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THE CAPTURE OF THE MANGROVE CRAB (*Ucides cordatus*) IN THE ESTUARINE SYSTEM OF SANTOS-SÃO VICENTE: ETHNOECOLOGY OF THE FISHERMEN FROM VILA DOS PESCADORES, CUBATÃO (SP), BRAZIL

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ABSTRACT

'Uçá'-crab (*Ucides cordatus*) is a fishery resource used by artisanal fishermen at 'Baixada Santista', São Paulo coast, very important for subsistence of countless families. Since 2014, law restrictions to capture of this species were generated actions to crab catch ordination in this region and in this process, an ethnoecological research was carried out. Among the fishermen's groups in the region, the 'Vila dos Pescadores' at Cubatão (SP), is the most important in relation to the crab catching of 'uçá'-crab. Between June 2015 and April 2016 were applied structured interviews to crab catchers in this same locality. Results obtained according socioeconomic and productive profile of these catchers, distinct management and rules of use of this resource, the product commercialization and possible actions concerning to better life condition of these crab catchers are discussed in present study. This information will be useful as subside to fishery ordinance, and to recognize the knowledge of these artisanal fishermen that have a dependence of this fishery resource.

Key words: Baixada Santista; crab; estuary; ethnoecology; mangrove.

A CAPTURA DO CARANGUEJO-UÇÁ (*Ucides cordatus*) NO SISTEMA ESTUARINO DE SANTOS-SÃO VICENTE: A ETNOECOLOGIA DOS CATADORES DE CARANGUEJO DA VILA DOS PESCADORES, CUBATÃO (SP), BRASIL

RESUMO

O caranguejo-uçá (*Ucides cordatus*) é um recurso pesqueiro utilizado pelos pescadores artesanais da Baixada Santista, litoral paulista, sendo importante para a subsistência de inúmeras famílias. A partir de 2014, restrições legais à captura desta espécie motivaram ações para a regulamentação dos catadores de caranguejo dessa região. Como parte deste processo, foi realizada uma pesquisa etnoecológica. Dentre os agrupamentos de pescadores da região, a Vila dos Pescadores, em Cubatão (SP), consiste no mais importante em relação à cata do caranguejo-uçá. Entre junho/2015 e abril/2016, foram aplicadas entrevistas estruturadas aos catadores de caranguejo, na própria localidade. Os resultados obtidos quanto o perfil socioeconômico e produtivo dos catadores, as diferentes formas de manejo e regras de uso do recurso, a comercialização do produto, bem como os problemas e possíveis ações visando a melhoria das condições de vida dos catadores são discutidos no presente trabalho. Os resultados apresentados serão úteis para subsidiar ações de ordenamento da captura, bem como no reconhecimento dos pescadores que dependem deste recurso pesqueiro.

Palavras-chave: Baixada Santista; caranguejo; estuário; etnoecologia; manguezal.

INTRODUCTION

Santos-São Vicente Estuary System is the largest seaport in Latin America, with 15,960 meters of pier area, reaching a total of 113.815 million tons of cargo in 2016 (CODESP, 2017). There are several coexisting anthropic areas, and the fishing activity is highlighted. FAGUNDES *et al*. (2012) estimated the existence of about 700 artisanal fishermen working in 67% of the municipalities of the Metropolitan Region of Baixada Santista (RMBS), represented by Bertioga, Guarujá, Santos, São Vicente, Cubatão and

Praia Grande, of which 36% perform fishing activities both in estuarine and coastal areas. Approximately 160 fishermen, from the Fishermen's Village (Cubatão) and the District of Vicente de Carvalho (Guarujá), operate exclusively in the estuary areas (FAGUNDES *et al*., 2012).

The Fishermen 's Village appeared in the 1960's, from an occupation in the domain of the Federal Railway Network (RFFSA), on the banks of Rio Casqueiro, in the municipality of Cubatão (SP), set initially by fishermen and crustacean collectors, earning the nickname of "Vila Siri". From the 1970s on, it grew in disarray, attracting migrants with no professional qualifications and with no access to housing facilities, making it the largest shanty town in the municipality of Cubatão (GRANZIERA and GONÇALVES, 2012). In 2006, the Municipality of Cubatão, as part of the Guará-Vermelha Project, recorded a population of 10,502 people in the Fishermen's Village, of which about 60% had low education and more than 40% lived in stilts.

The population of the Fishermen's Village is exposed to several threats and risks, such as drug traffic in the area of occupation of this community, and environmental accidents, such as the nine-day fire in fuel tanks at the Port of Santos in April / 2015.

Fishing is one of the main sources of income in the Fisherman's Village, including crabs (*Ucides cordatus*) and the blue crabs (*Callinectes* spp.) catching, as well as fish and shrimp. However, as from 2014, legal restrictions on the capture of one of the main target species, the crab-uçá (State Decree 60.133 / 2014, dated 02/02/14) (HARKOT *et al*., 2017), brought difficulties to the crab collectors, especially in the Fisherman's Village. This situation led to an interinstitutional work to regulate the catch in the region, through the issuance of special permits to local fishermen, whose actions and results were described by HARKOT *et al*. (2017).

The legal instruments regulating the issuance of special permits for the capture of the crab-uçá (Resolution SMA 64/2015 and CBRN Ordinance 4/2015) provided, among other documents, a crab producer's declaration issued by Instituto de Pesca / SAA-SP, since the institution has been responsible for monitoring the fishery production in the State of São Paulo, since 1969 (HARKOT *et al*., 2017). In order to comply with the regulations and to attend the fishermen's interest, the declarations were issued through a work of recognition to these professionals, using an ethnoecological approach, and through the application of interviews, so that the crab collectors could be properly identified, allowing the emission of authorizations for crab capture. The present work shows the results obtained in these activities and aims to increase the knowledge about this fishing activity practiced by the crab collectors of the Fisherman's Village, in Cubatão (SP).

METHODS

Figure 1 shows the location of the study area, the Fishermen's Village, in the Municipality of Cubatão, one of the nine components of the Metropolitan Region of Baixada Santista (RMBS), at 55 km from São Paulo.

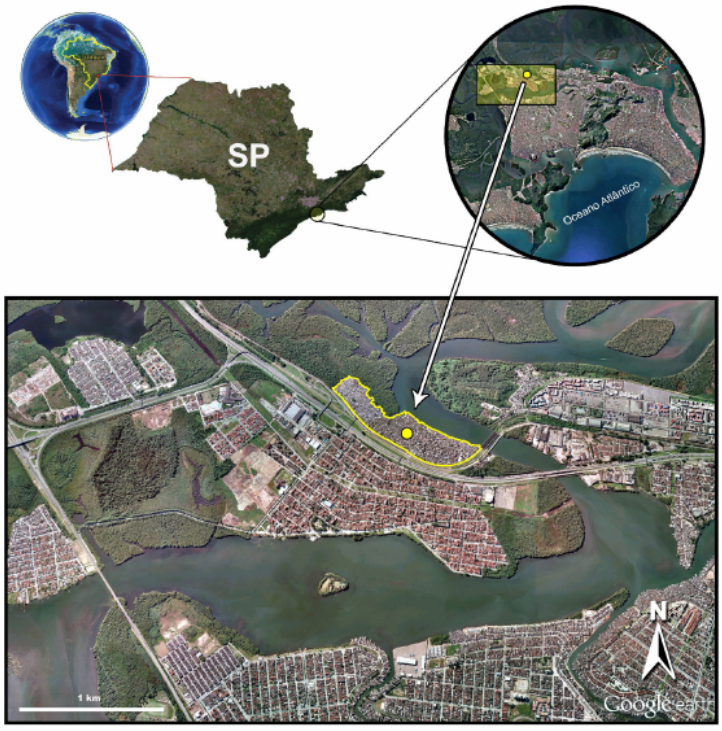

Figure 1. Map of the Metropolitan Region of Baixada Santista (RMBS), at the Fishermen's Village, municipality of Cubatão (SP), where interviews were carried out with "caranguejo-uçá" collectors (*Ucides cordatus*). Source: Google Earth, modified by Gustavo Pinheiro.

The "caranguejo-uçá" collectors were interviewed between June/2015 and April/2016, in the locality, using structured interviews (VIERTLER, 2002). The identification of the collectors was carried out through the community leaders (Capatazia of Fishermen's Colony Z1 and Community Association of Residents of Fishermen's Village), as well as through contact with the fishermen, who ended up indicating and disseminating this work among the community members, acting in favor of a regularization of the crab collectors, helping the inclusion of other crab collectors.

The interviews dealt with the collectors socioeconomics aspects of (eg, personal data, family and housing conditions), issues related to the productivity chain (eg, capture techniques, land use, productive cycles, environmental conditions, terms of use, etc.) and others of a commercial nature (eg, destination of the product, prices practiced, forms / opportunities for sale, ethno-knowledge about the species / environment, perception of the management tools and impacts to the mangrove). This paper will discuss the socioeconomic and productive profile of the collectors, the management and rules of the resource use, the commercialization of the product, as well as the problems and possible actions to improve the living conditions of the collectors. Part of the responses from the production and commercial aspects were multiple and non-exclusive, explaining why some frequencies described quantitatively summed up more than 100% when consolidated.

RESULTS

A total of 76 fishermen were interviewed, corresponding to 86.4% of the largest number of productive units already registered in Fishermen's Village, Cubatão (SP), according to monitoring by PROPESQ (2010-2012), which reported 88 collectors in 2011. This percentage rises to 88.4%, if 86 fishermen are considered in this locality, according to a survey with voluntary adherence, carried out by FAGUNDES *et al*. (2012).

The social data of the collectors interviewed show that 85% of them are men, with the highest frequency (75%) belonging to the age group from 41 to 60 years old (Figure 2).

Most of the interviewees (65.3%) had a stable relationship (Figure 3A), 68.7% had 1 to 8 years of school education (Figure 3B), 94.9% came from the Northeast of Brazil or from São Paulo State (Figure 3C, with 53.5 and 41.4%, respectively) and 73% of them lived in Cubatão from 21 to 60 years (Figure 3D).

During the research evaluation, 71% of the local crab collectors were not affiliated to any representative body for crab collectors, and only 28% declared that they were associated to the Fishermen's Colony, while 1% declared to be affiliated with the recently created Association of local Fishermen, which was extinguished before the end of the interviews of the present study.

When questioned, 55 crab collectors (72%) stated that they possessed all documents, including professionals; however, in fact, 48 collectors (63%) did not have the RGP (General Fisheries Register, or "fishing license"), which is a document essential for the profession.

The family nucleus of the crab collectors, considered here the groups formed by the collector and their relatives, all of them living in the same house, is characterized in Figure 4. It is important to highlight the significant proportion of minors dependent among the studied families, and most of them only had one provider: the crab collector himself. This demonstrates the high dependence of the fishing village community on the crab as a fishing resource.

The crab collectors interviewed and their families lived in very simple dwellings, with half of them built in masonry, and the other half in a more precarious structure, made of wood or in the form of a stilt house (Figure 5). As for basic services, the vast majority had treated water provided by the state sanitation company (SABESP), although about half of the families of collectors did not have sewage collection in their dwelling. The garbage collection service (company outsourced by the municipal government - TERRACOM) and electric power supply (CPFL) served most of the households of the crab-uçá collectors, although there was a high percentage of clandestine connections (25%).

In this research, 47% of Fishermen's Village crab collectors, as seen in other localities and in other fishing activities, did not have the crustacean as their sole source of maintenance, using other fishing resources. The crabs (*Callinectes* spp.) were identified as an important resource for 47% of respondents. Other resources cited were bivalve mollusks (oysters and shellfish), shrimp and various fish (eg "carapeba", "parati", catfish), obtained with "feiticeira"-like nets, "tarrafas", drift nets and hooks. For the fisherman's support, they also mentioned occupations outside fishing (called "bicos") by 24% of the collectors, such as driver's service, boatman, general helper, boilermaker, electrician, tradesman, carpenter, plumber, mechanic, watchman, seller, occasional jobs (with registration in work contract), etc. In addition, 8% of the collectors were retired.

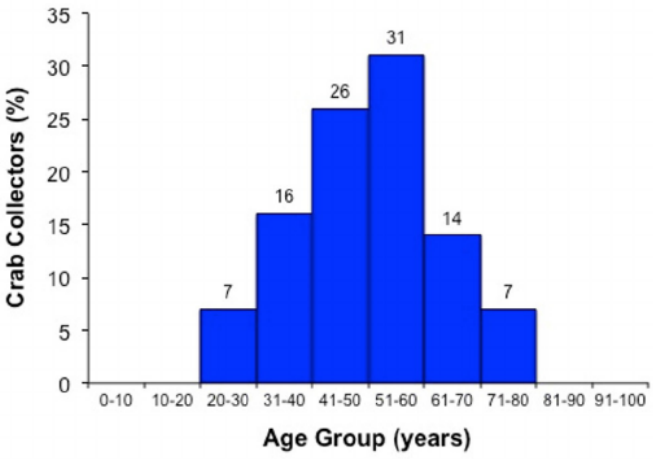

Figure 2. Age groups of crab collectors (*Ucides cordatus*), in the Fishermen's Village, Municipality of Cubatão (SP), in interviews conducted during 2015/2016.

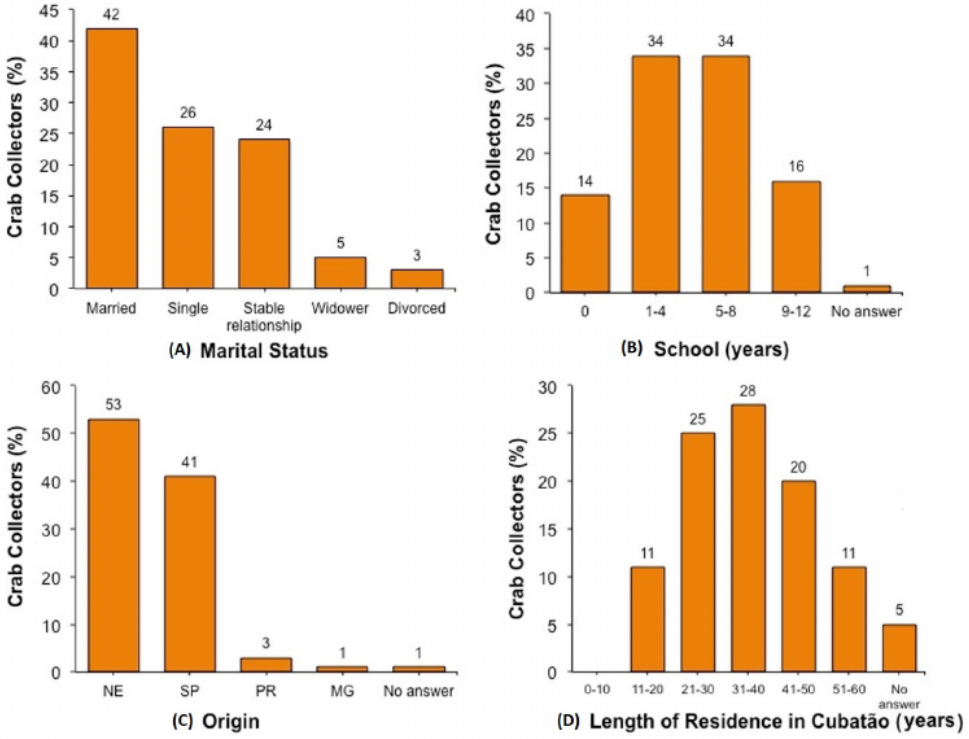

Figure 3. Social evaluation of crab collectors (*Ucides cordatus*), in the Fishermen's Village, Municipality of Cubatão (SP), from interviews conducted in 2016. Where: (A) Marital Status; (B) School Years; (C) Origin (NE, Northeast, SP, São Paulo, PR, Paraná, MG, Minas Gerais); and (D) Length of Residence in the Municipality of Cubatão (SP).

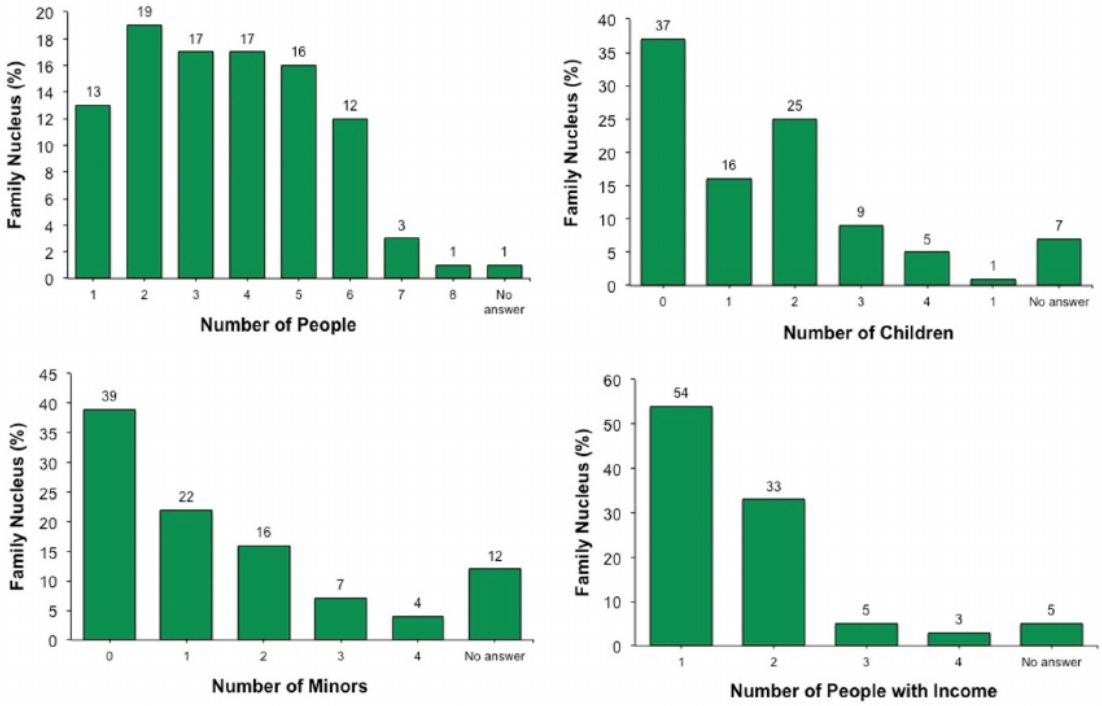

Figure 4. Characterization of the family nucleus of the crab-uçá collectors, in the Fishermen's Village, in the municipality of Cubatão (SP), years 2015/2016.

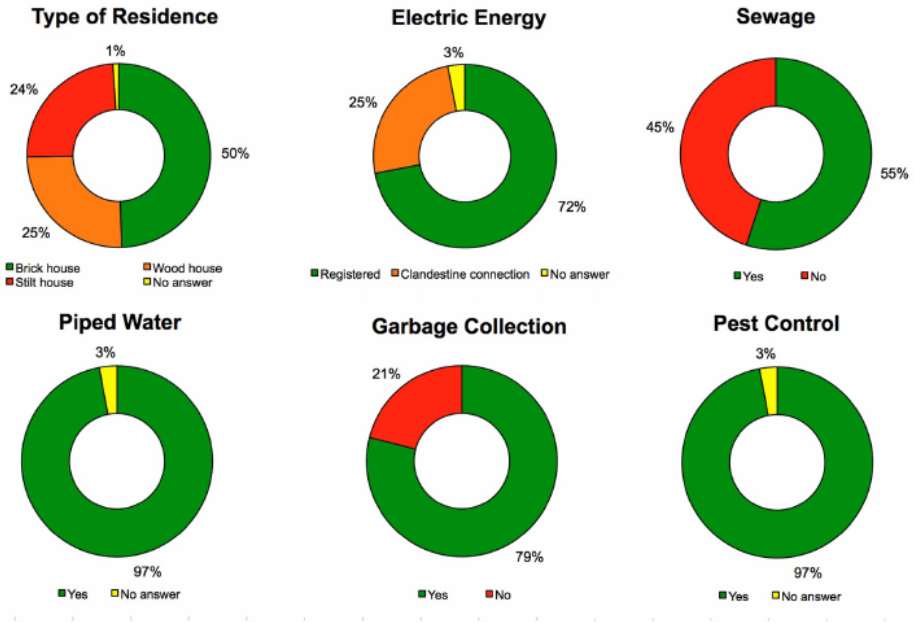

Figure 5. Characterization of the housing conditions of the crab-uçá collectors in the Fishermen's Village, in the municipality of Cubatão (SP), during interviews conducted in the year 2015/2016, regarding their structure and social resources.

Despite the existence of these alternatives, for 59% of the interviewees the crab was the most important resource for subsistence, both due to the price obtained and the facility to work with them. This is due to *U. Cordatus'* rusticity, surviving about a week after capture, a fact relevant to the commercialization of the product.

> *The crab Callinectes dies soon ... the crab, for commercialization, is much better.*
>
> *Here people make a living selling crab. Because it is more profitable.*

The majority (36%) of crab collectors declared a monthly family income lower than two minimum wages (US $ 435.35, considering US $ 1 = R$ 3.62, according to the average quotation for the period studied). In addition, 53% of respondents reported obtaining this monthly income range only through crab-uçá collection (Figure 6).

The largest portion of the collectors (54%) reported more than 20 years in the activity of crab collector. Less than half of the interviewees (45%) reported help from members of the family in the capture, and in most cases, it is the spouse. The children were mentioned with only 7% of participation, revealing a low participation of young people in the activity. In relation to other collaborators, 37% of the interviewees mentioned the existence of an external partnership to perform the work, with the division of the production divided into equal parts among the crab collectors. For most of the collectors, learning the activity occurred through close friends, such as relatives (47%) and other fishermen (40%),

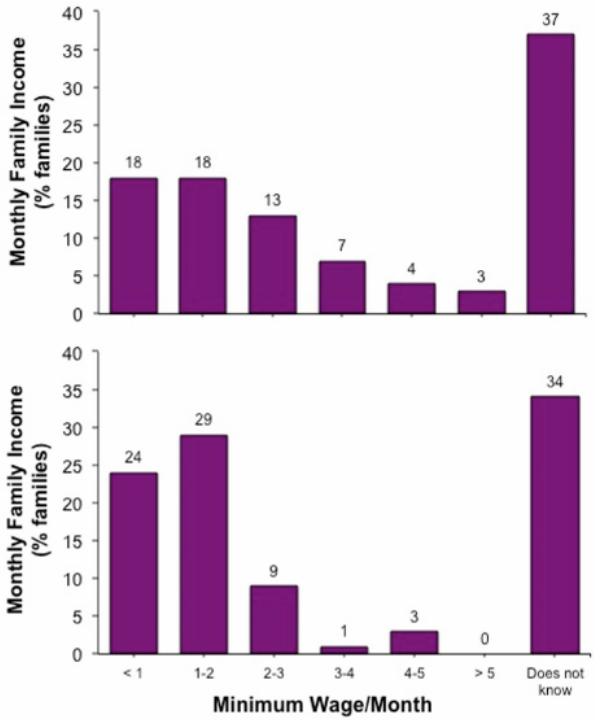

Figure 6. Average monthly household income of the crab-uçá collectors, in the Fisherman's Village, municipality of Cubatão (SP), informed in interviews conducted in the years 2015/2016. Where: Minimum monthly salary (2015) = R$ 788.00 or US$ 217.70.

and 13% of those interviewed mentioned that they had learned on their own.

I learned by myself, watching.

I learned from the people of the village, the oldest ones.

I learned from my brothers and my mother-in-law. I went out fishing secretly, my husband did not like it [...] I sold on the road with my mother-in-law, only us as women.

I learned from a person called Mr. Francisco, in the North.

In relation to capture techniques, the "hand" catch was used by 93% of the crab catchers, 33% used the "redinha", 20% used knife /"vanga" (used to increase the opening of the burrows and to facilitate the capture), 14% reported the cover technique ("tapamento"), 9% used the "tie" and only 1%, the "hook".

In the old days when it was out of season for crab catching, I worked on the cover technique ("tapamento") [...] before having the "redinha".

You have different ways to work. We took all the "redinha" of the mangrove. In the winter I would do the cover technique. This was not my brother who taught me, it was a fisherman from Sergipe.

I catch crabs using "hand" catch in the summer and winter with the "redinha", because the crab is deep underneath.

The "redinha" is in cold weather, when the crab is deep underneath. In the old days I would do the cover technique.

I use the "redinha" in cold weather ... the problem of the "redinha" is that comes a lot of females.

When you cover the burrow, the crab cannot stand to be there [...] especially if he is fat, he cannot stand without air.

Work is in the "redinha". Working with "hand" catch is terrible. To work again with "hand" catch is the same as getting rich and back to being poor.

The predominant mode of locomotion of the collectors was by boat (84%), but some also used bicycles or went on foot to the areas of extractivism. The majority of the collectors chose for the activity the areas less frequented or less "beaten" (38%), being guided also by the presumption of greater abundance or larger size of the crabs (37%), while 17% selected the area for the distance. Other criteria were mentioned less frequently, such as the characteristics of the mangrove (eg, firmer, muddy, larger trees with more roots, with a lot of burrows), soil, tide and moonlight, and the option by areas already known.

I go for the amount of crab. I already know the mangroves where finding them is easier.

I see if it is beaten or not. Mud mangrove is better because you can stick your arm.

I choose by the tide [...] the low altitude mangrove the tide starts soon [...] I do not go in these, I go in the high altitude mangrove.

The mangrove here is very deserted, very closed. You have to know how you get in and out of there.

I'll go where the crab is walking.

To do "hand" catching is an area where the crab does not sink too much ... if it is for "tapamento", area of 'tabatinga' (good mud, clay with alloy) [...] For tie or "redinha", area less beaten.

I choose using the distance [...] because it is less worked, more rested.

76% of the respondents said they did not practice the rotation of areas as a form of management, although they recognized that in highly used or "beaten" mangroves the catch is difficult because the crab "hides." The collectors who reported rotating areas, when asked to describe the method, reported strategies such as alternating the catch between known regions, adopting a minimum interval of time to return to an explored area, or updating daily areas that have not yet been used.

Only by stepping on the mangrove we already scare off the crab, it scares off [...] it takes time until he comes back.

Even if it is windy, the crab does not come out of the hole ... the crab is smart, any movement, it does not come out.

You have to alternate the mangroves [...] it's not finished, it's the crab hiding.

Despite denying the practice of area rotation, most of the interviewees knew how to define the time elapsed between two journeys of capture in a given area (Figure 7).

The so-called local institutions or rules of use of the areas (THÉ and NORDI, 2006), for 65% of the collectors there is no rule on the use of mangrove areas subjected to extractive activities, where they consider as totally free. However, 34% of collectors recognize that it is a rule to give preference to those who first arrived at the

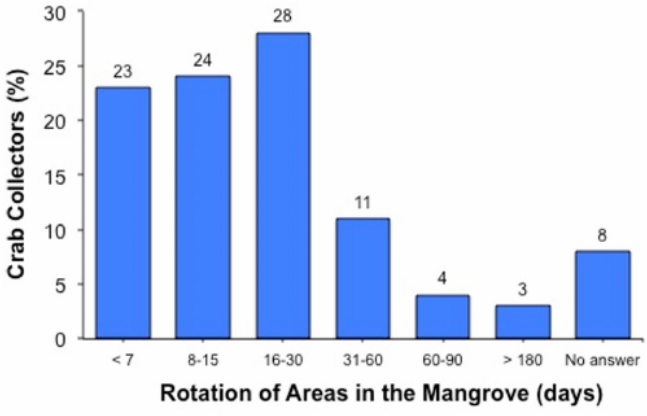

Figure 7. Rotation of areas in the mangrove (in days), used by crab-uçá collectors, in the Fisherman's Village, municipality of Cubatão (SP), reported in the interviews conducted in 2015/2016. Where: Rotation is the time between two journeys of capture for a same mangrove area.

place of capture. Despite the non-assumption of the existence of rules, there is a unanimous perception of respect and harmony among the collectors of the neighborhood, avoiding possible conflicts related to the use of these areas of extractive activities.

I do not work together when the fisherman is from another neighborhood; hence I avoid being together.

For 91% of the Fisherman's village crab collectors, the hottest months of the year are the best to work on. Among the reasons cited for this were the optimization of sales opportunities, by the more intense flow of tourists and buyers, with an increase in financial gain and profit, as well as a better opportunity to catch the crab, which is more "shallow" in the galleries, as well as the species reproductive "walking, which facilitates its capture.

In the season [...] the demand is higher, you can earn more money.

In the season the sale is good, the "Paulistas" all go down to the beach, there is a lot of traffic on the road.

In summer [...] because it's hot and the crab is shallow in the mangrove.

The best time is the walking ("andada"), because in the walking he is exposed. The problem is that in the walking everyone goes.

Catching crabs in the cold season, only for those who really need them, very hard.

After he walks, because we can sell and it's good to get.

In January, because there is a lot. Because now (July) he is 'matumbado' (laired), he is soft-shell.

The preference for catching the crab in the lunar phase and during the tides generated controversial answers. Thus, 29% of the collectors preferred the strongest "moon" tides (full and new), motivated by the following arguments: (1) in these moons / tides the water invades (wet, washes, floods) the mangrove, and the crabs come out of the burrows; (2) at this time the crab is fatter; and (3) there is more time between the ebb and flood, which facilitates manual catching and it is easier to see the crab. The tides (first or last quarter), also called "broken tides", were preferred by 64% of the interviewees, arguing to be favorable because: (1) the water does not invade the mangrove and the burrows in this period; (2) it is possible to work all day; and (3) there are fewer mosquitoes in the mangrove. The remaining 7% said they did not see any difference or did not know how to set the best time for capture. In this sense, both the information obtained and the comments of the fishermen gave indications that different ways of working and different techniques of capture can be used in the different environmental conditions, determining individual preferences of the collectors, which needs to be confirmed through more research in the area.

Fish in the net: new and full; for crab is indifferent.

It does not happen at the moon tide; washes the mangrove and covers the burrows.

Last quarter tide, because there is no "porvinha" (mosquito).

Last quarter tide, first or last quarter moon; it is a tide that does not reach the mangrove [...] is better.

The crab has no moon or tide. Any one [...] except in the walking ("andada").

The worst tide is the waning, because it is a tide that does not wash the mangrove, it is at the edge of the mangrove. The full moon is the best because it floods the mangrove and the crab has to leave the burrow. The crescent moon brings a lot of mosquito.

Dry tide. About the moon I cannot tell [...] moon where the tide does not rise. The full moon does not work.

Quarter moon, because the tide leaves the mangrove free to work.

Always new moon, first or last quarter.

47% of the collectors mentioned that they went 03 days/week to catch the crab, with frequencies of 02, 04 and > 04 days/week carried out by 16, 17 and 12% of the collectors, respectively. However, to avoid going to the mangrove to collect crabs, 91% of the collectors mentioned the bad weather; 62% a "bad tide" for the catch; 61% of them due to health problems; and 49% for being in the reproductive season ("defeso"). For 11% of collectors, other reasons were also mentioned (eg, fatigue, the occurrence of "mosquito moons", boat problems, etc.). Only 5% of the fishermen mentioned the absence of money as a reason for not going to the mangrove, showing that the activity is not an occasional source of income, but that there is a regularity of the collectors going to that ecosystem.

The majority of the collectors usually go only once a day to the mangrove to catch crabs (86%), and the permanence in the mangrove was variable, with more frequent intervals of 03-06 hours (38%), followed by 06-09 hours (29%) and from 09-12 hours (18%). It is important that this time of permanence vary with the topography of the mangrove and with the amplitude and intensity of the tides, being longer in those more sandy (high or "em barranco") and shorter in those muddy ("in baixios").

A catch rate of 10-20 dozen crabs day^{-1} is considered a good daily rate by 54% of the collectors, while for 57% of them, a catch of 5-10 dozen day^{-1} was considered as a bad daily rate or a "weak day". The production indicated by the collectors was 10 dozen day $^{-1}$. As to the catch distinction between males and females, 69% of the fish catchers from Fisherman's Village captured more males than females. However, when questioned about the of rules, 89% of respondents reported that they never capture females; 46% do not capture females with eggs; and 82% said they obey a minimum catch size, although 34% of the interviewees did not know what was defined by law ("portaria de defeso" - IBAMA Order No. 52, of 09/30/2003). These data also show that almost all of the local crab collectors are able to identify the females, which is an important element of the local ecological knowledge (CEL) of the Fishermen's Village, used for an informally established management measure, ie, a local institution.

Neither female nor too small.

I used to pick up the female [...] then the fisherman learned that getting them does not allow reproduction.

If the people see arriving with a bag full of females, they criticize ... they criticize until the guy returns the crab to the mangrove [...] I'll go there myself and put it back.

The community is critical of those who do not obey [...] the negotiator does not buy.

I always get the bigger ones, it helps nature as much as the price is better.

They say that I am 'maneco' because I get few [...] but I really choose.

It is important to note that a significant part of the collectors (73%) considered these practices as rules or originated from informal institutions (people or community); to 16% of the collectors these rules were imposed by law and inspected by the authorities (and therefore understood as formal rules); and for 7% of the collectors these rules were required by crab buyers.

Only 36% of the collectors consumed the crab as food and not only for commercialization. Table 1 summarizes the practices and preferences of the Fishermen's Village crab pickers, regarding the use of the areas and the resource.

The commercialization of the crabs was through selling the whole animal, live and arranged in "ropes" or "spinners," each containing half a dozen (57%) or one dozen (34%) of tied crabs. Sale of a unit or in bags was less frequent, with about 75% of the collectors marketing their product directly to the consumer in the "road" (SP-160, denominated Rodovia dos Imigrantes), at home, by order, or even on the street and fairs; 38% sold to a middleman.

The size for commercialization of the crab reported by the interviewees was 5-7, 8-10 and > 10 cm for 24, 53 and 8% of the collectors. However, many of the collectors from Fisherman's Village were not able to indicate an approximate measure. The prices for commercialization varied from R$ 20.00 to R$ 50.00 (US$ 5.52 to 13.81, considering an average quotation during the interview period of US $ 1.00 = R $ 3.62) when the sale was on the road (depending on the negotiation); from R$ 15.00 to R$ 30.00 ($ 4.14 to $ 8.29) when the sale was at home, to order or at the fair; and from R$ 12.00 to R$ 15.00 ($ 3.31 to 4.14) when the sale was through the middleman. The autonomous sale, directly to the consumer, was much more advantageous than through the middleman, and the collector only sells through the middleman when he is not able to maintain his autonomy to sell, for example, due to difficulties to sell on the road because of old age or sickness.

The price on the road depends on the customer, the car, whether or not he has money, whether he 'cries' or not.

In the past, I sold 30, 40 dozen in one day [...] nowadays the fisherman himself buys from another fishermen for twelve reais a dozen [...] this happened because the older ones started to die and because there was too much cheating ('calote') as well. On the road, there is a place to sell.

The crab collectors were questioned about the problems they have with the activity, as well as on the actions they perceive as desirable to improve the situation of the collectors, and are presented in Table 2.

Most of the problems listed reflect concerns regarding environmental issues such as impacts on the estuary caused by pollution and dredging of the Port of Santos, destruction of the ecosystem and possible decline of crab production, while only two commercial issues were cited. Consistent with this fact, pollution control of the estuary was the most cited and necessary for the improvement of the fishing conditions, followed by a careful look at the communities when disasters occur in the estuary, in the form of compensations and programs for fishermen as well as support for the local social organization.

The industries are destroying the fisherman [...] needs a more rigid inspection of that.

I've seen fishermen with a serious health problem and if there was no friends to help [...]

Table 1. Summary of areas and resource use, during the capture of Uçá-crab (*U. cordatus*), by the Fishermen's Village collectors in 2015/2016.

PRACTICES AND PREFERENCES	COLLECTOR'S RESPONSE
Seasonal catch rate	*All year*
Weekly catch rate	*Three days*
Daily catch rate	*Once*
Criteria for choosing areas	Less "batidas" + greater abundance + by distance
Rotation of areas	Not practiced
Rules of areas use	Priority for who first arrived
Rules of resource use	Do not catch females + Adopt a minimum size
Capture Techniques	Hand catch + "Redinha" + Burrow covering + Knife / "Vanga" + Tie
Preferred periods	Hot months + Seasonal
Preferred moons and tides	Quarter moon and "broken" tides + Full moon and strong tides

If it is going to ban [...] you need to have a salary for the fisherman.

Dredging harms because of the period they (the crabs) are in the water. Companies are wiping out the mangroves.

The dock was an eight fishery hauls. They built this pier and damaged it too much.

Companies are taking over the mangrove. Dredging harms fishing and pollutes.

There was a coherence between the problems indicated by the collectors as influential to the extractive activity and the proposition of the course themes suggested by these fishermen. This was mainly the case for fishing and the environment (37% of the collectors) and, secondarily, issues related to opportunities outside fishing (21%) or personal matters (5%) (Figures 8 and 9). This demonstrates that the collectors identify with the activity they perform or that they may recognize that opportunities outside fishing are very limited for them.

Table 2. Topics proposed by the crab-uçá collectors for training courses to be offered.

Proposed topics for training courses	%
They did not answer	43
Fishing	12
Boat engine maintenance	12
Environmental awareness, fishing techniques and garbage	7
Cooperative, association, seafood marketing, transport and conservation	8
Biology	5
Computer course	4
Literacy	4
Better knowledge of laws and rules	3
Shellfish farming	1
Cutting and sewing	1
Sailor's assistant for work in companies or passenger transport	1
Handyman, bricklayer or painter	1
Welder (to work elsewhere)	1
First Aid and Emergency	1
Environmental agent course	1

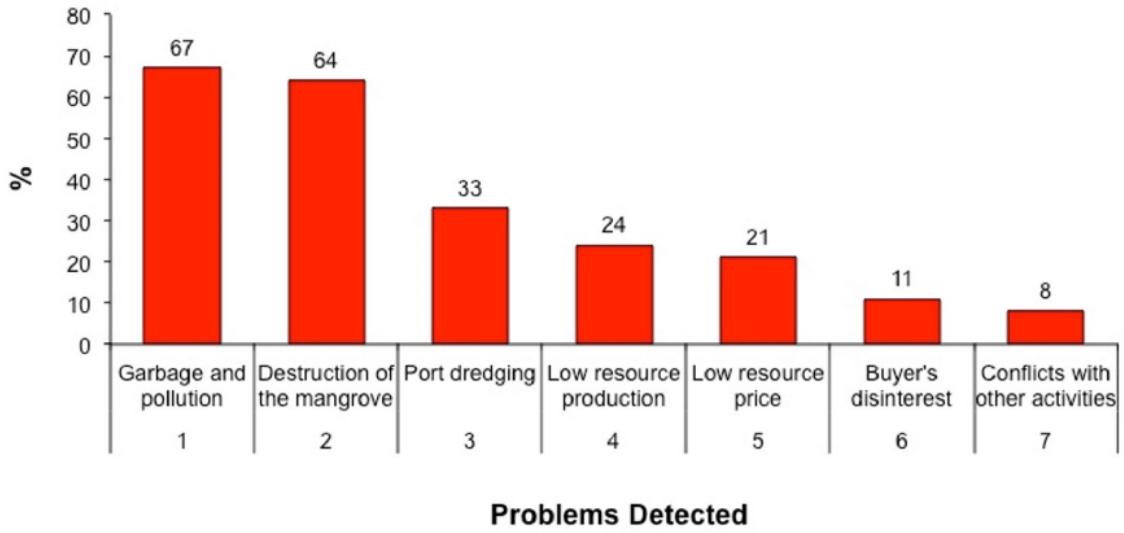

Figure 8. Problems detected by crab collectors (n = 76), in the Fisherman's Village, municipality of Cubatão (SP), reported during interviews conducted in the years 2015/2016.

Figure 9. Actions identified as necessary in the perception of the crab collectors (n = 76), in the Fisherman's Village, municipality of Cubatão (SP), informed during interviews conducted in the years 2015/2016.

DISCUSSION

Throughout the RMBS, it is common for fishing communities to be structured by local migratory processes, as well as coming from other regions of the country (ROMANI, 2006; OLIVEIRA and RIBEIRO-NETO, 1989). This was confirmed by the present study, where the majority of respondents were from the Northeast. The fishing village is one of those cases, with a strong core of Northeastern people (mainly "Pernambucanos"), although people from Ceará, Alagoas, Bahia, Paraíba and Sergipe also were observed in the interviews. This is associated with the history of community structuring, which influenced the way of natural resources is used, as well as the capture techniques adopted. It was recorded that 48% of the interviewees settled in Cubatão from 1965 to 1984, which may have been caused by the job opportunities sought in Cubatão's industrial center.

In terms of schooling, the proportion of interviewees who did not attend school (14%) is high when compared to illiteracy rates in the municipality of Cubatão and RMBS in 2010 (5.3% and 4.1%, respectively - SEADE Foundation). The existence of reduced levels of education is one of the unique characteristics of the mangrove extractive groups (SANTOS *et al*., 2016; FAGUNDES *et al*., 2012; MACHADO *et al*., 2010; MONTELES *et al*. 2009; OLIVEIRA and RIBEIRO-NETO, 1989), which, for this reason, cannot enter into formal work, which require basic training and professional qualification.

During the survey, 71% of the local crab collectors were not affiliated to any representative body, a scenario that is still recurrent and in agreement with that reported by OLIVEIRA and RIBEIRO-NETO (1989). This fact differs from that reported by MACHADO *et al*. (2010), who found that 64% of oyster collectors in Cananéia (SP) were affiliated to a representative body. The data from the Fishermen's Village shows the lack of representativeness of the crab collectors along with organized entities of the artisanal fishing sector, a deficiency that weakens these workers and excludes them from movements in defense of the category. Likewise, the fact that most crab collectors do not have an RGP shows the level of marginality of their activity, relegating the mangrove crab collectors to the most obscure levels of recognition and social participation. Despite scandals in this country, due to frauds in the registration of fishermen and the granting of RGP to non-fishermen, many other fishermen, on the other hand, still do not have access to a formal recognition and a regularization of their rights. In this sense, a regional campaign is necessary to legalize the documents of these professionals.

The precariousness of the living conditions in the locality is not surprising, since many authors describe the Fishermen's Village as a cluster of subnormal dwellings, whose occupation history registers the invasion of permanent preservation areas (CASTRO and SILVA *et al*., 2015; GRANZIERA and GONÇALVES, 2012; YOUNG and FUSCO, 2006) and the formation of shanty towns. Some projects have already been carried out in order to improve the living conditions of the residents, although this action was previously prevented by the Public Prosecutor, because of environmental problems (GRANZIERA and GONÇALVES, 2012). While this controversy persists, the local population remains living in a precarious infrastructure.

The time dedicated to the activity was superior to that recorded by MACHADO *et al*. (2010), for oyster collectors in Cananéia (SP), where 43% of them had more than 20 years of experience; and FISCARELLI and PINHEIRO (2002), observed a period of 0.5 to 22 years of activity among the fishermen of Iguape (SP), although no information was given about the predominant portion. A total of 33% of fisherman's crab catchers had 11 to 20 years

of experience, with only 11% engaging in this activity for up to 10 years. This view contradicts that described by OLIVEIRA and RIBEIRO-NETO (1989), who considered the Fisherman's Village as "a nucleus of temporary fishermen ... (where) some have fishing as their main activity, but do not have the knowledge of artisanal fishermen". However, the discordance can be due to the time the study was performed, the consolidation of this activity in the community and the lack of income-generating alternatives.

One point worth highlighting is the low interest of the son's collectors for the activity (7%), which reveals a break in the tradition of fishing knowledge from father to son since 47% of the active collectors reported having learned the technique with relatives. This decline shows a knowledge loss and reveals a recurrent tendency of youths to evade from fishing activity, due to lack of future prospects that artisanal fishing currently provides as a source of livelihood.

Different techniques used in the capture of the crab-uçá in the Brazilian coast are described in the literature (JANKOWSKY, 2007; SOUTO, 2004; FISCARELLI and PINHEIRO, 2002; NORDI et al, 2009). The techniques in the different regions of the country are dependent on processes of cultural transmission, both internal and external to the communities, as well as adaptations and uses, which are subordinated to seasonal environmental conditions, experience, knowledge, physical conditions and disposition of the collector. Thus, most collectors tend to use not just one type of catch technique, but a combined use, depending on the circumstances.

Hand collection consists in one of the most traditional techniques, allowed by legislation and considered non-harmful to the crab-uçá and the mangrove population (JANKOWSKY *et al*., 2006), being the reason why it was most cited by the crab collectors. However, the collectors themselves reported that the catch by this technique is feasible only in the hottest months of the year when the crab is "shallower".

It was verified that the hottest months of the year are the preferred periods to do the catch, similarly found by SOUTO (2007). Among the reasons mentioned were the optimization of sales opportunities, the intense flow of tourists and buyers, resulting in increased financial gain and profit, as well as by catching easiness of the crab, which is more "shallow" in the galleries, as well as the reproductive "walking" of the species, which facilitates capture. However, according to NORDI (1994), most of the crab catchers interviewed considered the catch to be poor at the time of the "walking", when the risk of injury to the collectors is higher because of longer distances, as well as the low commercial value of the crab due to the increase in supply.

Reporting on the information acquired in this study, in which 73% of the collectors considered the practice of prohibiting the capture of females as a rule coming from informal institutions (personal or community), NORDI (1994) reported a fishermen meeting in 1989 in the State of Paraíba, where the prohibition of females capture, then effective in the Northeast Region was discussed through an ordinance of IBAMA (Portaria 1208/89). He mentioned that the collectors agreed to the ban, as long as it was restricted to the months of the occurrence of females with eggs. Differently here, the elaborated regulation followed the informal rule of use already in force among the collectors, prohibiting the catch of females during the whole year in the State of São Paulo (SMA, 2015).

CONCLUSIONS

Crab collectors from the Fishermen's Village, in the municipality of Cubatão (SP), expressed concern about environmental issues, as well as a desire for actions that support them as a vulnerable social group, along with their empowerment to defend their activity and their quality of life. In this sense, a better interaction between port managers, industrialists and resident communities and users of the estuarine area is needed in order to promote actions that meet the demands, highlighting the problems related to garbage, pollution and the destruction of mangroves, with cleaning and control campaigns and support to the community organization and monitoring, for adequate compensation when accidents occur. Such compensations could include, among other actions, the offering of courses in the identified areas of interest, including areas that would provide the community with a better preparation to deal with environmental issues. These important opportunities can favor the construction of collective actions to transform their reality, as well as public policies in defense of the territory and local communities.

As a recommendation, it is worth highlighting the need for a joint effort among local public institutions to enable the legalization of the crab collectors towards the federal bodies responsible for the documentation of professional fishermen, so that they become recognized as a professional category, and can enjoy public policies and legal benefits.

Finally, it is worth mentioning the urgent demand and also the potential benefits that a management process of the crab-uçá catch would bring to the fishermen and to the environmental conditions in the Baixada Santista. This process could be a role model for other fishing activity in the region, protecting both the fishing territories and the quality of life of the population, ensuring the sustainable supply of fish with quality. However, as far as the Santos- São Vicente Estuary is concerned, overcoming the governance over the territory, the communities of crab collectors in this area will continue to be powerless when confronted by the use of the territory by economically relevant and more impacting activities.

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