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CHARACTERIZATION OF ARTISANAL FISHING AND COMMERCIALIZATION OF FISH IN OPEN AIR MARKETS

CARACTERIZAÇÃO DA PESCA ARTESANAL E COMERCIALIZAÇÃO DO PESCADO EM FEIRAS LIVRES

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RESUMO
Este trabalho foi realizado em feiras livres e em locais de pesca na cidade de Imperatriz no Estado do Maranhão/Brasil. Teve como objetivo avaliar o perfil socioeconômico dos pescadores que utilizam os recursos da pesca artesanal, assim como investigar o sistema de comercialização, os apetrechos de pesca, tipos de embarcações, espécies que são comercializadas em feiras livres do município. Para obter conhecimento a respeito do sistema de comercialização do pescado em Imperatriz, uma coleta dos dados foi realizada em três feiras livres localizadas nos seguintes bairros, Bom Sucesso, Mercado Municipal da Beira Rio e Nova Imperatriz, por meio de questionário semiestruturado. De acordo com as pesquisas, cerca de 62% dos responsáveis pelas bancas são do sexo feminino, enquanto que 38% são do sexo masculino a faixa etária variando entre 26 a 58 anos de idade, segundo os comerciantes as barragens tem sido os maiores causadores da diminuição das espécies. O estudo possibilitou informações atualizadas sobre a ótica da pesca artesanal e o pescado comercializado na região. A pesquisa realizada mostrou que mesmo com todas as ações antrópicas e não antrópicas o Rio Tocantins ainda apresenta uma vasta diversidade e grande potencial a ser preservado.
PALAVRAS-CHAVE: Feiras livres; Pesca artesanal; Rio Tocantins.

ABSTRACT
This work was carried out in open air markets and in fishing places in the city of Imperatriz in the State of Maranhão/Brasil. The objective was to evaluate the socioeconomic profile of the fishermen who use the resources of artisanal fishing, as well as to investigate the marketing system, the fishing equipment, types of boats, species that are sold at open air markets in the municipality. To obtain knowledge about the fish marketing system in Imperatriz, a data collection was carried out in three open air markets located in the following neighborhoods, Bom Sucesso, Beira Rio Municipal Market and Nova Imperatriz, through a semi-structured questionnaire. According to the surveys, about 62% of those responsible for the stands are female, while 38% are male, the age group ranging from 26 to 58 years old, according to traders, dams have been the main cause of species decrease. The study provided updated information on the perspective of artisanal fishing and the fish traded in the region. The research carried out showed that even with all the anthropic and non-anthropic actions, the Tocantins River still presents a vast diversity and great potential to be preserved.
KEYWORDS: Open Air Markets; Artisanal fishing; Tocantins River.

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INTRODUCTION

Fish is a source of vitamins, proteins and unsaturated fatty acids, it has become a healthier food option (GONÇALVES, 2011). It is estimated that it represents 16.7% of the animal protein consumed by humans and 6.5% of all protein taking into account the animal and plant origins (FAO, 2014a; FAO, 2014b). 520 fish species are believed to occur in the Tocantins River basin, and about 30% are endemic species (LIMA; CAIRES, 2011). The Tocantins River was a natural livelihood for the population, indigenous people who populated the region, maintained a link with it due to the existing resources.

Artisanal fishing is linked to the cultural values and socioeconomic lifestyle specific to artisanal fishermen. Short-term fishing activities and the use of small vessels are characteristic of the group (PÉREZ *et al.*, 2014). Industrial fishing, in turn, is a supplier of raw materials to food distribution center industries (REBOUÇAS*, et al.,* 2006). In Brazil, the growth of artisanal fisheries has received little government incentive, the absence of public policy aimed at this activity, lack of incentives, degraded stocks and the social situation of fishermen has been a set of problematic issues (BRONZ, 2005).

There are different types of fishermen and the average productivity is 331 kg / fisherman / year. The most notable species are fish such as peacock bass, hake and pirarucu (*arapaima gigas)*. Local professional fishermen live in medium to large urban centers in the region such as Imperatriz and Marabá, work as a team and use motor boats (ANA, 2009). The fishing activity used previously for the purpose of livelihood for the families has turned to the generation of capital, however some fishermen still have this practice only for food.

Fishing represents an activity of economic importance and protein source for the Imperatrizense population. Many families have this practice not only for cultural purposes, but also as income for their subsistence. Fishing is influenced by both economic and cultural factors (SANTOS, 2005). In the context of commercialization, open markets have a traditional retail format on public outdoor streets, and are considered important spaces for retailers due to the diversity of the fish, fresh fish is preferred by many buyers. (COÊLHO; PINHEIRO, 2009).

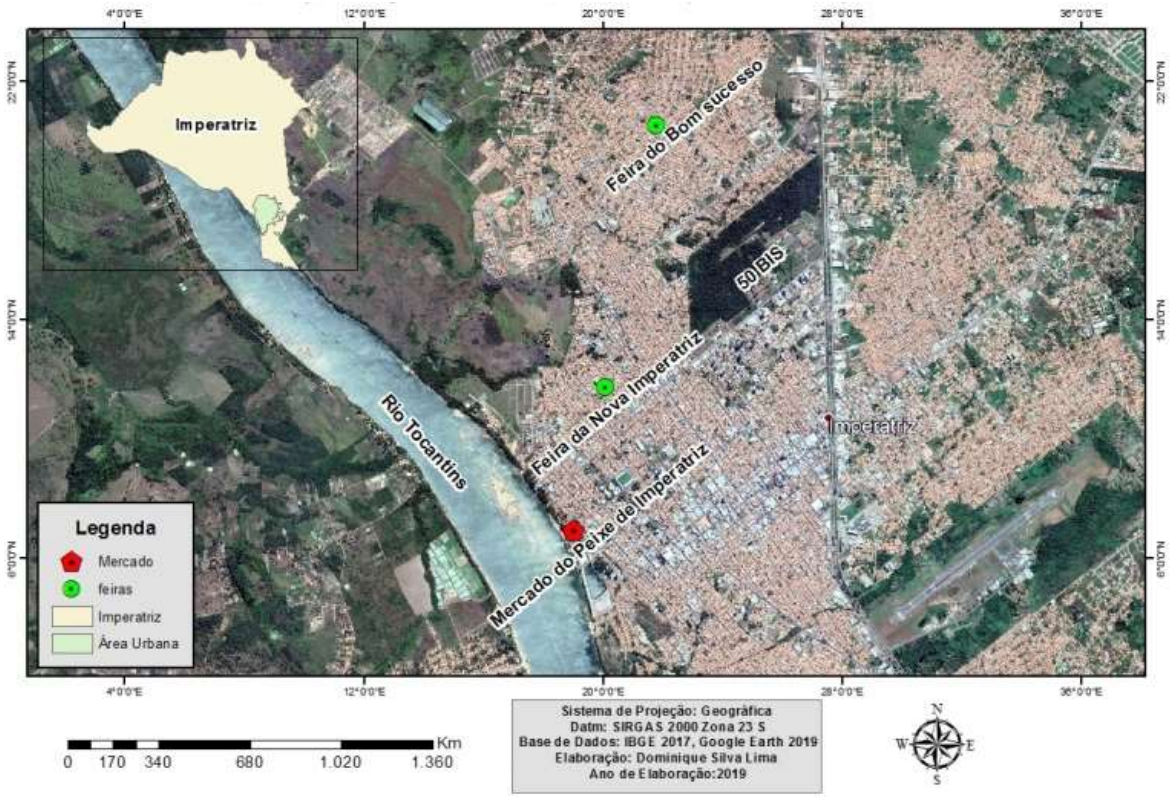
The present study aimed to evaluate the socioeconomic profile of fishermen who use the resources of artisanal fishing, as well as to investigate the marketing system, fishing equipment, types of boats and species that are sold at open air markets in the city of Imperatriz - MA.

MATERIALS AND METHODS

Research was carried out through a semi-structured questionnaire to obtain knowledge about the fish marketing system in Imperatriz – MA (Figure 1). The questionnaire contained five closed questions, multiple-choice and opened questions. The choice of open air markets in the Bom Sucesso, Beira Rio Municipal Market and Nova Imperatriz neighborhood was due to the greater popularity and sale of fish in the municipality, the interviews were conducted from October to November of 2019. From each open air market, three stands were chosen to apply the questionnaire.

It is worth mentioning that, due to ethical procedures and with respect to the people interviewed, the name of the market vendors and their respective stands were not exposed in the presentation and discussion of the results, as well as the acceptance or denial of participation in the research was also respected and presented consent form (JESUS *et al.*, 2018). In order to know the fishing equipment and types of vessels, visits were made to the fishing sites used by fishermen. After collecting the information, the data were expressed using an electronic spreadsheet (Excel).

Figure 1 . Map of the open air maskets Geographic Distribution surveyed in Imperatriz-Maranhão



RESULTS

Characterization of fishing and socioeconomic profile of fishermen

The fishing activity in the city of Imperatriz - MA, is carried out by fishermen who use motorized canoes like boats that mostly share the fish product due to the capacity to support a few tons, the most used nets are the casting-net and trawl. The landing place used by fishermen is known in the city as Cais do Porto. In general, some fishermen use instruments that aim to improve their catch, one of which is used to measure the distance from the fish to the nets. It was observed that there is a preferential fishing time, 06am, 11am and 21pm. Fishing represents an activity of economic importance and protein source for the imperatrizense population. It was observed that fishing in the city of Imperatriz, is essentially subsistence, fishermen usually sell the fish to marketers, or the fisherman himself sells directly to the final consumer. Regarding the socioeconomic characterization of the traders interviewed, it was asked about: sex and age group, respectively. It was found that 62% of those responsible for the stands are female, while 38% are male. With age range between 26 to 58 years old, including women and men.

Approximately 75% of respondents stated that they had been in the business of selling fish for over 10 years, 13% for 5 to 10 years, 12% for 2 to 5 years. It was found that over 10 years, the longest season consisted of 40 years, while the shortest with 2 years. As for the origin of fish traded at the open air markets, it was found that fish from Belém - PA and São Luís - MA

corresponded to 45% of the total, Tucuruí - PA and Santarém - PA corresponded to 22% and those from Imperatriz - MA to 33%. The fish of Imperatriz considers from the Tocantins River and also from the local fish culture. It is clear, therefore, that the majority of the commercialized fish originates from other cities.

Fish species most commercialized in Imperatriz open air markets

The species with the greatest representation in the local trade of Imperatriz, Maranhão was the tambaqui (*Colossoma macropomum*), from fish farming. The cultivation of this species is quite accentuated in the southern region of Maranhão. Fish such as caranha (*Colossoma brachypomum*) and pescada amarela (*Cynoscion acoupa*), were also widely marketed in the open air markets of Imperatriz. The caranha is also known as pirapitinga, and was representative at the Bom Sucesso and Nova Imperatriz open air market. The pescada amarela (*Cynoscion acoupa*) was reported by Nova Imperatriz and Beira Rio marketers.

Pescada dourada, corvina (*Plagioscion squamosissimus*) and tucunaré (*Cichla spp.*) fish were mentioned only by sellers in the Beira Rio market, pescada branca (*Cynoscion spp.*) and filhote (*Brachyplathystoma filamentosum*) were indicated as the most sold at the Nova Imperatriz open air market. Voador (*Anodus orinocensis*), mapará (*Hypophthalmus marginatus*), curimatá (*Prochilodus nigricans*), pacu (Metynnis hypsauchen), branquinha comum (Amazonian Curimatã) and piramutaba (*Brachyptalystoma vaillantii*) were cited for Bom Sucesso.

Marketers also cited some species that over the years have observed their decrease. Among them are barbado (*Pinirampus pirinampu*), mandi (*Pimelodus blochii*) and jaraqui (*Semaprochilodus brama*). Half of the interviewed fishermen associated the decrease in fish to the construction of four hydroelectric dams along the Tocantins River. In addition, 13% stated that the closed season was inadequate and 37% considered it to be a consequence of water pollution.

DISCUSSION

Many families have artisanal fishing as a practice not only for cultural purposes, but as income for their subsistence. Fishing activity is considered the main source of income for many fishermen, and most of them have a low level of education (SCHOR, 2015). Unlike the fishing that supplies the Manaus region, fishing centers are supplied by boats with large fish storage capacity of up to 10 tons, with huge nets being used for catching, while in the interior of the Amazon city the nets are not very often used (LOPES *et al.*, 2016).

The species with the greatest representation in the local trade of Imperatriz, Maranhão was tambaqui (*Colossoma macropomum*), this being the most produced native fish in Brazil, due to its easy breeding in nurseries or fish farming tanks, resulting from fish farming (CORRÊA; SOUSA; JUNIOR, 2018). The species most commercialized in the Imperatriz open air markets were the caranha (*Colossoma brachypomum*) and pescada amarela (*Cynoscion acoupa*). The caranha (*Colossoma brachypomum*) was representative at the Bom Sucesso and Nova Imperatriz open air market, having its occurrence in the Amazon and Araguaia - Tocantins basins and can weigh 20 kg and measure 80 cm (RORIZ *et al.*, 2015). Pescada amarela (*Cynoscion acoupa*) was reported by market traders from Nova Imperatriz and Beira Rio, it is of great importance for the state of Maranhão, accounting for the largest volumes of catches of marine and estuarine fish, thus compiling about 10% of the total state production (ALMEIDA, 2008).

Pescada amarela (*Cynoscion acoupa*) was well represented at one of the open air market and on the Brazilian north coast, it is one of the main fishing resources, as mentioned in research conducted in Pará and Amapá (ISAAC *et al.,* 1998; SILVA, 2004; MOURÃO, 2007). In studies by SILVA; JUNIOR (2003), which characterized the production of commercial fish in the State of Amazonas, city of Manau, between 1994 and 1996, 39 different types of fish were recorded in the landed fishery production. Being them Jaraqui (*Semaprochilodus spp.*), curimatã (*Prochilodus nigricans*), pacu (*Myleinae*), Matrinchã (*Brycon cephalus*), sardinha (*Triportheus spp.*), aracu (*Anostomidae*) and tambaqui (*Colossoma macropomum)* the most important.

The diversity of exploitable fish marketed in the studied region of Imperatriz – MA showed great variety, similarly in the study carried out in the South Coast of São Paulo where the species diversified, however some are more captured and more commercialized by fishermen, such as hake. Another considerable factor for the availability of species in trade is environmental conditions such as rain and moon (RAMIRES *et al,* 2012). Studies carried out in the region of sub-basin 23 of the Tocantins River in Imperatriz - MA, pointed out the existence of 13 species of fish caught, recognized and used as a food source by fishermen who were not found in the open air markets analyzed in this study. Among them is the family Characidae represented by species such as *Agoniates halecinus* and *Rhaphiodon* and the family Curimatidae represented by the *Amazonian Curimata* (PEREIRA *et al.,* 2020).

As in Imperatriz-MA, artisanal fishing is part of the life of the residents of the municipality of Gurupá, whose fishing is the driving force behind the local economy and culture. However, the system is still flawed, there are few contributions to the growth of activity in the region, although there is a vast diversity (QUEIROZ *et al.*, *im prep*). At the open air market where the interviews were conducted, the focus of the questions was directed in order to know the socioeconomic level of the marketers, the diversity of the fish that are traded, the origin of the fish, species that are in decline and factors that contribute to this. Because fishing is influenced by both economic and cultural factors (SANTOS, 2005). As for the fishing mode and instruments used, not unlike other places, in general the boats used are produced by the fishermen themselves, mostly motorized canoes, as seen in studies carried out in the municipality of Porto do Mangue. In addition, some equipment also helps in obtaining information, which can be radios in very high frequency (VHF) (SILVA *et al.*, 2018).

Activities such as agriculture, pollution, deforestation and hydropower production affect the fish life cycle (BEZERRA *et al.*, 2020). The production of hydroelectric energy eliminates the vital sites of fish such as spawning and nurseries, taking also into account the biochemical factors such as the decrease in oxygen (LOURES; GODINHO 2016). It is noticed that, in addition to anthropic actions, other factors contribute to the decrease of some species in the fish market. Both pollution and the reproductive cycle can influence the availability of food and adaptation of fish species to the environment.

CONCLUSIONS

The study made it possible to generate updated information on the perspective of artisanal fishing and the fish traded in the region. The research carried out showed that even with all the anthropic and non-anthropic actions, the Tocantins River still presents a vast diversity and great potential to be preserved. It was observed that traders maintain artisanal fishing as a cultural activity, being thus passed on to generations. Therefore, the information analyzed is important to make the population aware of the environmental issues and damage that can cause the loss of

species in the region, as well as knowing the artisanal fishing activity that supports so many families.

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REFERÊNCIAS

ALMEIDA, Z. S. Os recursos pesqueiros marinhos e estuarinos do Maranhão: biologia, tecnologia socioeconomia, estado de arte e manejo. 2008. **Tese** (Doutorado) -Curso em Zoologia, Universidade Federal do Pará, Bélem, 2008.

ANA - Agência Nacional de Águas. **Plano estratégico de recursos hídricos da bacia hidrográfica dos rios Tocantins e Araguaia**: relatório síntese. -- Brasília: ANA; SPR, 2009.

BEZERRA, C. A. M.; SOUSA, A.L.; VIANA, D. C. Histopathologic alterations of gill tissue in Siluriformes and Characiformes from the Middle Tocantins River in the Brazilian Amazon. **Arquivo Brasileiro de Medicina Veterinária e Zootecnia**, v. 72, n. 1, p. 285-289, 2020.

BRONZ, D. Pesca e petróleo na Bacia de Campos, RJ políticas de licenciamento ambiental no mar: atores e visões. **Dissertação** (Mestrado) - Universidade Federal do Rio de Janeiro, UFRJ, Rio de Janeiro, RJ, 2005. p. 177.

COÊLHO, J. D.; PINHEIRO, J. C. V. Grau de organização entre os feirantes e problemas por eles enfrentados nas feiras livres de Cascavel e de Ocara, no Ceará. In: **Anais Do Congresso De Economia e Sociologia Rural**. Porto Alegre: SOBER, 47p., 2009.
Available in: http://repositorio.ufc.br/bitstream/riufc/5194/1/2009_eve_jdcoelho.pdf.
Accessed in: Fev. 2020.

CORRÊA, R. O.; SOUSA, A. R. B.; MARTINS JUNIOR, H. **Criação de Tambaquis**. Brasília: Embrapa, 2018.
Available in: https://ainfo.cnptia.embrapa.br/digital/bitstream/item/181969/1/Criacao-de-Tambaquis-AINFO.pdf.
Accessed in: Fev. 2020.

GOOGLE. **Google Earth**. Website. http://earth.google.com/, 2009.

ISSAC, V. J.; ARAÚJO, A. R.; SANTANA, J. V. **A pesca no estado do Amapá**: Alternativas para o seu desenvolvimento sustentável. Governo do Estado. Secretaria do Meio Ambiente, 90 p., Macapá, 1998.

JESUS, T. B.; SANTOS, T. N.; CARVALHO, C. E. V. Aspectos da comercialização de pescado em feiras livres do município de feira de Santana-BA. **Revista de gestão e sustentabilidade ambiental**, v. 7, n. 2, p.159-179, 2018.

LOPES, G. C. D. S.; CATARINO, M. F.; LIMA, Á. C. D.; FREITAS, C. E. D. C. Small-scale fisheries in the Amazona basic: general patterns and diversity of fish landings in five sub-basins. **Boletim Instituto de pesca**, v.42, n. 4, p. 889-900, 2016.

MOURÃO, K. R. M. Sistemas de produção pesqueira da pescada-amarela (*Cynoscion acoupa Lacepéde*, 1802) e serra (*Scomberomorus brasiliensis Collette*, Russo & Zavalla-Camim, 1978) no litoral nordeste do estado do Pará. **Dissertação**, PósGraduação em Ciências Animal-Produção Animal, Universidade Federal do Pará, 130 p., Belém, 2007.

PEREIRA, M. C.; TORRES. J. E. S.; QUEIROZ, C. **Ictiofauna comercial do rio Tocantins**: um guia introdutório da sub-bacia 23, Imperatriz – Ma. Educação Ambiental – cenários atuais da saúde ambiental e humana/ Geovanni Seabra (org). Ituiubata: Barlavento, 2020. p. 623 a 631

QUEIROZ, C.; PANTOJA, E.; QUEIROZ, C.; NASCIMENTO, J.; CUNHA, D.B. Commercial ichthyofauna in Gurupá, Pará. *Im prep.*

RAMIRES, M.; BARELLA, W.; ESTEVES, A. M. Caracterização da pesca artesanal e o conhecimento pesqueiro local no vale do ribeira e litoral sul de São Paulo. **Revista Ceciliana – Unisanta**, v. 4, n.1, pag. 37-43, 2012.

SANTOS, G. M.; SANTOS, A. C. M. Sustentabilidade da pesca na Amazônia. Estudos avançados, v. 19, n. 54, p. 1-10, 2005.

SILVA, V. B.; MIGUEL JUNIOR, P. Caracterização da produção pesqueira desembarcada pela pesca profissional em Manaus, Amazonas, Brasil. **Acta Amazonica**, v. 33, n. 1, p. 53-66, 2003.

SCHOR, T. Redes, fluxos e abastecimento de comida no Alto Solimões/Am: Reflexões sobre o papel das cidades e da produção rural no desenvolvimento local. **Revista Terceira Margem Amazônia**, v. 1, n. 5, p. 89-109, 2015.

SOARES, D. C. E.; MARQUES, R. R.; LIMA, D. S.; VALE, I. B. Caracterização da pesca artesanal no município de Porto do Mangue – RN, Brasil. **Revista Brasileira de Engenharia de Pesca**, v. 11, n. 2, p. 1-10, 2018.

RORIZ, B. C.; MARIANO, S. W.; TAKAKO, A. K.; CASTRO, J. F.; GARCIA, R. Efeitos do estresse de exposição ao ar sobre parâmetros sanguíneos de juvenis de caranha, *Piaractus brachypomus*. **Enciclopédia biosfera**, v.11 n.21, p. 2231, 2015.

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