

Analysis of Income Sources of Fishers' Families on the Coast of the State of Paraná, Brazil

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ABSTRACT

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Small-scale fishing has been part of the economy of more than 60 communities on the coast of the state of Paraná for more than two hundred years. A great diversity of aquatic habitats allows for a variety of fishing practices and target species, heterogeneously distributed in space. This work focuses on fishermen revenue sources in five fishing production systems of the region. The sample was composed of 136 randomly selected households in communities representing each system. Monthly average values of household incomes were assessed according to their sources. Total monthly fisher household income averaged R\$749.00, or six minimum wages at the time. Fishing income represented 55% of total income. Income from other sources and jobs had a very important contribution, responding for 31% or R\$ 214.00 of average total income, in 69% of the households surveyed. Data also show poor income distribution among fishers, and marked differences among production systems. Average income in the 18% upper percentile was R\$ 2,036.00, or the equivalent of almost 50% of the total of all households surveyed. These fishers are wholesale traders, and the owners of larger, more technologically sophisticated vessels, with better access to capital, living in urban neighborhoods. Although such results do not support the usual view of fishers as "poorest among the poor", in most villages, where technology is simple, and marketing is strongly intermediated, most fishermen live below the poverty line. In any case, thanks to opportunistic, informal income strategies, Paraná's fishers still have in fishing the most important material means of social reproduction.

ADDITIONAL INDEX WORDS: *Income distribution, poverty, artisanal fisheries, fishing systems, production systems, access to capital.*

INTRODUCTION

Small-scale fisheries have been a major part of the economy of the coast of the State of Paraná for more than two hundred years (MIGUEL, 1997). The region, among the poorest in southern Brazil, has a total population of 236.000, and covers 6049 km² between the Atlantic Ocean and the Serra do Mar, the coastal sea range. An estimated 10.000 or more fishermen and their families inhabit more than 60 villages or urban neighborhoods on the municipalities of Antonina, Guaraqueçaba, Guaratuba, Matinhos, Morretes, Pontal do Paraná and Paranaguá (ANDRIGUETTO *et al.*, 1998).

Coastal fisheries in Paraná are characterized by great complexity. A great diversity of aquatic habitats, from the continental shelf to mangrove-surrounded bays, allows for a variety of fishing practices, with different gear and target species. Such practices are heterogeneously distributed in space, and complexity is further compounded by different cultural origins of fishers, their migratory movements, levels of market insertion, and differential use of natural resources other than fisheries (agriculture, forest exploitation and hunting). Social change, particularly technical change, has been subjected to a number of factors of pressure such as market changes, tourism and land use development, and tightening and complexification of environmental legislation. Besides fishing regulations, present environmental protection also prevents many uses of forest resources by fishing communities, a very sensitive issue, since the region shelters the last remnants of the Brazilian Atlantic rainforest. On the other hand, returns supposedly diminishing, changes in catch composition, and habitat degradation, particularly that deriving from tourism and port development, have resulted in adaptation strategies from fishers, including the invention of new gear.

In the last decade or so, growing attention has been paid to Paraná's fisheries, due to the need to solve their development problems, particularly poverty alleviation (*e.g.*, ROUGEULLE, 1989, 1993; SPVS, 1992; ATHAYDE and TOMAZ, 1995; CHAVES *et al.*, 2002). Yet, despite their complexity, Paraná's fisheries have been considered both by management and

research as a homogeneous whole, usually referred to as "artisanal". That has prevented, to a certain extent, better understanding, and resolution, of management and development problems. That is particularly true regarding the interactions between major social and natural dynamics and processes. Thus, in order to deal with complexity and to better address development issues, an interdisciplinary line of research has been initiated, approaching fisheries as technical or production systems, which means they are a major interface or new level of integration between natural and social systems (BLANC-PAMARD *et al.*, 1992; CORMIER-SALEM, 1992; LALOË *et al.*, 1995; ANDRIGUETTO, 1999). Following such approach, ANDRIGUETTO (1999, 2002) recognized and described six different fishing technical systems in the region.

This work explores the issue of household income sources, as part of an effort to further understand Paraná's fishing systems. A brief description of those systems is in order, then (Figure 1). System I is actually an agrofishing system, where agriculture is more important than fisheries in community economy. The "fishing part" of the system is actually quite similar to that in system II, so system I was not addressed in this work. System II is the most traditional, characterized by the greatest variety of practices, developed in the Bays of Paranaguá and Guaratuba. Besides set and drift gillnetting for fish, one can find longlines, a variety of seines and traps or corrals, and the so-called *gerival* or *tarrafinha*, a kind of beam trawl developed locally. It is widely used to capture shrimp, since the device does not require motor propulsion, and can be managed even by children. Oyster and crab are also exploited. The vessel of choice is the pirogue, usually without motor propulsion. Many villages are remote, not accessible by land, and market is strongly intermediated. In systems III, IV and VI, fishing practices are almost restricted to set and drift gillnetting for fish and shrimp, and to shrimp bottom trawling. Among fish, Serranidae, Sciaenidae and Clupeidae are the most important groups, but shrimps respond for the largest proportions of landings, both in weight and revenue. System III is found in rural villages at the mouths of the bays, exploring both them and the continental shelf near shore. Besides pirogues, motored wooden plank vessels,

Table 1. *Villages and number of interviews in this study, according to fishing production system.*

Fishing system (ANDRIGUETTO, 2002)	Village	Number of interviews
System II	Piassagüera	23
System III	Barra do Superagüí	40
System IV	Piçarras	38
System V	Pontal do Sul	25
System VI	Caieiras	27

without a deck or ice bilge, are common. System IV is the most technological and market-oriented one. Modern navigation and communication equipment is used in 16-m, 16-ton, up to 150-HP wooden plank boats, operating on the shelf a few miles from shore. Processing after landing is also developed, including mechanized shelling of shrimp, filleting and freezing. System VI is characterized by urban villages in the southern part of the coast, and it shares with system IV a strong immigration and cultural influence of fishers from the neighboring State of Santa Catarina. In terms of technology and fishing practices, it can be considered intermediate between systems III and IV. Finally, in system V, traditional Paraná's beach seining, with mullet as the main target, is declining due to the economic and social impacts of urbanization and tourism. This system will probably be replaced, in the same geographical locations, by systems IV and/or VI.

METHODOLOGY

Between April of 1998 and January of 1999, 153 questionnaires were applied to randomly selected households in villages and neighborhoods illustrating each production system (Table 1, Figure 1). Interviewees were picked randomly from a list of fishers from each village that was elaborated beforehand relying on institutional data (IBAMA, the federal environmental agency; EMATER, the State technical assistance and extension agency; and FUNASA, the National Health Foundation), and through privileged informants among the fishers themselves.

In order to characterize the different fishing production systems, the questionnaire was divided into modules, each one approaching the dynamics and specifics of the economical, social and biotechnological structures apprehended in each fishing village. The "income" module, the subject matter of this study, presented questions about average house income, as well as its sources, both from fishing and non-fishing activities.

RESULTS

The general average monthly domestic income of the fishers of the coast of Paraná was found to be approximately R\$ 749.00 (table 2), about six minimum wages at the time. From that total, 66.2% came from fishing (capture, shelling and sale) and 33.7% from other sources. The income from capturing (1st sale)

represented the most important isolated contribution, for it made up 55.2% of the full earnings.

Other sources of income, which complement fishers domestic income, were found in this study under two categories:

1. Situations where income sources did not originate from the direct labor of the family, but from the following sources:

- a) retirement and alimonies
- b) house rental
- c) money sent by relatives

2. Other regular, and casual or temporary jobs carried out by the family, as an alternative to the earnings from the main activity:

- a) jobs in commerce (not related to fishing);
- b) general services
- c) public services
- d) sailor/seaman, in marinas or in the ferry boat service
- e) "Clean Bay" program
- f) farmer
- g) other

The earnings from diverse regular and casual jobs were shown to be important in the economic logics of the coast, since 69.1% of the interviewees admitted having some kind of occupation to complement the earnings from fishing, adding in average R\$ 214.00 to family income. This proves the significance of the sources that are not linked to the fishing activity, and are usually informal, to the total family income. Generally, preference is given to those alternative activities which allow: 1) articulating or optimizing time usage in relation to the labor regime in fishing (half a turn, in the weekends or seasonally), and 2) profiting from variable seasonal services and products demanded by tourism. The fishing systems recognized by ANDRIGUETTO (2002) showed significant disparities (Table 2), revealing details such as the commerce of fish and other jobs, which seemed to be more important in the systems with higher income. Results made evident profound disparities in income distribution among the systems, as can be seen in the average income contrast between the Piassagüera and Piçarras systems for example. Such imbalance is further evident in Table 3, where it is revealed that the 18,7% of the fishermen with the best remuneration in the coast, with 10 or more minimum wages, show a general average income of R\$ 2,036.00, receiving around 48% of the total fishing income in the coast. These fishers are wholesale traders, and the owners of larger, more technologically sophisticated vessels, with better access to capital, living in the urban neighborhoods of Piçarras, Pontal do Sul and Caieiras. On the other hand, the fishers with the lowest income, from 1 to 3 minimum wages, representing almost 36% of the fisher population, received 11,7% of total income, with an average income of R\$ 259.00. Putting together the two lowest income levels, we get, as the average income of most fishers, around R\$ 397.00, attesting that around 66% or

Table 2. *Average monthly family income of the fishing systems of the coast of Paraná, according to source (source: field research)*

PLACE	N	RENT - R\$ and (%)								
		Capture (1st sale)	Shelling	Fish commerce	Total fishing activities	Retirement	Rent	Other jobs	Aid by relatives	Total
Caieiras	22	361.00 (42%)	67.00	43.00	471.00 (55%)	88.00	21.00	284.00 (33%)	0.00	864.00
Piçarras	29	790.00 (67%)	12.00	160.00	962.00 (82%)	9.00	0.00	204.00 (17%)	1.00	1175.00
Pontal do Sul	15	396.00 (52%)	7.00	87.00	490.00 (64%)	96.00	33.00	145.00 (19%)	0.00	764.00
Barra do Superagüí	37	350.00 (49%)	46.00	5.00	401.00 (56%)	35.00	0.00	274.00 (38%)	2.00	712.00
Piassagüera	20	213.00 (66%)	0.00	0.00	21.00 (66%)	26.00	0.00	84.00 (26%)	2.00	325.00
Whole coast	123	439.00 (55%)	30.00	58.00	526.00 (66%)	44.00	8.00	215.00 (27%)	1.00	794.00

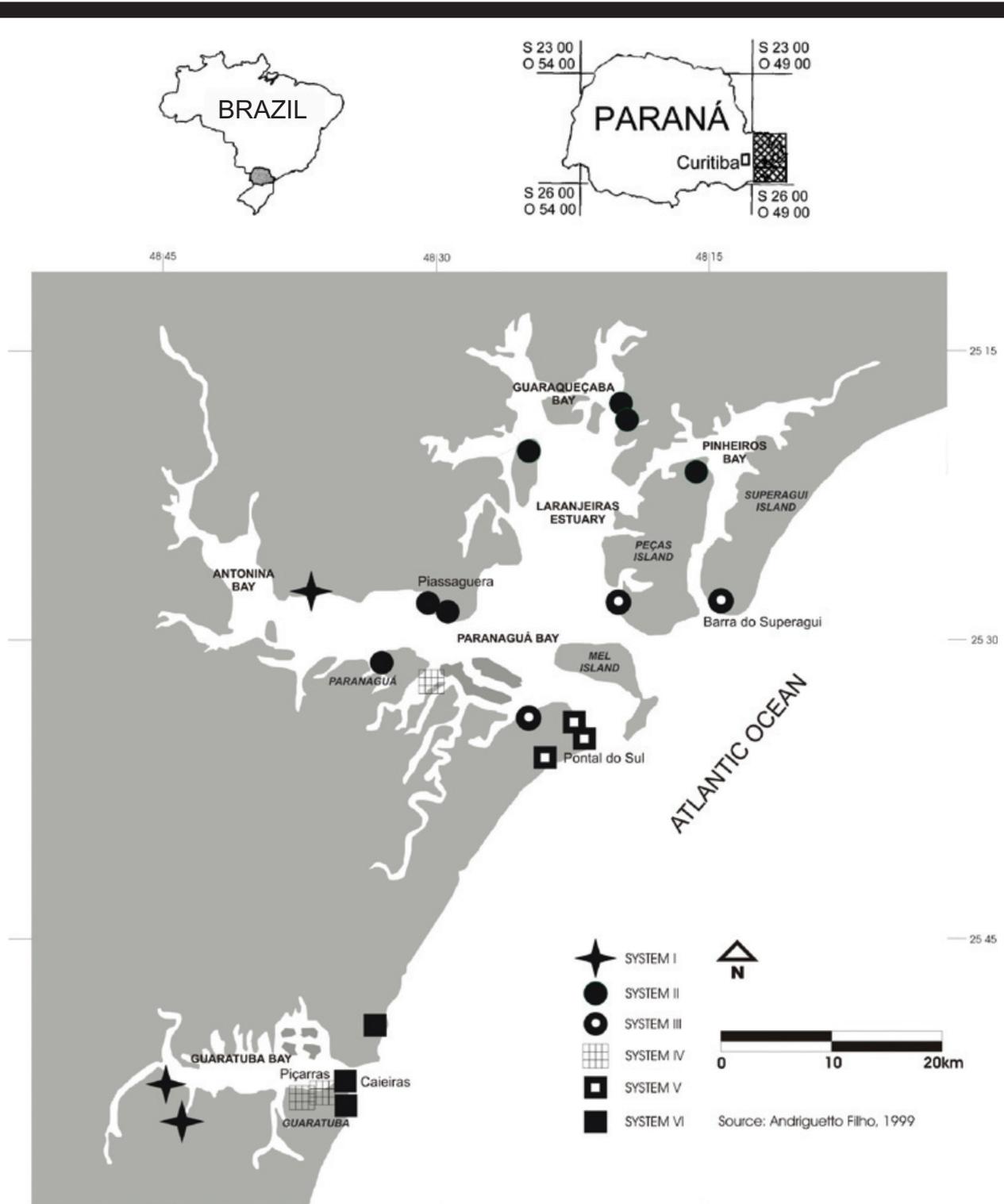


Fig. 1. Location of the study area and the six fishing systems studied. The symbols used in this study and mentioned in the text are labeled.

two thirds of the fishers take in 32.8% or 1/3 of the income attained in the coast. The sample was not large enough to allow an analysis of income distribution of each system internally, but the comparison between the results in tables 2 and 3 suggests that the income discrepancy is at least as large within each system as it is between systems.

DISCUSSIONS

Though there are no publications about the income of the fishers of the coast of Paraná, various studies try to evaluate the conditions of their material life (e.g., KRAEMER, 1983; IPARDES, 1989; SPVS, 1992; ROUGEULLE, 1989, 1993; ATHAYDE and TOMAZ, 1995). Restricting themselves to rural

villages around the Bay of Paranaguá, these studies unanimously record poverty and precarious life conditions, and manifest their concern as to the prospect and possibility of small-scale fishing as an economic activity. The picture painted by such descriptions has more often than not been generalized, and made out to be the situation of the fishers of Paraná, who are portrayed as economically unprivileged. The results of this study demonstrate that reality is more complex and diverse than it was thought, bringing important implications to management and research.

To the fishers who remain in the activity, fishing is the main source of income, suggesting that the activity is still the chief aspect of social reproduction even in the poorer fishing systems. In table 4, the fishers' *per capita* domestic income in each

Table 3. *Distribution of fishers by class of domestic income (in minimum wages) and participation in the total income received by all households. Minimum wage at the time was R\$ 130.00. Source: field research.*

No. of minimum wages	N.º of households	%	Total income, all households (R\$)	Total income (%)	Average monthly income per household (R\$)
1-3	48	36	12412.00	12	259.00
4-6	41	31	22481.00	21	548.00
6-9	23	17	20715.00	19	901.00
10 or more	25	18	50907.00	48	2036.00

village is compared with the *per capita* income of the rest of the population in the corresponding municipality in the coast of Paraná in the year 2000, as obtained from the newly released Atlas about Human Development in Brazil from IPEA (2003). As we see, in three cases, all based on shrimp bottom trawling, the fishers' income was next to or superior to the city average. In the systems represented by these villages, the income may be substantial in the richer households (table 3), corresponding to a satisfactory and rather wealthy lifestyle in the city of Guaratuba, as noted by CHAVES *et al.* (2002). On the other hand, fishing itself is not enough to keep such income levels. Most part of the fishers use opportunistic and informal strategies to heave up income, through diversifying productive activities. As seen, other jobs and casual earnings are responsible, in average, for a 27% raise in domestic income, numbers that go up to 34% when other sources are added (rent and retirement). Even so, the income of the poorest third of the fishers puts them in a situation of indigence, while the intermediate third lives next to the World Bank poverty line, earning no more than US\$2.00 / per person, per day.

This can be better appreciated by the value of the minimum wage at the time of the study (R\$130.00), as compared to present values, since the exchange rate fixed by government is misleading. These poorer fishers are the majority in the poorer systems, represented by Piassagüera and Barra do Superagüi.

As presented in the Introduction, a number of circumstances may help explain the differences not only in levels but also in the formation of income between fishing systems, particularly regarding the 1st sale, and other jobs and casual earnings. In the poorer systems, technology is simpler. Most villages are remote, or at least not accessible by road. Consequently, difficulties in commercializing production and dependency on the local profiteer are greater (ANDRIGUETTO, 1999). These are also the systems were bay fishing, less productive than fishing on the continental shelf, has the biggest contribution in production, and where there are no other ways of attaining alternative income like those that can be found in systems closer to urban centers and tourism (ANDRIGUETTO, 2002). As a matter of fact, the samples taken in the villages of Piassagüera and Barra do Superagüi may be overestimating the levels of income in those systems, for the first one is located near the city of

Table 4. *Comparison between fishers' per capita income and per capita income of the municipalities in the coast of Paraná, according to fishing system. Fishers' income was estimated by dividing household income (table 1) by 4, which is the average number of inhabitants by household. Per capita income of municipalities was obtained from IPEA (2003).*

Place	Municipality	Fishers per capita income (1998)	General population per capita income (2000)
Piçarras	Guaratuba	293.88	274.31
Caieiras	Guaratuba	216.13	274.31
Pontal do Sul	Pontal do Paraná	190.93	269.09
Barra do Superagüi	Guaraqueçaba	178.05	107.13
Piassagüera	Paranaguá	81.28	305.36

Paranaguá, the biggest urban center in the coast of Paraná, and the second one receives an important flux of tourists, featuring four inns at the time of the study, despite its insular isolation.

Besides these circumstances, the profile and income level differences between systems are, as expected, at the same time cause and consequence of the observed differences as to the access to means of production. The system with the highest average income, represented by Piçarras (Table 2), is the one that best follows a capitalistic model of production. Higher capital allows more intensive and technological fishing, and a better commercialization structure. Consequently, it is the system with the biggest labor productiveness. On the other end, in the Piassagüera system, a more traditional productive system predominates, closer to the ancient practices of fishing from the interior of the bay of Paranaguá (ANDRIGUETTO, 2002). The remaining systems represent intermediate situations. It is important to note that the income and material conditions of life were not used by ANDRIGUETTO (2002) as criteria for the distinction between systems. At most, such elements were indirectly reflected in the technical practices of each system. Even so, now they appear as notable differences between the systems, reflecting the differences as to access to capital among fishers.

These observations confirm what ANDRIGUETTO (1999) concluded: that there are two dynamics that control the transformations in fishing on the coast of Paraná. On one hand, there is an increase in performance and intensity, particularly in one segment of what the author calls the diversified artisanal fishing, which suffers a process of complexification and is becoming more commercial or entrepreneurial in nature, and progressively inserts itself in the market. On the other hand, the lack of access to the market and capital may lead part of the fishing activity to marginalization, making fishers poorer, and stimulating abandoning of the activity. This process, to some extent, explains the concentration of the means of production in the fishers society, something that has already been recorded in literature (IPARDES, 1989), and is made evident in this study. Even under these circumstances, it is notable that fishing is still the principal source of income to those who remain in the field, differently from what ANDRIGUETTO (1999) supposed.

One can also conclude that small-scale fishing is not in danger of disappearing, at least in the short run. DIEGUES (1988) had already brought down the myth that Brazilian artisanal fishing was doomed because it is a stage of transition between subsistence fishing and entrepreneurial-capitalistic fishing. In fact, the transitional character is not even real (ANDRIGUETTO, 2002). Yet, even though the activity persists, some fishing systems of Paraná truly risk disappearing, victimized by the dynamics of marginalization. Such is the case of the traditional beach seining whose primary target used to be the mullet (*Mugil* sp), and whose last representatives are elder fishermen from Pontal do Sul. The conflicts and dilemmas that surround the issue of resource protection are also better understood, for the poorer fishers risk not being able to guarantee their survival through their income levels if fully obeying legislation (closure seasons, minimum mesh sizes, etc.), considering current levels of stock depletion.

The focus of research and management may change after these conclusions, since results do not support the usual view of fishers as "poorest among the poor". Better than considering the fishing society as economically less privileged, is to notice that its structure is a particular case of the social exclusion and disparity processes present in the Brazilian society as a whole. As for research, this demands integrated approaches for the study of the relationship between various fishing systems and other productions systems on the coastal zone, beyond the fragmented approaches applied up to now, and abolishing dichotomies such as "artisanal" versus "industrial" fishing. Management programs and policies would also benefit from the same kind of integrated approach, and in some aspects could be more effective when working with the broader context of development in which the fishing sector and society are embedded, since the major causes to their problems are external.

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