Sport fishing in Cachoeira de Emas in Mogi-Guaçu River, State of São Paulo, Brazil

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(With 8 figures)

Abstract

Sport fishing is an important leisure activity in many countries. It directly and indirectly generates income and jobs for millions of people. In some places, its landing outstrips production from professional fishing but this fact is not always taken into account in the establishment of management actions. In the area of Cachoeira (Waterfall) de Emas there are reports of intense fishing since the 20's. The objective of this paper is to identify the profile of the sporting fishers who frequent this place and to characterise this fishing. From February to October of 2006, we interviewed 107 sporting fishers that visited Cachoeira. We describe the fishing and the socio-economic status of the sport fishers. Most of the fishers are men, coming from the state of São Paulo, with a mean family income of US$ 1,212.3 (R$ 2,558.10, US$ 1 = R$ 2.11, July/2007), being aged 50.2 years old on average. A large amount of them (49.5%) only have incomplete first grade education. The main captured species are curimba *Prochilodus lineatus*, mandi *Pimelodus maculatus*, *P. heraldoi*, *Pimelodella* spp., lambari *Astyanax fasciatus*, *A. schubarti*, *A. altiparanae*, *Roeboides paranensis* and piava *Leporinus lacustris*, *L. friderici, L. octofasciatus*. Fishers have had a strong connection with this place for many years and even with low captures (2.8 kg/day), they are quite satisfied.

Keywords: inland sport fisheries, sporting fishers' socioeconomic profile, Mogi-Guaçu River, Brazil.

A pesca esportiva na Cachoeira de Emas, Rio Mogi-Guaçu, Estado de São Paulo, Brasil

Resumo

A pesca esportiva é uma atividade importante de lazer em muitos países. Ela gera direta e indiretamente renda e emprego para milhões de pessoas. Em alguns locais seu desembarque supera a produção da pesca profissional, mas esse fato nem sempre é levado em conta no estabelecimento de políticas de manejo. Na região da Cachoeira de Emas, há relatos da sua ocorrência desde a década de 40. O objetivo deste artigo é identificar o perfil dos pescadores esportivos que frequentam esse local e caracterizar essa pesca. De fevereiro a outubro de 2006 foram entrevistados 107 pescadores esportivos que frequentaram esse local. A maioria dos pescadores são homens, procedentes do Estado de São Paulo, com renda média familiar de US$ 1.212.37 (R$ 2.558,10, US$ 1 = R$ 2,11, Julho/2007), com idade média de 50,2 anos e grande parte deles (49,5%) tem apenas o primeiro grau incompleto. As principais espécies capturadas são o curimba *Prochilodus lineatus*, mandi *Pimelodus maculatus, P. heraldoi, P.* spp., lambari *Astyanax fasciatus, A. schubarti, A. altiparanae, Roeboides paranensis,* e piava *Leporinus lacustris, L. friderici, L. octofasciatus*. Os pescadores têm ligação com esse local há muitos anos e, mesmo com seu baixo rendimento (2,8 kg/dia), a maioria acredita ter sucesso na pescaria.

Palavras-chave: perfil socioeconômico dos pescadores esportivos, pesca esportiva, Rio Mogi-Guaçu, Brasil.

1. Introduction

In Brazil, the law-decree no. 221, of February 28, 1967, defined the several fishing modalities as "every action able to capture or to extract animal or vegetable beings which have the water as their normal or more frequent habitat. Sport fishery: the one which is practiced with a hand line, or by using a diving device or any other allowed by the competent authority, and whose product cannot be sold under any circumstances." In some cases, the expression "sport fishing" is used to refer just to "catch-and-release" fishing. So there are several names

used to designate this activity but all have in common the non-commercialization of the fish.

The "Portaria" no. 30 of IBAMA (the Central Brazilian Government Environment Agency), of May 23, 2003, refers to three categories of sport fishing. i) disembarked fishing - it is accomplished without the use of a boat and just employs hand lines, dip-nets, poles, fishhooks single or multiple, reels, natural or artificial baits; ii) embarked fishing - accomplished in a boat using the same gear as before; and iii) underwater fishing - accomplished with or without a boat, using a dive rifle or arbalete, the use of any sort of aqualung being prohibited. The Portaria no. 39, of IBAMA, of August 12, 2003, which approves the license for sport fishing, refers to the need for the adaptation of this license to the new forms of use of fishing resources by the tourist activity of amateur/sport fishing. In this case the terms "amateur" and "sporting" are used to define the same kind of fishing, with an option for the term "amateur" in the fishing license.

From 1996 to 2005, the mean number of sport fishing licenses released by IBAMA was 98,423 (Michel Lopes Machado, PNDPA - Plano Nacional de Desenvolvimento da Pesca Amadora/IBAMA - Brasília, personal communication to JP). This number must be higher, as many fishers go fishing without a license.

Sport fishing is the Australians' second favorite outdoor activity (PA Management Consultants, 1984 fide Bucher, 2006). In the United States, 37.5 million people fish for leisure, where 28.4 million fish in inland waters and 9.1 million in the sea. On average, they fish 16 days/year spending US$14.7 billion on the trips and US$ 17 billion on equipment (U.S. Fish and Wildlife Service, 2001). According to Schramm and Gerard (2004), in that country, the activity has been decreasing since the 80's due to demographic changes, and to the fishers' changing and decreasing socio-economic and behavioural status. In the Pantanal de Mato Grosso do Sul, in Brazil, the same situation is repeated due to capture restrictions in weight and inadequate infrastructure (Catella, 2004). Salmi et al. (2006) report a reduction of 0.5%/year in the number of fishers in Finland, 1.3% in Norway and 1% in Sweden.

In Finland, it has been decreasing due to the advancing age of the fishers (Sipponem and Gréboval, 2001). According to Pintér and Wolos (1998), from 23 countries of Europe, which total around 21.35 million of sport fishers, in 17 of them, sport fishing is stable or in ascension and in other ones it is decreasing. The main reasons are the development of other leisure options and fishing costs increasing. In Portugal, sport fishing is an activity in expansion in which 300,000 people are now engaged (Marta, et al., 2001).

In the first half of the last century, in Germany, commercial fishing in rivers and lakes had great relevance; now, sport fishing is becoming more and more important (Wedekind et al., 2001). According to these authors, sport fishing is responsible for about 82% of the production of fish in rivers and lakes around the country caught by 1.42 million fishers (nearly 2% of the population), expending US$ 1.23 billion/year.

In the area of Berlin, there are 40,000 to 50,000 sport fishers (Grosch et al., 2000). In spite of the importance of this activity, there is a strong movement to banish it totally based on animal rights; the same is happening in Holland (Kearney, 1999).

In southeast England there are 240,900 sport fishers living in the area. These fishers and others from elsewhere generate together US$ 331.914 million and 3,000 jobs (Invest in Fish South West Report, 2007). A large proportion of the continental fishing in England and Wales is sporting (Peirson et al., 2001). There are 0.8 million fishers specialised in salmonidae and 2.3 million looking for other species. The annual expenses with fishing gear, baits, licenses and trips were estimated at US$ 5,980,500 in 1994 (Moon and Souter, 1994 fide Peirson et al, 2001) generating 40,000 jobs. Just in the Teifi River, in Wales, fishers' direct expenses is of US$ 378,442/year and the total expenses, including the indirect ones and those not related to fishing, is US$ 2,310,488 (Peirson et al., 2001).

In the area of Newfoundland, in Canada, sport fishing generates above US$ 54 million/year (Dempson, et al., 2001).

In spite of sport fishing being so important worldwide, due attention is not given to the fact that it also causes stock decline (Cooke and Cowx, 2006). According to these authors, sporting fishing results in habitat degradation as much as commercial fishing. In lakes in Poland, the landed sport fish overtakes commercial fishing for some species (Bninska and Wolos, 2001). The same happens at Lago Toya, in Japan (Matsuishi et al., 2002). In the Pantanal de Cáceres, in the state of Mato Grosso, sport fishers capture 2.7 times more than the professionals (Netto, 2006). According to Catella (2004), in the Pantanal do Mato Grosso do Sul, most of the captured fish comes from the sport fishers. From 1994 to 1999, the median total landing was 1.415 ton/year, and, from this total, 76% were captured by sport fishers.

Moreover, the available technologies for commercial fishing (portable cameras, more resistant fishing lines, GPS, etc) are also used by sport fishers. This guarantees them better chances of catching fish (Cooke and Cowx, 2006). Some of these new technologies have as their main objectives the reduction in the capture of undesirable species and the minimising of environmental impacts, but most of them are intended to spot the fish (Cooke and Cowx, 2006).

This paper aims to describe the socioeconomic profile of the sport fishers coming to Cachoeira de Emas in Mogi Guaçu River in the municipality of Pirassununga. The profile includes their gender, marital status, age, mean monthly income, etc. Related to the fishery, we present the catch of the main fish species, better fishing months, fishing time, fishing gears, etc. We also try

to detect their environmental perception about fishing changes over time.

2. Material and Methods

2.1. Area

The Mogí-Guaçu River headstreams are located in the State of Minas Gerais in the municipal district of Bom Repouso in the Mantiqueira mountain chain, at an altitude of 1,650 m. In the states of Minas Gerais and São Paulo (most of it), its total basin drainage area is 17,460 km^2, (Brigante et al., 2002) (Figure 1). It is 473 km long up to its confluence with the Pardo River, in the Paraná basin. Just 5.9% of its natural vegetation remains.

Cachoeira de Emas is located in the middle stretch of Mogí-Guaçu River in the Municipal district of Pirassununga (SP). "Cachoeira" in Portuguese means waterfall although Cachoeira de Emas in fact is just a rapid. It has been a traditional professional and sport fishing site for many years because of the rapids, where fish tend to concentrate in large schools and so are more vulnerable, mainly during the upriver reproductive migration (known as "piracema") (Schubart, 1949; Godoy, 1974). There is a small village which offers infrastructure for the sport fishers as bait sale, boat renting and fish restaurants. There is a small dam (with a fish ladder) with a hydroelectric power station which was built in the 20's and which has been inactive for several years.

2.2. Methods

For the characterisation of the sport fishing, visiting fishers where interviewed by answering open and closed questions consisting of the following items: city of origin, education level, family income, type of transportation, fishing gears, quantity of captured fish species, visit frequency, etc. Descriptive statistics were calculated for each piece of information.

In the interviews we adopted systematic sampling, interviewing 20% of the fishers who were in the sampling area on the interviewing day. The selection of the first interviewee was accomplished with the aid of a dice. A number from 1 to 6 was randomly selected and the

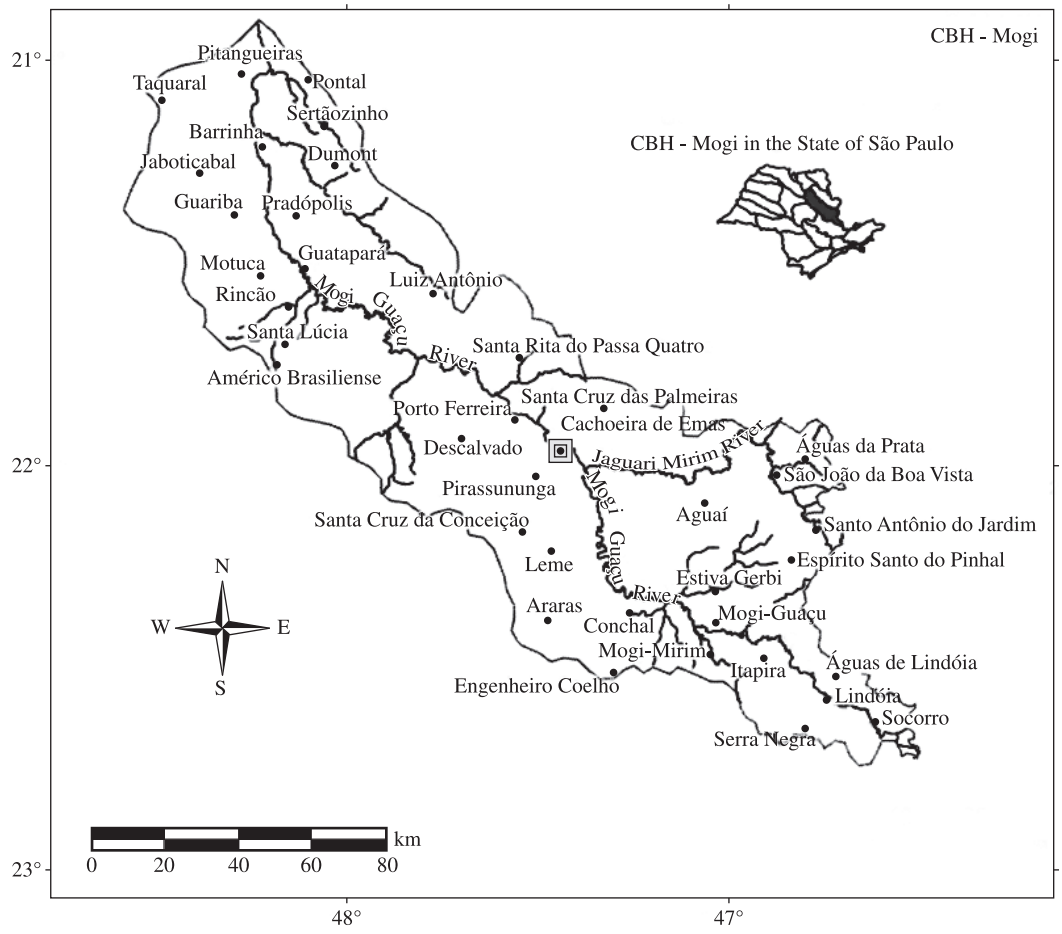

Figure 1. Location of Mogí-Guaçu River basin in the State of São Paulo, with the fishing area surrounding Cachoeira de Emas. Adapted from CBH-Mogí and CREUP (1999).

result indicated the fisher. With this first interviewee as the starting point, every next fifth fisher was then interviewed. In these cases, the number was related to the order along the river margin or according to the position of the boats. We only interviewed fishers over 18 years old, in a total of 107 from February to October, 2006. We considered fishers that fish on the margins and in boats.

3. Results

3.1. Socioeconomic profile of the sporting fishers at Emas

Except for a fisher from the state of Minas Gerais, all the others were from the state of São Paulo. Most of them are men (97.2%), married (81.3%), 10.3% are single, 5.6% are divorced or separated and 2.8% are widowers.

Table 1 shows some of their characteristics. Their mean age is 50.2 years and the mean family income is US$ 1,212.37 (US$1 = R$ 2.11, July/2007).

According to Table 2, nearly half of them has only incomplete first grade education and just one fisher declared holding an MSc degree. They have different professions (Table 3). Most sport fishers are still active (58.9%), while 31.8% are retired, 5.6% do not work due to health problems and 3.7% are unemployed.

Table 4 presents their city of origin and we see that most of them just come from Pirassununga itself.

It takes on average 0.8 hours to reach the fishing place (sd = 0.66; n = 106; min. = 0.03; max. = 4:00 hours) travelling 65.3 km, on average, (sd = 36.6; n = 14; min. = 7; máx. = 122).

The most common means of transportation are the private car (73.8%), lift with others (12.1%), walking (4.7%), bus (4.7%), bicycle (2.8%), boat (0.9%), while (0.9%) did not inform.

Most of the interviewed sport fishers (80.4%, n = 86) have frequented Emas for 14.7 years on average (sd = 15.5; range = 0.02 - 64 years). Some fisher interviewees (14.9%) were visiting Cachoeira de Emas for the first time and only two fishers (1.9%) did not give this information, while 2.8% informed that it had been some years since they last came.

Disembarked fishers usually fish below the dam and the embarked ones rent boats which remain anchored on the river margins. In this case the fisher can also have access to the meal delivered by the boat owners who may also be a small-scale professional fisher or a former one.

3.2. Sport fishing at Emas

Figure 2 shows the main fish species and the number of fishers that capture each one of them. The main species are: curimba (*Prochilodus lineatus*) (Valenciennes, 1836), mandi (*Pimelodus maculatus* (LaCepède, 1803), *Pimelodus heraldoi* (Azpelicueta, 2001), *Pimelodella* spp.) (Eigenmann and Eigenmann, 1888), lambari (*Astyanax fasciatus* (Cuvier, 1819), *Astyanax schubarti,* (Britski, 1964) *Roeboides paranensis,* (Pignalberi, 1975) *Astyanax altiparanae*) (Garutti and Britski, 2000), piava and piau (*Leporinus lacustris,* (Campos, 1945) *Leporinus*

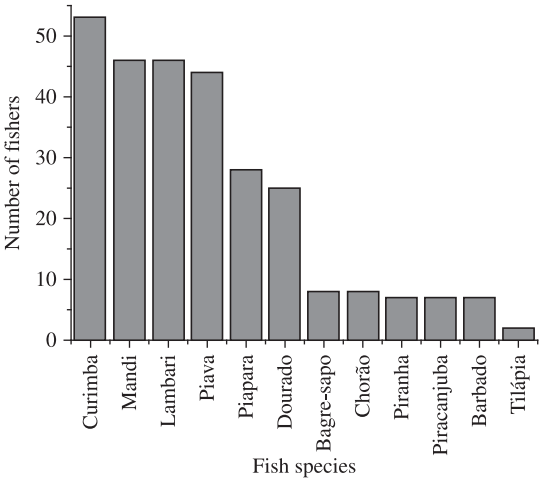

Figure 2. Main captured fish species at Emas and the number of sport fishers capturing each one. Curimba (*Prochilodus lineatus*), mandi (*Pimelodus maculatus, Pimelodus heraldoi, Pimelodella* spp.), lambari (*Astyanax fasciatus*, A*styanax schubarti, Roeboides paranensis, Astyanax altiparanae*), piava, piau (*Leporinus lacustris, Leporinus friderici, Leporinus octofasciatus* (ferreirinha), piapara (*Leporinus obtusidens*) (Valenciennes, 1836), dourado (*Salminus brasiliensis*) (Cuvier, 1816), bagre-sapo (*Pseudopimelodus mangurus*) (Valenciennes, 1840), chorão (*Pimelodella* sp.), piranha (*Serrasalmus maculatus*) (Kner, 1858), piracanjuba (*Brycon orbygnianus*) (Valenciennes, 1849), barbado (*Pinirampus pirinampu*) (Agassiz in Spix and Agassiz, 1829) e tilápia (*Tipalia rendalli,* (Boulenger, 1897) *Oreochromis niloticus*) (Linnaeus, 1758).

Table 2. Level of education of the sport fishers at Emas (N = 107).

Education level	N
Illiterate	3
1st. incomplete degree	53
1st. complete degree	14
2nd. incomplete degree	3
2nd. complete degree	26
Complete superior	7
Masters degree	1
Total	107

Table 1. Characteristics of the sport fishers visiting Emas.

Variable	Mean	Standard deviation	Range	N
Age (years)	50.2	12.62	21-73	107
Monthly family income (US$)	1,212.37	1,371.88	154.31-10,287.54	106

Table 3. Professions of the sport fishers at Emas (N = 107).

Professions	
Merchants, entrepreneurs, industrialists	11
Waiters, joiners, sales attendants, cook, salespersons, farmers, drivers, mechanics, bricklayers, bricklayers' assistants, etc.	96
Total	107

Table 4. Cities of origin of the sport fishers at Emas.

City	Number of fishers	Distance in km [1]
Pirassununga	47	7
Tambaú	9	47
Rio Claro	7	55
Porto Ferreira	5	24
Others	39	-
Total	107	-

[1]The distance from the city of origin to the district of Cachoeira de Emas.

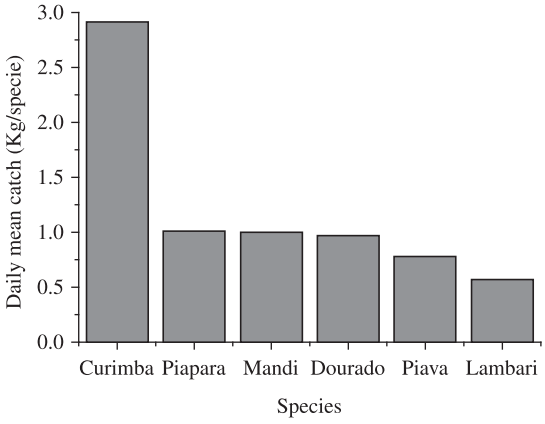

Figure 3. Daily mean catch (kg/species) at Emas.

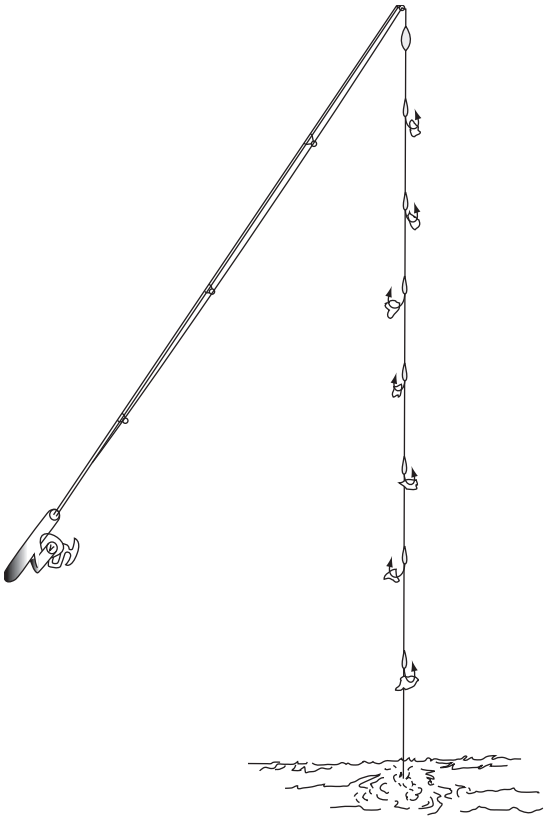

Figure 4. Chicotinho: fishing gear used in the curimba (*Prochilodus lineatus*) capture at Cachoeira de Emas.

friderici (Bloch, 1794), *Leporinus octofasciatus* (Steindachner, 1915) (ferreirinha).

Figure 3 presents the daily mean catch (kg/species). Curimba stands out with the highest yield, nearly 3 kg/day. The other species are around 1 kg/day.

Some fishers (12.1%) informed us that most of the time they did not catch any fish; 13.1% informed that they had not captured any fish until the moment of the interview; 1.9% never catch any fish. Fishers that have success in fishery (65.4%, n = 70) informed that their mean catch is 2.8 kg/day (Table 5). Fishers usually come to Emas 33.8 times a year (4.2 times a month) on average, 14 fishers visited Emas for the first time; 10 fishers informed that they just come every now and then.

A retired fisher that lives in Emas fished 240 times per year. Fishers come to return to their cities of origin on the same day spending, on average, 6.4 hours fishing. Few spend more than one day. They come accompanied by 2.21 people, on average, (sd = 1.2; min. = 1; max. = 7; n = 78 people); 22.4% come alone and 4.67% did not inform.

The most common fishing gear are the pole (several materials and sizes) and reel. For curimba fishing, the "chicotinho" and the "chuveirinho" are also used. The first is a group of 6 or more hooks, disposed along a single line (Figure 4). The "chuveirinho" consists of a single line in a pole and in its final portion the hook apparatus hangs out (Figure 5).

The more commonly used baits are earthworms followed by chicken viscera. Some baits are quite peculiar, such as the spangle and pieces of coloured medicine balls. They also use a home made pastry whose ingredients vary according to the target species. It is usually composed of wheat flour, crumbs of rice, rabbit ration mixed with water or some juice type, among others. This gear is also used for lambada fishing. This fishing method captures the fish by the impact of quickly pulling the hook which eventually might hang out by chance in any body part.

Figure 6 shows the number of fishers referring to the best fishing months, which span from August to

December. Some fishers (12.1%) even did not know which are the best fishing months and 10.3% mentioned the ones during the low water season, others the piracema, with any month for others. The best months are characterised by larger amounts of fish, the piracema, higher temperatures and low water level; this was cited by 44.8% of the fishers; low water and cleaner river (11.2%) and others (43.9%).

According to Figure 7, most of the fishers believe that fish abundance has decreased when compared to the past and less than 10% of them believe that the condition is the same. They believe that the change is mainly due to water pollution, followed by occasional fish mass killing (Figure 8). Only 10% of them associated low catches with the presence of the professional small-scale fishers, specifically related to their gear (mainly nets and cast nets).

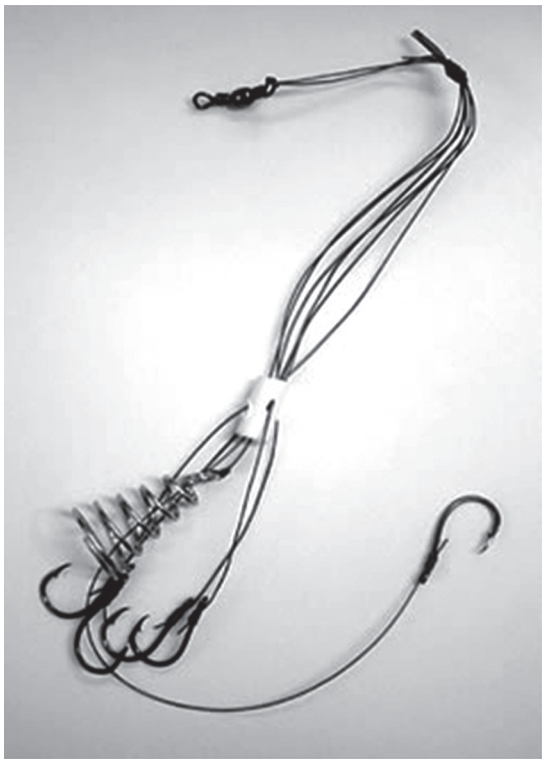

Figure 5. Chuveirinho another fishing gear used in the curimba (*Prochilodus lineatus*) capture at Cachoeira de Emas (Source: www.martinellishop.com.br).

4. Discussion

4.1. Fisher socioeconomic profile

In Cachoeira de Emas, most of the sport fishers are men as is usual elsewhere, as in Finland (Salmi et al., 2006); in the Southeast area of England (Invest in Fish South West Report, 2007); in the State of Saxony-Anhalt, in Germany (Wedekind et al., 2001); in Liège, in Belgium (97.2%) (Frank, et al., 1998); marine fishers in northeast USA (80.1%) (Thunberg, 1999), in Guadiana,

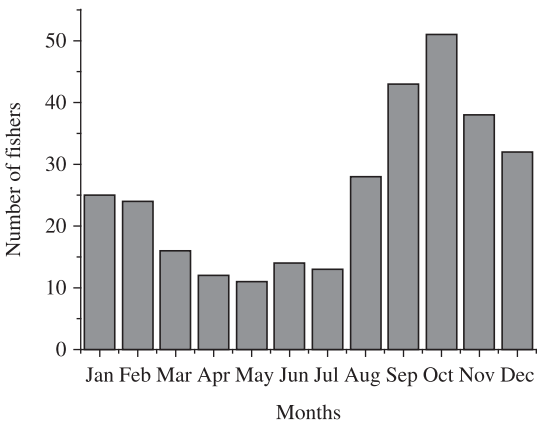

Figure 6. Better fishing months at Emas according to the sport fishers.

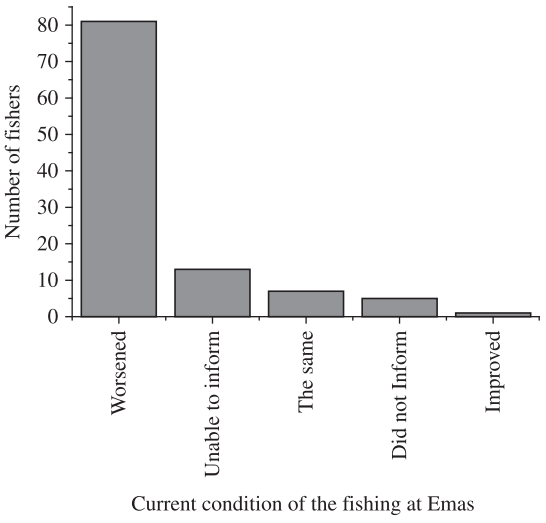

Figure 7. Current condition of the fishing at Emas.

Table 5. Characteristics of the sport fishing at Emas.

Variable	Mean	Standard deviation	Range	n
Daily catch (kg)	2.80	1.75	0-8	70
Fishing visits/year	33.80	44.59	1.50-240	83
Hours fishing	6.40	2.50	2-12	106
Fishing days	2	0.50	1-3	11

Portugal (97%) (Marta, et al., 2001); pole fishers visiting the Casino beach, in Rio Grande, Brazil (94%) (Basaglia and Vieira, 2005); fishers visiting the Pantanal of Mato Grosso do Sul (99%) (Moraes and Seidl, 2000); fishers in the area of Aruanã/GO (85%) (Carvalho and Medeiros, 2005) and on the marine coast of the state of São Paulo (98%) (Ikeda, 2006). Comparing different places in the world, it can be said that this activity might be described as predominantly masculine, a curious aspect which is not well covered in the literature.

Sweden and Finland are exceptions, with a slightly higher number of women practicing this sport (25% in Sweden and 35% in Finland) (Bogelius, 1998; Salmi et al., 2006). According to Toivonen, et al., (2004), in the Nordic countries, half of the fishers are occasional and a 1/4 of the ones that usually fish are women.

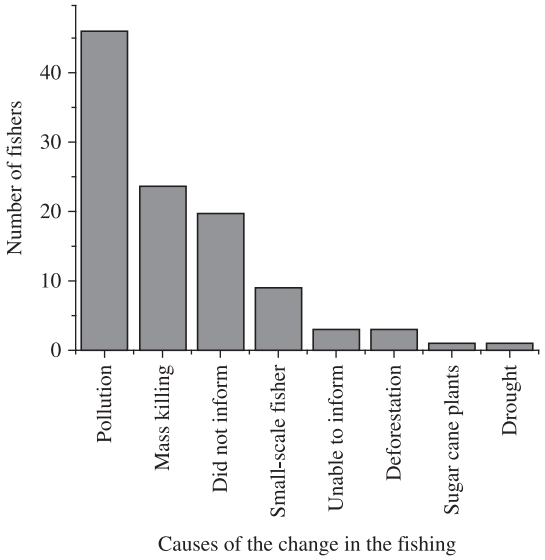

Figure 8. Causes of fishing change.

Most of the fishers are middle-aged, married people (50.2 years on average). Table 6 compares their age in different countries. The fishers at Emas are among the oldest and this may well be related to the easy access and convenient fishing facilities, as already explained.

The mean family income (US$ 1,212.37) of the sport fishers visiting Emas is close to the mean family income of the state of São Paulo, which according to IBGE, in the period of 2002/03, was of US$ 1,247.27, higher than the country's average (US$ 938.52). These data show that they are not rich people and they probably don't have economic conditions to travel to farther and more fashionable places, such as the Pantanal. There the average income of the visiting sport fishers in the State of Mato Grosso do Sul reaches US$ 4,400.00. The average income of the fishers frequenting Emas is much inferior to the monthly medium income of the fishers that visit the "Newark Bay Complex", of New York-New Jersey, that is between US$ 2,083.33 and U$ 2,916.58 and it is similar to 18% of them that have income below U$ 1,250.00 (Burger, et al., 1999). According to these authors, 11% have income above US$ 6,250.00. Clearly this comparison must be made with caution when comparing their order of magnitude, as Brazil and USA have very dissimilar patterns of wealth distribution.

The education level of the fishers visiting Emas is very low (reflecting their social status and the Brazilian educational structure): only seven hold a university degree. Most of them cannot afford more expensive leisure activities. In other places as shown in Table 7, the social level is higher with better formal education. On the other hand, more than 50% of the fishers that visit

Table 6. Sporting fishers mean ages around the world.

Place	Mean age (years)	References
Cachoeira de Emas	50,2	This paper
Pantanal of State of Mato Grosso do Sul (Brazil)	43	Moraes and Seidl, 2000
Sport fishers registered at IBAMA	52.3% between 41-65 27.3% between 31-40 17.9% between 19-30 1.4% above 65 below 18	(Michel Lopes Machado/PNDPA/IBAMA, personal communication to JP).
Pantanal de Cáceres (State of Mato Grosso, Brazil)	47.1	Netto, 2006
Casino beach (State of Rio Grande do Sul, Brazil)	between 40-45	Basaglia and Vieira, 2005
Aruanã area (State of Goiás, Brazil)	36	Carvalho and Medeiros, 2005
State of São Paulo seaside (Brazil)	between 21- 40 (59%)	Ikeda, 2006
Guadiana River, Portugal	between 31-40	Marta, et al., 2001
Saxony-Anhalt, Germany	45	Wedekind et al., 2001
Southeast England	45	Invest in Fish South West Report, 2007
Liège, Belgium	between 31-50	Frank, et al., 1998

Table 7. Sporting fishers education level around the world.

Place	Education level	Refrences
Cachoeira de Emas	50% only have the first incomplete degree and just one fisher declared to hold a MSc degree	This paper
Pantanal of State of Mato Grosso do Sul	more than 50% have university degree	Moraes and Seidl, 2000
Aruanã area (State of Goiás)	most (72.5%) of them hold a second complete degree or superior complet/incomplet	Carvalho and Medeiros, 2005
Newark Bay Complex of New York-New Jersey	28% do not have second degree, 45% have second degree and 27% are studying or hold an university level	Burger et al., 1999
Casino beach in Rio Grande, Brazil	33.8% have first degree, 42.3% the second degree and 23.9% hold university degree	Basaglia and Vieira, 2005

the Pantanal have a university degree, reflected in their higher income.

As we have described, most of the fishers visiting Emas come from nearby and this proximity makes the activity also accessible to poor and older people as it is easy to get there walking, by bicycle and urban bus. According to Sipponen and Gréboval (2001) the fishing practiced close (less than 100 km) to the fisher's dwelling is becoming common in Europe. So the fishers that participate in fishing tournaments in the area of Parque Nacional da Ilha Grande, (State of Paraná, Brazil), travel around 50 km (37%) and 23% travel from 51 to 150 km (Zacarkim et al., 2007). More than 80% of the fishers of Casino beach (State of Rio Grande do Sul, Brazil) live less than 100 km (Basaglia and Vieira, 2005). In Portugal most of the fishers (54%) do not travel more than 50 km from home (Marta, et al., 2001). Most of the fishers of Liège, travel 38 km by car on average, only 10% fish close to their residences (less than 3 km) (Frank et al., 1998). In the State of Saxony-Anhalt, in Germany, many fishers travel from 3 to 8 hours to fish (Wedekind et al. 2001). Most of the sport fishers in France fish near home (47% - districts) or departments (43%) (Jantzen, 1998).

Most of the fishers are constant visitors in Emas showing the preference and the connection that they must have had with this place for many years (14.7 years on average). The same happens with the fishers in the area of Aruanã, (State of Goiás, Brazil) who have frequented it for more than 14 years (Carvalho and Medeiros, 2005).

Cachoeira de Emas certainly is the main leisure option for many people in the area who mainly come from the city of Pirassununga. As this is not a large city with few leisure options for old people, going fishing at Emas creates an opportunity to meet friends and to practice a cheap sport, which is safe and of easy access.

4.2. Sport fishing at Cachoeira de Emas

The catches of curimba are the largest when compared to other fish species and probably this is the most abundant species in the river, as estimated by Capeleti and Petrere (2006), where 34% of the ascending fish at Emas fish ladder is represented by this species. In the Pantanal de Cáceres the sport fishers capture 21 fish species and 8 of them correspond to 95.5% of the catches (Netto, 2006).

The majority of fishers at Emas are satisfied with the amount fished, even if it is low, 2.8 kg/day, albeit being similar to the area of Aruanã (3.2 kg/day) (Carvalho and Medeiros, 2005). A similar figure is shown for the Pantanal de Cáceres (2.0 kg/day) (Netto, 2006) and in the Pantanal of the State of Mato Grosso do Sul, 4.2 kg/day (Catella, 2001). These data show that in the Mogí River, the basin of which is under intensive use, the fishers still have a yield comparable to the Pantanal. It is worth reminding that the Pantanal is one of the most famous places in Brazil for sporting fishing due its high fish abundance and to the appeal of the media in general, mainly through magazines and radio and TV programs addressed to the public, delivering an image of a fishing paradise. In the State of Saxony-Anhalt (Germany), this figure is only 0.71 kg/day (Wedekind et al., 2001). For better comparison we should include the fishing effort figure (kg/fisher*area), but even so, we must emphasize that most sport fishing in Europe comes from artificial fish stocking, which is not the case here. This fact shows that if appropriate habitat recuperation and conservation measures are taken, the most industrialized state in the country will offer a sound river, plenty of fish, generating cheap leisure for the old and poor.

So, we saw that most of the sport fishers at Emas just go fishing for the day, on average once a week. When fishing is accomplished at more distant places, it is common that fishers spend more time at the fishing spot, as is the case of the fishers who travel farther to the Pantanal of Mato Grosso do Sul staying on average 6.3 days. In the Pantanal de Cáceres, fishers stay on average 5.6 days. The fishers of Casino beach usually visit it from 4 to 8 days a month (Basaglia and Vieira, 2005).

As this activity is relatively cheap, there is no need to organize large fishers groups in order to divide the costs. So at Emas, most fishers eat in groups of 2.2 people on average, numerically smaller than the ones at Pantanal in the State of Mato Grosso do Sul and of Cáceres (State of Mato Grosso, Brazil), with 7 people (Moraes and Seidl, 2000) and of 12.2 (Netto, 2006), respectively.

As the fishery is concentrated on a few fish species, the fishing gear is almost the same among the fishers at Emas being mainly rod and pole, with baits varying according to the target species. The fishers at Pantanal de Cáceres use 3 types of fishing gear: pole with rod, pole with reel and the bamboo stick (Netto, 2006). Most of the fishers licensed by IBAMA (54%) use natural baits, poles with wheelbarrows or reel (Michel Lopes Machado/PNDPA/IBAMA, personal communication to JP). In the Berlin area, fishers just use poles and lines (Grosch et al., 2000). In Finland the situation is different as sport fishers are allowed to use passive gear as nets (Lappalainen and Pönni, 2000) and 45% of the fishers use gillnets (Salmi et al., 2000).

The most favourable fishing season starts in August, when spawning shoals (piracema, upriver migration) start to arrive at Emas. This is a common feature of all rivers in the Neotropics. From November to March the fishing ban takes place. In this period, sport fishers are only allowed to catch up to 10 kg of exotic fish species plus one more fish, irrespective of its weight. They are only allowed to fish from the river bank, not in a boat.

As we said before, most of the sport fishers believe that fish catches have decreased at Emas. They attribute this mainly to water pollution and few associate this decrease with the fishing gears (mainly nets and castnets) legally employed by small-scale fishery (as there are around 30 registered professional fishers at Emas. This indicates that similarly to professional fishers, they are attentive to the environmental changes and their influence on fish abundance. This perception is also reported by 40% of the Aruanã fishers (Carvalho and Medeiros, 2005). In the Southeast of England fishers have witnessed a decline of practically all fish species (Invest in Fish South West Report, 2007).

Cury and Cayré (2001) believe that fishing will follow the same destiny as hunting, becoming a marginal activity for the collection of luxury items. In the case of Emas sport fishing, the activity still persists albeit at lower intensity as it used to be and with a smaller number of fishers, mainly professionals, but it is still an extremely important leisure option. According to Kearney (1999), we have been capable of quantifying some important aspects of sport fishing such as its expenses, but others, like the social benefits, are still ignored. The fact that this place has assiduously visiting working people, who take the day off and others already retired who come just to spend a few hours to occupy their time, should be taken into account in the definition of public policies that would help the conservation of natural resources. Besides, sporting fishers at Emus may become involved and collaborate in recovering research projects in the Mogí-Guaçu River, viz the importance that they have for the river.

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