A STUDY OF FISHING AND EDUCATIONAL LEVEL OF YOUNG FISHERS ON THE BONIFÁCIO VILLAGE, BRAGANÇA, PARÁ, NORTHERN COAST OF BRAZIL

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ABSTRACT

This study aimed to characterize the fishing and verify its effect on the school life of young fishers from the village of Bonifácio, Amazon coast. The forms were applied to 41 young fishers, aged 7-18 years. Data collection was performed monthly during the year 2006. The young interviewed started in the fishing activity about age of 10 ± 3.29 years often, accompanied by relatives. A total of 39% admitted truancy due to the incompatibility of the working hours with the school timetable. Approximately 52% of young fishers about age of 14 ± 3.52 years having reached no more than the sixth grade, rather than the eighth or ninth grade, which would be expected at this age. The school is a priority for 63% of the respondents when the timetable coincides with the fishery. There is a need to synchronize the school and fisheries calendars to reduce truancy and age-class distortion in fishing communities.

Keywords: Artisanal fishery; estuary; fishing community; learning; age-class distortion

ESTUDO DA PESCA E A ESCOLARIDADE DE JOVENS PESCADORES NA VILA DE BONIFÁCIO, BRAGANÇA – PARÁ, COSTA NORTE BRASILEIRA

RESUMO

O presente estudo teve por objetivo caracterizar a pesca e verificar os seus efeitos na vida escolar de jovens pescadores da Vila de Bonifácio, litoral amazônico. Os formulários foram aplicados a 41 jovens pescadores, com faixa etária de 7 a 18 anos. A coleta dos dados foi realizada mensalmente durante o ano de 2006. Os jovens entrevistados iniciaram na pesca com idade média de 10 ± 3,29 anos, acompanhado por parentes. O total de 39% admitiu a evasão escolar devido à incompatibilidade entre horários da pesca e da escola. Aproximadamente 52% dos jovens pescadores com idade média de 14 ± 3,52 anos cursavam a sexta série quando poderiam cursar a oitava ou nona série, como era esperado para essa idade. A escola foi prioridade para 63% dos entrevistados quando os horários coincidiam com a pesca. Há necessidade de sincronização do calendário escolar e o da pesca para reduzir a evasão escolar e a distorção idade-série nas comunidades pesqueiras.

Palavras chave: Pesca artesanal; estuário; comunidade pesqueira; aprendizagem, distorção idade-série

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INTRODUCTION

Small-scale fishing is characterized by the use of individual or family labor making little use of technology, and the produce is for domestic use or for local sale (TECH and SUMAILA, 2013). It is noteworthy that this fish catch is of importance for food security, and the generation of livelihood income for coastal and riverine communities of developing countries (HAUZER *et al*., 2013; TECH and SUMAILA, 2013; BÉNÉ *et al*., 2009; ISAAC *et al*., 2008). But the management and the monitoring of small-scale fisheries were not included in fishery development programs. However, this situation is changing in some countries with certain forms of co-management, closed areas, the conceptual scheme for diagnoses and management of small-scale fisheries (ANDREW *et al*., 2007) and the ecosystem approach (FAO, 2012).

The importance of the small-scale fisheries activity in global fish production was evidenced in the BigNumber Project, funded by the World Bank, FAO and World Fish Center, which estimated an annual production of 48 million tons of fish originating from small-scale fisheries. Developing countries accounted for 84.5% of this capture. In these countries, 106.5 million people are engaged in this activity full or part time (GRAAF *et al*., 2011).

The subsistence of traditional populations depends on the harvesting of natural resources from both aquatic and terrestrial ecosystems, using eminently simple methods and technology (FURTADO, 2001). Given this, the economic, social and cultural lifestyle of the artisanal fishers is intimately linked to local flora and fauna, cycles of the moon and tides, seasonal changes in the climate and the breeding patterns of the fish, crabs, and other species on which they depend (GLASER, 2005). In Bragança, northeastern Pará, fishery activities are among the most ancient of local traditions, and have continued despite the socio-cultural transformations imposed by the region's recent economic development (ESPÍRITO-SANTO and ISAAC, 2005). In recent decades, there was the expansion of large-scale artisanal fishing using boat equipped with GPS, echo sounder, long lines, driftnet, among others technological resources.

In Pará, approximately 21% of the state's artisanal fishers have had no formal education, 23% have had less than four years of schooling and 56% have attended school for between five and eight years (SETEPS, 2003; ISAAC *et al*., 2009). According to CARDOSO (2002), the involvement in artisanal fishing begins at an early age – often at six years old – when parents begin to encourage their participation, allowing them to both contribute to the catch and to learn the trade. This learning process occurs through practice, continuity, and shared experiences.

Probably, the early initiation in fishing activity by young people in traditional communities reverberates in school life, hence the low educational level of these young fisher. Therefore, this study aims to characterize and assess the effects of the fishing activity in relation to school life for young fishers from the Bonifácio village, in Bragança, northeastern of Pará, Amazon coast. In particular, it attempts to identify the factors that contribute to the reduced performance of this group in the school system.

MATERIAL AND METHODS

Study area

The Bragança coastal plain is located in the northeastern extreme of the Brazilian state of Pará, between Maiaú Point and the mouth of the Caeté River (00°43'18"- 00°04'17"S, 46°32'16"-46°55'11"W). It is dominated by a macrotidal regime and mangroves, which cover 95% of the coastal zone (SOUZA FILHO, 2001). The local settlement, known as Ajuruteua, is divided into three distinct socioeconomic environments – Ajuruteua Beach, Pescadores and Bonifácio villages (Figure 1).

Bonifácio village is adjacent to a tidal channel, and is located approximately 35 km from Bragança town. Its principal economic activity is artisanal fishing. Bonifácio village has a municipal elementary school. To study at the high school the students come from the village to center of Bragança.

Data collection and analysis

The fieldwork consisted of an exploratory survey with participatory observation and

partially structured interviews (AMAROZO *et al*., 2002). Local residents between seven to eighteen years of age involved in fishery activities are referred to in the present study as "young fishers". In elementary school, a form was applied to identify students who practiced fishing activity.

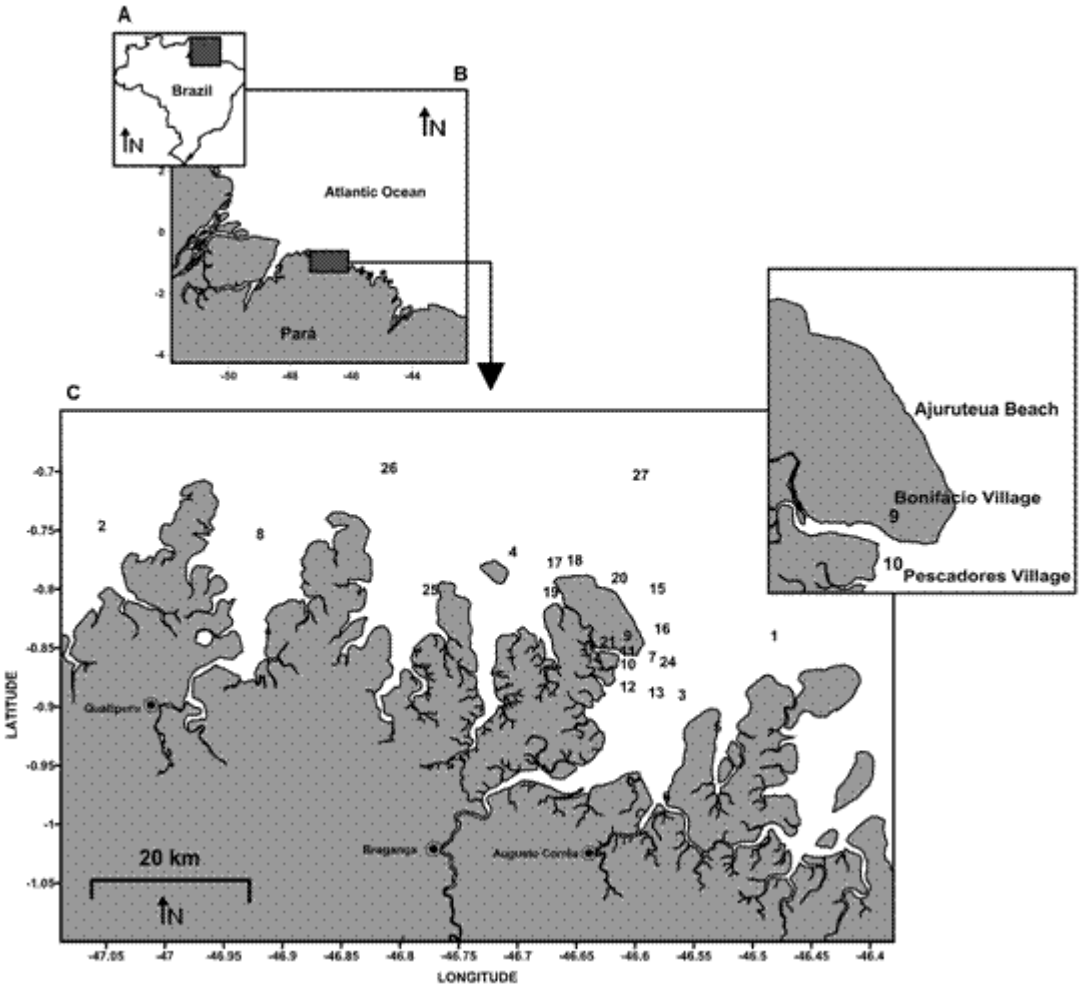

Figure 1.Location of the fishing grounds used by the young fishers of Bonifácio village. Fishing grounds: 1-Areia Branca; 2-Boa Vista; 3-Camaroaçu; 4-Canelas; 5- Marambaia; 6-Nova Olinda; 7-Ponta de São Miguel; 8-Quatipuru; 9-Ponte do Bonifácio; 10-Vila dos Pescadores; 11-Curral; 12-Terra Frouxa; 13-Canal Mata 5; 14-Poço Fundo; 15-Canal da Racha; 16- Quebrada; 17-Pilão; 18-Boca da Barra; 19-Cabeceira; 20-Canal do Farol; 21,22,23-Imburateua; 24-Canal da Brechinha; 25-Mata-boi; 26-Cascalho; 27-Tijuqueiro; 28-Lageirinho.

All of the homes of students (n = 88) who identified themselves as young fishers were visited. However, forty-seven families denied the involvement of the youngest members, citing the dangers of the activity for such young children and, primarily, their fear of losing their claim to federal child support from the Low Income Family Social Program. In total were 41 students interviewed. The forms were applied in the family homes.

Through the interviews, the quantity of students that practice the fishing activity together with school, how they conciliate these activities; which local fishing occurs and fishing techniques are used and the species caught were registered.

Data were collected over a 12-month period in 2006, and were supported by audio recordings. The fishing grounds explored by the young fishers were mapped using a GPS (Global

Positioning System). Three participatory meetings were conducted with the target group *in locus*, with the objective of confirming and complementing the data collected. These meetings happened at Bonifácio village. The families involved in the search took part in the meetings.

The data were recorded on specific forms, and then transcribed to an Access database for processing and the subsequent production of descriptive statistics. The young fishery activities was based on a more detailed descriptive study, using multivariated Correspondence Analysis (CA) to verify possible associations between two variables, captured species *versus* month. This is an essentially descriptive approach, based on the analysis of contingency tables with a large number of variables. Acceptance of the CA was based on the occurrence of dimensions with single values of above 20.

RESULTS

A total of 41 young fishers, 32 boys and 9 girls, were interviewed during the present study. The age of the fishers interviewed was an average of 14 ± 3.52 years old. Three-quarters of the interviewed were more than 11 years old. The youngest fisher was 7 years old, and the oldest, 18 years.

The young fishers of Bonifácio became involved in fishery activities at a mean age of 10 ± 3.29 years. The young fishers dedicate 5.64 ± 2.99 hours per day to fishery activities. At Bonifácio village, 48.7% of the interviewees participate in fishery activities on between four and six days per week, dedicating four to eight hours a day to the work, depending on the type of activity.

Approximately 85% of the young fishers study between the first and seventh grades. Only 15% of the interviewees were in the eighth or ninth grades. A total of 39% admitted truancy due to the incompatibility of the working hours with the school timetable. In general, the young fishers are less well educated than expected for adolescents of their age, with approximately 52% of those with a mean age of 14 ± 3.52 years having reached no more than the sixth grade, rather than the eighth or ninth grade, which would be expected at this age. The school is a priority for 63% of the respondents when the timetable coincides with the fishery. Fishing is the priority for 32% of the interviewees due to the need to support their families. Approximately 5% did not inform priority.

The fishing partners of most of the young fishers (63%) are family members, and 24% fishing in the company of relatives or neighbors. About 10% fishing in the company of a neighbor or partner, and only 2% did not inform their company.

The young fishers are remunerated for their participation of different ways; approximately 59% are paid in cash, whereas 24% receive a share of the catch and 15% receive cash compensation as part of the production. Only 2% did not inform their remuneration.

About 37% of the young fishers earn less than 5 USD per fishing trip, and 39% between 5 USD and 10 USD. Overall, around 76% of the young fishers earn less than 10 USD a day, although earnings vary according to the season and the target species. The fishers earn more during the King weakfish (*Macrodon ancylodon*) season, and when capture southern white shrimp (*Litopenaeus schmitti*) and acoupa weakfish (*Cynoscion acoupa*).

Normally, the fishers decide how to dispose of their earnings, depending on the economic status of their family. The income obtained from fishing is used by 51% of the young fishers for the acquisition of personal items, whereas 34% both invested their income in personal items and contributed to the family budget. About 7% support the family, and 8% did not inform their expenditures.

The young fishers harvested about 21 species of aquatic organisms. These species are captured primarily in the coastal zone, that is, in the estuary. The principal resources exploited were crustaceans, bony and cartilaginous fish. The most important of these resources were the King weakfish, southern white shrimp, and the Coco sea catfish (*Bagre bagre*).

The young fishers associate different resource species to specific fishing grounds (Figure 1). The acoupa weakfish is caught frequently in the Mata 5 and Cascalho channels, and at the mouth of the

Caeté and Canelas Island, due to the presence of muddy substrates. Coco sea catfish are typical of estuarine environments and occur in different fishing grounds. Southern White shrimp is caught frequently on the sludgy-sandy substrates of Terra Frouxa. The young fishers work in the fishing grounds located in the vicinity of Bonifácio, including Terra Frouxa (61%), Ajuruteua beach (51%), tidal channels (51%), Pescadores/Bonifácio (46%), and the mouth of the Caeté (27%).

Approximately 78% of the young fishers were involved in fishery activities between September and December (Figure 2). This period was dedicated almost exclusively to shrimping. More than half of the young fishers were also involved in fishery activities between March and August. According to the interviewees, the King weakfish season is between May and July. It is noteworthy that the school holidays in January and February, the rainy season, participation in fishing falls from 42 to 32% of the interviews.

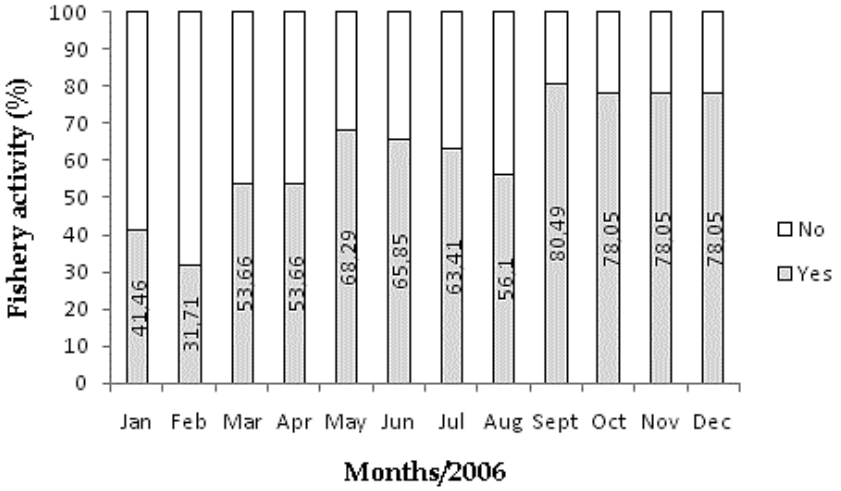

Figure 2. Monthly distribution of the fishery activities of the young fishers (n=41) of Bonifácio in 2006.

The correspondence analysis between species and monthly variation indicated a strong relationship between the King weakfish and the months of May and June (Figure 3). A close association was also found between the shrimp harvest and the period between September and December. However, the Coco sea catfish is caught throughout the year, with no obvious seasonal pattern.

The young fishers of Bonifácio used 12 different fishing gears, including fish traps or wooden barriers, locally called 'corrals', hand lines, and mobile nets. Nets, such as gillnets, seine nets, hand nets, and shrimp nets, are the equipment most used by the young fishers.

The use of different fishing gears varies during the year according to seasonal variation in the climate, species targeted, and habitat. Hand-lining is used primarily to fish for mutton snapper (*Lutjanus analis*), Pemecou sea catfish (*Arius herzbergii*), Coco sea catfish (*Bagre bagre*), dog snapper (*Lutjanus jocu*), pacu toadfish (*Batrachoides surinamensis*), Gillbacker sea catfish (*Arius parkerii*), and the Madamango sea catfish (*Cathorops spixii*) and *C. arenatus* of the estuaries.

The fish traps 'corrals' are located next to the village of Bonifácio and are used throughout the year. The species caught most frequently are croaker (*M. ancylodon* and *Micropogonias furnieri*) and catfish (*B. bagre* and *Cathorops* spp).

Gillnets are used to capture a variety of species. They have different mesh opening and meshes, and are approximately 300 m long. During their use, the nets are checked, emptied, and reset, and substituted, if necessary. The main species captured by the gillnets are *C. acoupa*, *C. virescens*, *M. ancylodon*, *Aspistor parkeri*, *B. bagre*, *Genyatremus luteus*, *Scomberomorus brasiliensis*, *Mugil* spp and *L. schimitii*.

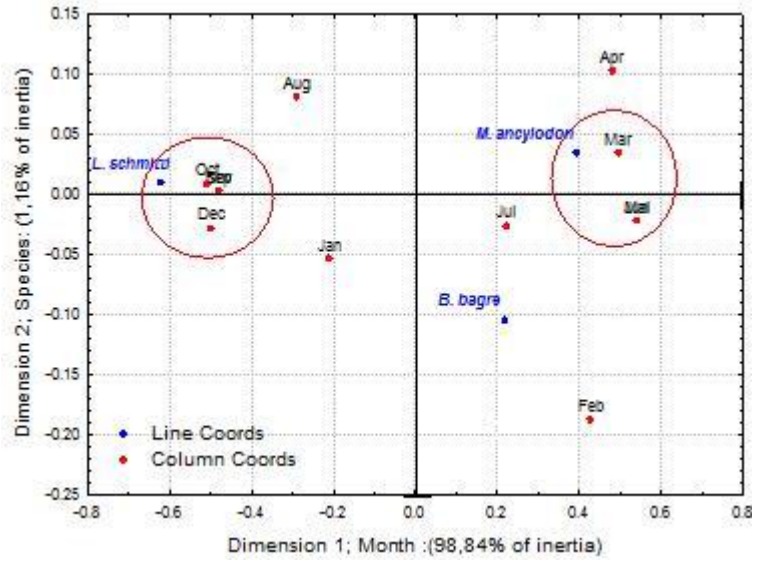

Figure 3. Simple correspondence analysis of the variable species *versus* month for the catches of the young fishers of Bonifácio in 2006.

DISCUSSION

One of the principal characteristics of artisanal fishers is the role of the family as a unit of both production and consumption (MALDONADO, 1986; TECH and SUMAILA, 2013). Family-based artisanal fishing operations are long tradition in the Bonifácio village. According to the data from SETEPS (2003), approximately 78% of the state's fishers work with other people, in particular their relatives. In Bonifácio, the participation of a young family member or neighbor in fishing is slightly above the state average (88%). Thus it appears that in addition to starting young in a productive activity, the family also has the task of caring for the young at the beginning of this activity, minimizing the risks of accident.

The learning process of the local children begins with 'marginal activities' under the supervision of their parents (CARDOSO, 2002). The early involvement of the young fishers of Bonifácio village in these activities guarantees a process of learning that accompanies the everyday experiences of the individual. CUNHA and SANTIAGO (2005) found that 15% of the crab fishers of the rural communities of the Caeté River (northern Pará, Brazil) were first involved in this activity between the ages of 6 and 10 years, when they began to accompany their parents during the harvesting process and started to learn the procedures involved. In Manacaparu in central Brazilian Amazon, children began to get involved in fishery activities at a mean age of 7.1 ± 1.9 years (GARCEZ and SÁNCHEZ-BOTERO, 2006).

The FAO (2012) finds that child labor is facing a difficult task. The work interferes with schooling and harms personal development. Many of these jobs are dangerous activities that threaten the health and sometimes even their lives. However, some types of work are without prejudice and may be beneficial to the children. The child labor is part of a cultural logic derived from psychosocial pressures intrinsic to everyday family life (BLANDTT and SOUSA, 2005). Porting the learning by doing is a common practice in fishing communities to be maintained (CARDOSO, 2002). This practice occurs in many places where they are made to small-scale fisheries in Congo (BÉNÉ *et al*., 2009), in Ngazdja island - Comoros (HAUZER *et al*., 2013), as also reported here, in Bonifácio village that represents the Amazon coastal zone (Brazil).

Direct access to capital, in the form of money or a catch share, tended to encourage the young fishers to dedicate more time to this activity in order to increase their contribution to the family budget, with a resulting reduction in the time spent at school. The participation of children in

the fishery sector has been condemned by the UN's International Labor Organization (ILO), which promotes the abolition of child labor in this industry, due to the working conditions on the vessels and the risks to the children's health (TORRES, 2002).

The organizational structure detached from reality of the young fishers and the socioeconomic need of family involvement as production unit are the main causes of truancy and the lower school. This is confirmed when the survey data shows that 39% of respondents have already dropped out of school at least twice in their life due to a mismatch between the hours of fishing activity and school. For 32% of respondents fishing is a priority, because they need to help support the family.

The results of the present study indicated that the skill of the young fishers and their abilities to use different types of fishing equipment is not related directly to their age, but the socioenvironmental conditions of the group and the area which they work. Given this, the children and adolescents participate in the activities using the same equipment as the adults, whether family members or not.

Gillnet was identified as the most frequently-used fishing gear by the majority (96%) of the interviewees, who referred to the capture of species not normally targeted by this type of equipment in other regions. NERY (1995) found that the same mesh size may be used to harvest a number of different fish species, and the same nets may be used during distinct parts of the year to capture different species (ISAAC *et al*., 2006; ESPÍRITO-SANTO and ISAAC, 2005). Overall, the activities of the young fishers and the fishing gear they use are typical of those of artisanal fisheries of other traditional communities on the northern coast of Brazil. In traditional communities of other regions, such as Enseada do Mar Virado, in Ubatuba, São Paulo, artisanal fishing also is practiced by the younger fishers. This indicates that the transmission of traditional skills and knowledge to the younger members of the community is essential to guarantee their continuity over the long term (CLAUZET *et al*., 2005). Therefore the lessons taught by the more experienced generations permit the maintenance of local traditions (MORAES, 2007).

The young fishers of Bonifácio village associated different target species with specific fishing grounds. This type of knowledge reflects the intimate nature of the relationship of the fishers with their environment. The fishing grounds have been identified by fishers of previous generations, and handed down to the younger members of the community. The location of each area is identified by the fishers through the sighting of reference points, such as promontories or lighthouses as registered by MORAES (2007). Overall, the data obtained of the habitats preferred by target species such as the acoupa weakfish, catfish, and shrimp are consistent with the results obtained by ESPÍRITO-SANTO and ISAAC (2005) in the same region.

The principal fish species harvested by the young fishers of Bonifácio were the same as those captured throughout the Bragança region. In the Caeté estuary, there is an abundance of King and acoupa weakfish and catfish, which are responsible for 70% of the total catch of the local small and large-scale artisanal fisheries (ISAAC *et al*., 2006; BENTES *et al*., 2012). BARBOZA and PEZZUTI (2011) recorded the socioeconomic importance of species such as weakfish for the Bonifácio community, and MANESCHY (1993) reported that shrimping was of major economic importance to the communities of Ajuruteua (Bragança, northern Pará, Brazil) especially during the dry season (September-December).

The calendar of the fishing seasons for the different species is one of the most important characteristics of the artisanal fisheries of the study area (ISAAC *et al*., 2006). The young fishers follow the calendar adapted to the life cycle and abundance of the different fishery resources they exploit. Between April and June, activities are directed primarily towards the King weakfish. During the dry season (September-December), shrimp are the main target, whereas catfish are harvested throughout the year. These two main seasons were identified by the young fishers as the most important periods for the income of the families in the community, reinforcing the need for the participation of all their members, including children and adolescents. This obviously means that fishery activities exert a strong influence on the education of the youngest members of traditional communities.

The age-class distortion in rural areas varies considerably among the different Brazilian regions, but is especially marked in the north of the country. In this region, the distortion is 58.8% in the early class, rising to 72.1% towards the final years (BRASIL/MEC, 2003). This situation indicates that the involvement of the young fishers in the local fisheries is an additional factor influencing truancy patterns and inferior school performance, which is the product of the lack of adequate educational policies in these coastal areas.

The implementation of adequate public education policies in this region would reduce this age-class distortion and truancy rates, as well as increasing the quality of the teaching. Initiatives such as the Low Income Family Social Program, *Bolsa Família* (Law 10.836/04), the vocational system in alternative education (Fisheries School) (TEXEIRA *et al*., 2008) and the implementation of technological courses contribute to the qualification of young people in fishing communities.

Governments should direct educational policies that prioritize increasing the schooling of children in fishing communities. Effective measures would be (i) offering elementary and middle school in these communities, (ii) the continuity of the family allowance program to reduce truancy; (iii) the synchronization of the school calendar to fishing, intensifying classes during the rainy season. In northeastern Pará, this period covers the months of January, February, March and April.

CONCLUSION

The small-scale fishing in Bonifácio village is ruled by the environmental conditions, from the familiar unit to the production. This involvement in the familiar fishing has stimulated the entry of children and teenagers into this activity.

The development of fishing happens in estuary, or that is, near the coast line, due to access facility in attempts to match the school activities. The weakfish and shrimp seasons are fundamentally important sources of income for the local families. There is thus a clear need to synchronize the local school calendar with that of these fishing seasons in order to reduce truancy and correct the age-class distortion in this fishing community. The viable action is legally guaranteed in the law 9394/96 (BRASIL, 2011) as adequation to the school year calendar, to local necessity and the contextualized organization of the curriculum and teaching practice, and would extend the possibility between the developed activities by the traditional population, especially those of school age.

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