of fish, shrimp and lobster differs accordingly to the buyer and the salesperson, with different prices being passed onto the fisher, to the consumer and to the seller (Table 2). In the case of lobster, which has the largest economical value, only the value paid to the fishers was supplied, so that it was impossible to know the values paid by consumers and resellers, so as to be able to infer the profit margin of the fishers colony.

The prices of fish, lobsters and shrimps sold to the resellers are, on average, 19% higher than those values paid to the fishers. The consumer that buys directly from the colony pays 10.1% more than the seller and 31% more than the price paid to the fishers for the same goods.

During the interviews, the fishers stated that there was a decrease in the fishing yield and in the income associated with this activity, and they also inferred that the probable causes of this decrease in yield was overfishing.

The most experienced fishers frequently pointed this out. Less important factors are natural causes, trawling, lobster nets and the blast of seismic essays seeking oil.

Table 2. Average prices (R$/kg, U$ 1 = R$ 2,87) of the main species fished in the Camamu-Almada Basin (Source: Colônia de Pescadores Z-34).

	Prices		
	Fisher	**Seller**	**Consumer**
Albacora	4.50	5.00	6.00
Aracajira	6.00	7.00	8.00
Arraia	2.50	3.50	4.00
Bagre	2.00	2.50	3.00
Beijupirá	6.00	7.00	7.50
Cação	4.00	5.00	6.00
Camarão pistola	9.00	10.00	12.00
Camarão rosa	8.00	9.00	10.00
Camarão sete-barba	5.00	7.00	8.00
Cavala	7.00	7.50	8.00
Curvina	4.00	5.00	5.50
Dourado	6.00	7.50	8.00
Graçaim	4.50	5.00	6.00
Guaiuba	6.50	8.00	8.50
Lagosta cauda	90.00	-	-
Lagosta com cabeça	27.00	-	-
Mero	9.00	11.00	12.00
Olho de boi	6.50	8.00	8.50
Pescada amarela	6.50	7.50	8.00
Pescada guoiva	6.00	7.00	7.50
Vermelho	6.50	8.00	8.50

4. Discussion

As agricultural production in the region decreased, rural workers that had previously obtained their income from the cocoa plantations started to search for new alternatives, preferentially without having to move to new areas and/or to invest in a new activity. From this moment on, the region experienced an increase in fishing effort, as more families attempted to obtain their incomes from coastal and estuarine fisheries. Clauzet et al. (2005) identified an increase in fishing effort on the coast of the State of São Paulo as a result of the reduction of agricultural activity in the area. The main characteristic of this reduction was the bankruptcy of the coffee and sugarcane cycles in the colonial period of Brazil.

We also noticed that the interviewees exercise the activity for on average 18 years; therefore this transition from agriculture to other activities like fishing might have happened even in previous generations.

Small-scale fishers of the area are represented by Fishery Colonies; however, many fishers complained about such representation. Begossi (2002) characterized the Colonies as being social organizations, which, according to their historical creation and current role, are state representations that inhibit legitimate forms of organization by the fishers, and which have their origin in colonialism, and in the Brazilian government's intervention in the activity since 1846. Moreover, (Breton et al., 1996) stated that, during the military governments, ser-

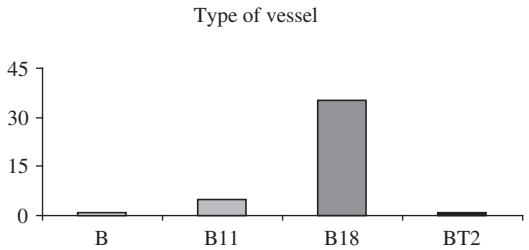

Figure 3. Type of vessel used.

geants or lieutenants were assigned to the Presidency of the Colonies. Nowadays, the Colonies are presided, in general, by former fishers with some political influence, as they later became city counselors.

The fishing communities are widespread along the coast, and are either located far away from the urban centers or constitute suburbs of some cities.

Diegues (1983) stated that small-scale fishing is currently devoted to the market, yet a subsistence character still exists, as some fishers set aside some of the fish for their own consumption: "the small-scale fishers maintain their livelihood and sustenance in fishery, which is fundamentally market-oriented."

Some features associated with livelihood sustenance, such as traditional traits, differ between fishers that live in communities and those who live in the cities.

According to Barthem et al. (1997), there are some fishers with a deep association with city life (citadino fisher), who have already lost their link to the land and with the different ways of obtaining income from extractivist activities. Such type of fisher is commonly found in Ilhéus.

On the other hand, the small-scale fishers from small colonies can be compared with the fishers from central Amazon (interiorino fisher, (Barthem et al., 1997)), as they exercise their activity in the same way and live in the rural area, having a deep relationship with their landscape.

In agreement with the concepts adopted by Diegues (1983), we can regard the fishing communities and villages as being traditional, as in such communities small-scale production prevails, the labor is family-based and autonomous, and small-scale fishing is still a part of self-subsistence. Franco (2002), in a study carried out at Garapuá, Cairú municipality, also classified the local community using these concepts.

The results from the present study allow the identification of some characteristics of the fishers of the Camamu-Almada Basin. Although some had completed higher education, even holding academic degrees, most of the fishers had not completed fundamental (Junior and high) schooling. This low education level prevents most of the fishers from getting a place in the work market other than in posts associated with fishing. In fact, fishers of higher educational levels inhabit large cities in the area, not small communities, and have already lived in large cities such as São Paulo and Rio de Janeiro. Low educational level is also associated with a high level of early marriage and with the presence of children in almost all the fishers' dwellings, which leads to an increase in the dependence from fishing.

Concerning the possibility of additional sources of income, Tomanik (1995) showed that in the municipality of Porto Rico, Paraná State, where the sammal-scale fishery is also present, lack of work leads to a high poverty level, which is also associated with the deterioration in the fishers´ identity, as they hold no hope for any change in their lives. The same can be noticed, albeit on a different scale, on the south coast of Bahia due, among other factors, to low educational levels.

In past decades, there has been an improvement in the techniques used in small-scale fishery. In order to increase the catch rate, and to maximize the size of the catch, new types of nets were developed, and motor boards started to be used on a large scale. These modifications in small-scale fishery also occurred on the economical and social levels, with new forms of social organization, such as cooperatives and new commercial relationships (Scudder, 1985).

However, in the study area, new developments in the equipment associated with fishing were not so evident. For example, boats do not possess equipment such as GPS, which can be useful for navigation and location of fishing spots. The absence of this equipment prevents the fishers from reaching less-exploited areas, with denser presence of fish away from the coast.

Gulland (1970) stated that information about several boat characteristics and its gears are pivotal to estimate the fishing power of the local fleet, especially for temporal analyses.

In agreement with the price of fish in the area, lobsters are of greater economical importance, because its price ($ 31.35.kg^{-1}) is higher than the value of any other fish.

Among the species frequently captured, shrimp and lobster stand out as the most important. Severino-Rodrigues et al. (1992) stated that shrimp fishing in Brazil is preferentially centered on the family Penaeide, to which belong the species captured in the area: *Xiphopenaeus kroyeri*, *Farfantepenaeus subtilis*, and *Litopenaeus schimitti*.

According to Mendes (2002), the winter is regarded by the fishers as the best period due to high shrimp abundance. Moreover, fishers affirmed that shrimps "prefer to stay in dirty waters", that is, shrimps occur in water mixed with substrates from the bottom, a condition that frequently occurs during the winter due to the storms, common in these months. In the summer, the water is clean, which is an unfavorable condition for shrimp fishing.

In tropical and subtropical rivers, the seasonal fluctuations and the high fish diversity leads to the development of a great variety of capture methods by the small-scale fishers. Priorities based on the species and age classes of the fishes aimed to be captured also dictated the variety of capture methods (Cetra, 1998). The same pattern can be noticed in some coastal areas, such as in the south coast of the state of Bahia.

Throughout Brazil, shrimp fishing is carried out by trawling, so it is no surprise that this gear is the most frequently used in the area, followed by the long line.

Concerning the red lobster, Oliveira (2001) states that the pressure on the stocks on the coast of Cairú municipality decreased the reproductive stock and the recruitment level, which in turn, jeopardized its reproduction. This fact can lead to an imbalance in the age

structure of the local population and can even lead to local extinction. Thus, management action is urged to protect these stocks.

Besides natural causes, the local community pointed to the use of trawling, seismic activities and overexploitation as being the main causes of stock decrease in the area.

Overfishing, which is regarded as the main cause of the stock decreasing in the area, is a key factor for any discussion about sustainability. Due to this situation, unless fishing effort decreases, it would not be possible to reach the previous productivity level (Escofet, 2004).

The impacts caused to the sea environment by the use of trawling have been dealt with in several papers. According to Hall (1999), changes in the bottom caused by the trawl lead to a decrease in local species diversity. Branco and Fracasso (2004) and Diegues (1983) reported a negative effect on the benthic community, as trawling modifies the bottom structure and catches other species, besides shrimp and lobster.

Thus, another problem associated with trawling is the discarded by-catch. Fishers, even those devoted to shrimp and lobster fishing, affirmed that many fish or small shrimps are dumped dead while the produce is being sold. As shrimp and lobster attain large market prices compared with other species, fishers will not invest money to conserve the other species. That is, on a cost-to-benefit basis it will not pay off, in terms of money used in fuel and ice, to catch and conserve species with a small market price.

Alvez et al. (2002) reported that in the municipality of Goiana (State of Pernambuco, Brazil), from a total of 30 interviewed fishers, only three respected the minimum catch size, releasing alive the smallest individuals, nestlings or gravid females. In this case, as well as in our study area, most of the fishers brought back specimens that did not conform to the minimum catch size, discarding most of them and keeping some for their own consumption.

As already noted by Mendes (2002), the fishers of the south coast of Bahia do have the knowledge that the use of this gear negatively affects fishing in the area, because it causes high mortality of different species and because it does not have the adequate selectivity in the capture. Nevertheless, according to the interviewees, there is no other option in the area. If they abolish trawling and used only line, their income would be seriously compromised.

All fishers stated that lobster fishing is the most harmful, due to the net used in this activity, which, when it reaches the bottom, removes stones and decreases food abundance. One fisher affirmed that in areas where lobster fishery is intense, the abundance of bottom fishes, such as the mero (*Epinephelus itajara*), decreases.

The difficulties found in the area are directly related to the lack of infrastructure, such as financial credit to purchase or to construct boats, improvement of the harbors, as well as other factors.

Overall, fishery characteristics found in the Camamu-Almada Basin do not differ from those found in other regions. Pauly et al. (2002) argued that in a few and rare moments, fishing was a sustainable activity, with depletions having been masked for a long time by technological improvements and by geographical expansion; historically, fishing tended to be a non-sustainable activity, with the literature being permeated by debates about its causes and exceptions. Botsford et al. (1997) stated that more than half of fishing resources are being heavily exploited and that 22% of them are already over-exploited.

Berkes (1985) associates sea resource regulation to the traditional communities, since their economical activities are related to the social relationships among members. Such relationships, in turn, are regulated by the culture, that is, by common values and rules.

In the Camamu-Almada Basin, as well as all along the northeast coast, tourism is one of the main economical activities, and receives incentives from the public administrations. However, tourism can bring some problems to fishing. Mansperger (1995) pointed to social conflicts generated by the presence of tourism in small societies, such as the loss of autonomy and of the local economical base.

In the studied area, it can be already noticed that some boats otherwise used for fishery are being used for tourism. Prado (2003) identified such a change in economical activity, from small-scale fishery to tourism, on Ilha Grande, Rio de Janeiro state, and indicated problems such as the restrictions to resources usually used for fishery, displacement of local inhabitants, and the appearance of other boats and residences.

On the other hand, tourism can also present some benefits. Baum (1999) demonstrated that, after the diminution of small-scale fishery, tourism brought a new source of income for communities near the North Atlantic Ocean. In this regard, the impact of tourism in an area where fishery is the main economical activity must be considered in the light of local community needs, and should be regulated by local fish abundance.

Besides traditional management, Pauly et al. (2002), when analyzing the decrease in the catch rates since 1980, indicate as a possible solution a reduction in fishery subsidies and the implementation of marine reserves. According to Cardoso (2001) in the 5th Encounter of Fishermen, which took place in the State of Pernambuco in 1991, the area limitation proposal for small-scale fisheries was presented in order to recover the stocks.

Petrere-Jr (1995) proposed that to solve the conflicts that threaten fishery activity in Brazil, a joint effort would be necessary between government and society, the recognition of the fisher culture, accumulated over generations, and the knowledge about fish ecology, a pivotal instrument for the proper management of the resource. In agreement with Paiola and Tomanik (2002), the fisher communities point to some environmental alterations as

factors that hinder the exercise of fishing due to the decrease of the stocks in certain areas.

Ulrich et al. (2002) explain the importance of management tools starting from the fishing effort control or the limitation of the total catch of threatened species. However, they point out that the effectiveness of these tools is associated to the regional fishing community's economical needs. FAO, through the Code of Conduct for Responsible Fisheries, states that precaution is one of the most important actions in order to attain this goal (FAO, 1995).

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