

Characterization of the artisanal fishing trade in Paraty/RJ/RJ.

Mariana Clauzet

Universidade Santa Cecília (UNISANTA)

Fisheries and Food Institute (FIFO)

Rua general urquiza 263/302, Leblon, Rio de Janeiro/RJ CEP: 22431-040

e-mail for correspondence: mariana.clauzet@gmail.com

Abstract

This study is part of a collaborative project between the FIFO (Fisheries and Food Institute) and IDRC (International Development Research Centre), coordinated by Prof. Dra. Alpina Begossi and Prof. Dr. Fikret Berkes focused on fisheries management and food security of artisanal fishermen in the Atlantic Forest of Brazil. Within this large project, this study focuses on four fish markets of the historic center of Paraty / RJ as representatives of the network's commercial fishing spot. Data collection is performed twice a year, during the summer and winter, being aware of seasonal and temporal changes of the local market. The method of collection includes interviews with questionnaires to the fish stores owners. The information was collected at the moment of the sales and focus on over the counter availability of species, the price of fish, costs and profits of fish stores and also the profile of fish consumers. At the present date and referring to the data analysis it is possible to observe that the fish purchasing is quite complex at the regions of Paraty. That analysis includes the sale to residents, tourists, restaurants and foreign markets, especially CEASA at Rio de Janeiro. Important to mention that CEASA / RJ is also a fish supplier to the domestic market of Paraty. There is a cooperation between the fish stores. The aim of this partnership is to join several fish stores and split the transportation expenses to CEASA/RJ.

Key Words: trade of fish, artisanal fishing, Paraty.

1. Introduction

1.1. Artisanal fishing

In the context of human populations living along the coast of Atlantic Forest in Brazil fishing is the principal means of subsistence and source of animal protein. The fish caught by these populations represents 50-68% of all animal protein consumed by them (Begossi *et al.* 2000, Silvano, 2004).

When referring to artisanal fishing, it means an activity carried out with small fishing teams, usually of the fishermen's family, geographically limited in an environment near the coast and boats and technologies of low autonomy and low capture ability. The artisanal fisheries is a profession that generally, is passed in the family through oral transmission and by direct observation of natural phenomena such as tides, winds and moon phases which are decisive in the choice of the used fishing strategies (Diegues, 1983, 1995; Begossi, 1992).

In the global context the small fishing produces about half of all marine production (Davy, 2002). In Brazil, marine extractive fishing represents 50.2% of the total fish production (which also includes fish water production and aquaculture) (IBAMA, 2008). According to Ludicello *et al.* (1999) and Hersoug (2004), in the last forty years the fishery has increased its share in the market and food supply, generating more exports than products arising from traditional agriculture such as coffee, cacao, fruits, etc.

1.2. The Fisheries' Resources

In relation to marine resources, 52% of fish stocks are already being exploited at maximum capacity and 17% are overexploited (FAO, 2005). The statistics of this marine artisanal activity has been proven extremely weakened in the Southeast and South, due to the lack of a systematic collection and data processing, beyond the reach of small communities (SEAP / IBAMA / PROZEE, 2005). The historical view of the vast abundance of marine fish and of the little impact of artisanal fisheries, has directed the management to measures that could increase more catch fish, encouraging during the years 40's, new technologies for more efficient capture (Ludicello *et al.* 1999; Hersoug, 2004).

In the long term, among other reasons, this may have caused the decrease in the percentage of fishing production coming from the marine fishing extractive in relation to the total marine fishing production in the country registered in fishery statistics report of IBAMA in 2006, where in 1997 extractive marine fishery production in Brazil accounted for 72% of total fisheries production, declining after almost 10 years

to 68% in 2006. Besides the decrease in fisheries production, the data analysis of the trade balance in Brazil in 2006 showed a decline in exports of around 10% and an increase in imports of 46% and relates this to the high costs of inputs such as oil-diesel, electricity and labor (IBAMA, 2008).

Negative results of reduction and over-exploitation of fish stocks and the decline of the profitability of fishing activity in the country can be directly related to the absence of effective management policies in fisheries management (Begossi *et al.* 2000, Cergole & Wongtschowski, 2003, Silvano, 2004).

In addition to over-exploitation of resources, fishing is an activity within a social context, and this makes the question of the handling quite complex. Solving the problem of over-exploitation of resources only through policies limiting access to resources such as, for example, issuance of fishing licenses, closed seasons, restrictions on equipment, catch limits and quotas for the over-taxation on resources exploited, not necessarily decrease the fishing effort and can have negative consequences for fishermen who live exclusively from fishing and are economically dependent on the exploitation of these resources (Ludicello *et al.* 1999; Hersoug, 2004, Castello, 2007).

Evidences show that the issue of fisheries management and development needs the construction of forms of management and co-management that include the improvement of scientific knowledge and local expertise on the species exploited (Begossi & Hens, 2000, Gadgil *et al.* 2003, Aswani & Hamilton, 2004; Huddle & Hickey, 2008) and strengthening of local institutions in managing natural and social resources in different scales: local, regional, national and global (Johannes, 1993, 1998, Johannes *et al.* 2000, Berkes, 2007).

1.3. Case Study: Paraty / RJ.

The State of Rio de Janeiro has the third longest coastline in the country, about 640km long and the second set of bays, estuaries, coastal lagoons and wetlands, totaling 25 coastal municipalities and a population of 3,500,000. In recent years, the fishery production in the southeastern region of Brazil has grown and the state of Rio de Janeiro appears at times as the largest fish producer in the region, contributing, for example, in 2007 with 60% of all Southeast region production. Roughly speaking, the estimated number of active fishermen in the artisanal marine fisheries of the state is of 20,000 people (SEAP / IBAMA / PROZEE, 2005, IBAMA, 2006).

In the state of Rio de Janeiro most common used boats for fishing are between 4 and 8 meters long (including lifeboats, drummers, canoes, rafts and Caicos with and

without cab) which, together, represent 34.89% of total municipal fishing fleet. Then, representing 9.82% of the fleet, the vessels are between 8 and 12 meters long. In Paraty, small vessels between 4 and 8 meters long account for half of the total artisanal fishing fleet (51%) followed by boats between 8 and 12 meters, which represent 22.85% of the total.

Regarding the production capacity of these fishing boats, dinghies, pipes and Caicos boats with and without cab between 4 and 8 meters long can catch = <10 tons, while vessels 8-12 meters long can catch = <20 tons. The fish caught by vessels up to 8 meters long has to be kept on ice and fresh, while the fish caught by vessels => 12 meters can be stored in refrigerators.

In most landing sites in the state of Rio de Janeiro the infrastructure of fish conservation is very poor. In most cities of the state fish conservation is done in small freezer or boxes with ice and the vast majority of fisheries production is sold as whole fish and cold. Generally, production is passed on to intermediaries or fishing enterprises and cold storage freezer. Ice factory and cold stores are found only in places that rely on fishing companies or offices in municipalities (especially in the Guanabara Bay in Rio de Janeiro).

In the case of the Ilha Grande bay, including the municipality of Paraty / RJ, 85% of the fishermen sell the fish caught to local and regional market that absorbs all the fish production (Begossi *et al.* 2009). Paraty / RJ is composed of 14 communities of fishermen who deliver their fishing production the local fishmongers. In the central region of Paraty there are neighborhoods like Chácara, Ilha das Cobras, Pontal e Jabaquara, Corumbê, Mangueira and Parque Imperial. Pontal e Jabaquara have always been residence of fishermen, but today lost its importance. Ilha das Cobras and Mangueira represent current place of residence of urban fishermen in Paraty. These communities sell their catch in the various local fishmongers of Paraty, which were included in this paper the fishmongers "Mar de Paraty," "Sao Pedro", "Duas Irmãs" and "Caicara" all located in the center of Paraty. The choice of fishmongers were based on data from previous studies from Begossi *et al.* (2009) in which is highlight the accessibility and their importance in the fish flow from local market in Paraty.

The aim is to investigate the process of marketing of local production considering 1) the species traded, 2) the costs and profits of fishmongers and 3) extracting fishermen, good suppliers and final consumers. Whereas the trajectory of natural resources, that from extraction to final consumption define aspects of food security, this paper will trace the trajectory for the species of greatest commercial

importance in the region of Paraty, seeing results that can support the conservation of species commercially important and the actual continuation of the artisanal fishing system in the region.

With these dimensions, one can identify weaknesses and strengths in the economic chain of artisanal fisheries in Paraty, which serve as indicators of the local situation in relation to fisheries development in the region. Attending to the numerous problems previously identified in the literature about the system of fishing and conservation of natural resources, aims to provide subsidies to local fisheries development in Paraty.

2. Materials and Methods

The study methodology includes two steps: Data collection and fieldwork; the data analysis of fisheries landings, ecology and ethnoecology and socio-economic data in the region of Paraty/RJ. At stage I, four fish stores were selected: "Mar de Paraty", São Pedro", "Duas irmãs" and "Caiçara" located at the center of Paraty. At first the owners of the shops provide information about the structure and operation of the sites. For example they informed about monthly expenses to maintain the fish market, number of employees, most profitable products in the marketing reasons for the price changing's, commercialization and forms of payment to fishermen.

After that, visits at the fish stores are made seasonally (summer and winter). During those visits it is possible to perform direct observation and interviews which leads to data collecting on storage and marketing of fish products and consumers; In a daily basis, information about availability of fish stocks sold there, the prices of purchase and sale of commercial species, the different forms of marketing and types of consumers who were present at the fishmonger are recorded on "field sheets timetables".

The second step of the methodology is to discuss the collected data with previous data that are available in databases of two research projects underway in the region of Paraty/RJ: a) Thematic Project FAPESP (Proc. 2009/11154-2): "ECOLOGIA DA PESCA ARTESANAL EM PARATY: FORRAGEIO ÓTIMO E ETNOECOLOGIA", coordinated by Prof. Dra. Alpina Begossi and b) "COMMUNITYBASED RESOURCE MANAGEMENT IN COASTAL AND FOODSECURITY OF BRAZIL" established through a partnership between Fisheries and Food Institute (FIFO) based at the University of Santa Cecilia (UNISANTA, Santos /SP) and the International Development Research Centre (IDRC),

based at the University of Manitoba, Canada and under the coordination of Prof. Dr. Fikret Berkes and Profa. Dra. Alpina Begossi. And recently published data in the book *Ecologia de Pescadores Artesanais da Baía da Ilha Grande* (Ecology of Fishermen in the Bay of Ilha Grande) authoring Begossi, A, Lopes, P. F., Oliveira, L. E. C. & Nakano, H, in 2010, published by EIR, São Paulo / SP. 254p with various information about ecology, ethnoecology and socio-economic aspects of artisanal fisheries in the region of Paraty / RJ.

The fish species cited here, are not collected and identified, therefore in this paper the fish are named only by common names and/or their scientific families.

3. Preliminary Results and Discussion

In four fish markets included in the sample data collection, interviews were conducted to understand the structure of operation of the establishment, including the monthly fixed costs. These are described in Table 1 below:

Table 1. Structure and organization of the cost of the fishmongers of Paraty/RJ.

Monthly Expenditure (R\$)	Fishmongers			
	Mar de Paraty	São Pedro	Duas irmãs	Caiçara
Water	13	100	60	20
Ligth	240	700	700	250
Cleaning	20	200	150	80
Ice	1.200	400	1600	2000
Employees	800	2400	3110	2290
Total	2273	3800	5620	4640

The monthly cost of the fish establishments varies with its structure; the fishmonger “Mar de Paraty” is the smallest of the four sampled, the work is done by two brothers and most of their fish is purchased from local fishermen. This makes their owners have lower monthly expense of maintaining the establishment, quite different from the fishmonger “Duas Irmãs”, which has employees registered in the portfolio, electronic invoices system, and an emphasis on fish coming from the CEASA / RJ, etc..

The São Pedro is the most modernized out of the four, and the only with cold room for the products and participates in public offerings of fish. Among the possible costs of the facilities, the transportation of merchandise from Paraty / RJ to CEASA / RJ is the main cost reported among owners interviewed. This transport involves high maintenance costs of a refrigerator car, fuel and driver pay.

The marketing of fish products in the fishmongers of Paraty / RJ was investigated to date, focusing on aspects of diversity and value of fish available, as well as their variations and final consumers. The descriptive tables that follow show the results on the commercial species, including composition and frequency, values and changes in price, suppliers and consumers.

Table 2. Best species for marketing and consumers according to the owners of the fishmongers of Paraty / RJ.

Fishmongers	Three best species for sale	Best sale price (R\$)	Three worst species for sale	Best sale price (R\$)	Reasons of price variations	Main consumers
Mar de Paraty	Carapau (Carangidae)	8	Porquinho (Balistidae)	-	availability	residents
	Sororoca (Scombridae)	14	Bagre (Ariidae)	-		
	Cavala (Scombridae)	16	-	-		
São Pedro	Sororoca	12	Bonito (Scombridae)	1	availability and size	residents
	Carapau	8	Bonito	2	size	residents
	Cação (Carcharidae)	8	-	-	Availability and size	residents
Duas irmãs	Carapau	7	Parati (Mugilidae)	4,5	Availability and size	Residents and CEASA
	Cavala	16	Bonito	1,50	availability	restaurants
	Sororoca	10	Bonito	2	size	residents
Caiçara	Carapau	8	Arraia	-	availability	residents
	Robalo (Centropomidae)	33	Corvina (Scianidae)	-		tourists
	Cavala	15	Garoupa (Serranidae)	-		restaurants

According to fishmongers owners, “carapau” is the best species for sale, being mentioned by 100% of respondents. Despite not having the highest selling price among the species, it is one of the best sellers, which justifies the choice of the traders as the best product for sale. The value of the kilo seems to be decisive on the choice for the worst fish kind for sale to traders who cited only species of low market value.

The value of one kilo of fish sampled from fish markets in Paraty/RJ varies mainly in relation to availability, but also depending on the size of the fish. One can say

that it is a rule of the market, that if the availability of fish is low, the price goes up and if the fish is abundant, the price goes down. The fish size was the least mentioned, but larger fish are considered the most noble and raise up the price of the kilo of a fish of the same species that have a smaller size. A good example is the “corvina”, which has a price / kg different (\$ 5 to \$ 7) if a fish is smaller or larger.

The main buyer of fishmongers in Paraty / RJ is the city dweller. It was cited by all traders as buyers of their products. Some species of high market value, however, are bought by restaurants and even tourists can be buyers, but were rarely mentioned in interviews. According to the data collected, tourists consume fish at the local bars and restaurants during their stay in the city, and eventually they buy some frozen fish when returning to their hometown.

There is some variation in the fish available for sale in fish markets sampled, however, some species could be identified in most visits and other species show greater variation on availability. Tables 3 and 4 below show some information of the most frequent species in the market place of Paraty/RJ.

Table 3. List of species with higher frequency of availability in four fishmongers studied during the field study (n = 24 visits).

Species Common Name	Frequency of availability (%)
Lula (squid)	46
Espada (Trichiuridae)	38
Corvina (Scianidae)	
Pescada (Scianidae)	
Tainha (Mugilidae)	33
Carapau (Carangidae)	
Enchova (Pomatomidae)	25
Dourado (Characidae)	20
Parati (Mugilidae)	17
Guaivira (Carangidae)	12
Vermelho (Serranidae)	

Table 4. Details of the most frequent species for sale in the counters of each fishmongers (n = 6 visits).

Fishmongers	Species Common Name	Average price paid to fishermen (R\$/Kg)	Average price of sale (R\$/Kg)	Variation of price (R\$/Kg)	Frequency of availability (%)
Mar de Paraty	CARAPAU	6,5	10,0	3,5	50
	ENCHOVA	8,0	12,0	4,0	
	ESPADA	5,0	9,0	4,0	33
	TAINHA	9,0	12,0	3,0	
	BADEJO	15,0	25,0	10,0	
	GAROUPA	15,0	23,0	8,0	
	CAÇÃO	14,0	18,0	4,0	
São Pedro	LULA	8,0	13,0	5,0	50
	OLHUDO	6,5	10,0	3,5	
	DOURADO	8,0	13,0	5,0	
	TAINHA	9,0	14,0	5,0	33
	PESCADA	15,0	25,0	10,0	
	CORVINA	5,0	9,0	4,0	
	PIRAJICA	2,5	5,0	2,5	
Duas irmãs	VERMELHO	12,0	20,0	8,0	50
	PESCADA	13,0	18,0	5,0	
	PARATI	1,5	4,5	3,0	
	ROBALO	28,0	40,0	12,0	33
	ESPADA	4,0	9,0	5,0	
	TAINHA	6,0	10,0	4,0	
	CAÇÃO	13,0	18,0	5,0	

Table 4. (Cont). Details of the most frequent species for sale in the counters of each fishmongers (n = 6 visits).

Fishmongers	Species Common Name	Average price paid to fishermen (R\$/Kg)	Average price of sale (R\$/Kg)	Variation of price (R\$/Kg)	Frequency of availability (%)
Caiçara	CORVINA	5,0	8,0	3,0	83
	ESPADA	5,0	8,0	3,0	66
	ANCHOVA	10,0	12,0	2,0	50
	PESCADA	13,0	15,0	2,0	
	GUAIVIRA	4,0	7,0	3,0	
	TAINHA	9,0	14,0	5,0	

The species with greatest variation between the prices of sale are: “badejo”, “garoupa”, “vermelho”, “pescada” and “robalo”. Such species showed difference of \$ 8 to \$ 10 per kilo sold, while others showed to \$ 5.00 per kilo. However, the sale of the most popular species, ie, the lowest price, may be more frequent, which may compensate the trader to invest in your marketing. This may explain the frequent availability of species with little variation in sale price identified in the samples. It is evident that most species sold in fish markets have a price rate that varies up to \$ 5.00.

Table 5. Example of origin of fish sold in fish markets

fishmongers	Total quantity for sale em quilo (100%)	Quantity from CEASA/RJ (%)	Quantity from artisanal fishing (%)	Fishing communities of fish supply
Mar de Paraty	528	71	29	Tarituba e Angra dos Reis
São Pedro	350	–	100	Mamanguá, Ilha do Algodão, Parati Mirim e Joatinga
Duas irmãs	366	11	89	Joatinga e Tarituba
Caiçara	870	71	29	Calhaus e Joatinga

The amount of fish supplied to the fishmongers by CEASA and by local artisanal fishing is well balanced among the four fishmongers sampled during the field work completed to date. Although “Sao Pedro” fish market does not have fish acquired from CEASA in this table, the data already collected (but not yet analyzed) show that, like the other three fish markets, buy fish at Ceasa. It is noticed that the fishmongers Mar Paraty and Caiçara have most of their fish purchased in Ceasa / RJ, while fishmongers Duas Irmãs and São Pedro have most of the fish provided by local artisanal fishing. This variation may be related to the close or distant professional ties between fishmonger owners and fishermen. “Duas Irmãs” and “Sao Pedro” employ fishermen who come to have commitment and the sales and the other fishmonger don't.

These relationships are difficult to be discovered; neither merchants nor fishermen seem to be comfortable when the point is the commitment in the sales of the production. This will be one of the objective in the final data analysis

The seasonal nature of fishing also seems to be the reason for buying fish at CEASA/RJ. Traders justify the CEASA / RJ as a provider of fish diversity, when the artisanal fishing often cannot offer the same. Among fishing communities cited Joatinga is the community that provides more fish to the local market, was cited by 30% in the interviews, followed by Tarituba (20%) and five other communities with 10% of citations (Angra dos Reis Island, Algodão, Mamanguá, Paraty Mirim and Calhaus).

The next stages of this research are to investigate how exactly happen the commitment on sale relationships between local fishermen and fishmongers owners and to identify more detailed the importance of CEASA and local restaurants in the fish chain commerce of Paraty / RJ.

4. Considerations on the analysis of preliminary data

- 1) There is a fixed expenditure per fish store with little variation that includes the infrastructure, organization of space and staff.
- 2) Values in the fish marketing vary depending on the fish availability and consumer's demand.
- 3) The seasonality of local tourism has little influence on the values of fish purchases, and local's inhabitants and CEASA are the main consumers of fish commercialized at fish markets.
- 4) CEASA is an indispensable part of the economic chain of Paraty. There it is possible to find both consumer and supplier of products for the local fish marketing.
- 5) There is joint work between the four local fish markets in relation to CEASA. There is a relation with bankers at Ceasa. When receiving the products carried by freight the decision is made referring to the selling price. After a few days the money from the sale is sent, discounting the value of the note.
- 6) Some fish stores are more entrepreneurial than others; the electronic invoicing system, the agreement with the bankers (in specific CEASA / RJ), cold storage, refrigerated vehicle, formal employees, public offer of fishing on social networks are part of the day-by-day. These items and other observations demonstrate the professionalism of the sale of fish in the city of Paraty. Less entrepreneurs' fish stores are somehow working together with the most professional ones.

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