



Surveys

Commercial relationships between intermediaries and harvesters of the mangrove crab *Ucides cordatus* (Linnaeus, 1763) in the Mamanguape River estuary, Brazil, and their socio-ecological implications



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ABSTRACT

The large mangrove crab *Ucides cordatus* (“caranguejo-uçá”) is a key fisheries resource in Brazil, critical for the sustenance of livelihoods of thousands of people in coastal rural areas. Today’s crab populations suffer from habitat degradation, disease, and increasing fishing pressure. Crabs are sold alive on local and regional markets, or traded as processed meat and the market chains typically involve intermediaries (i.e. traders). The present study examined the relationship between crab harvesters and the intermediaries, and the socio-ecological implications thereof. The research was performed between September 2013 and October 2014 in the Mamanguape River estuary, northeastern Brazil. Socioeconomic information and data regarding the catch (sex and carapace width of the crabs), the processing of *U. cordatus* meat and the commercial relationship between harvesters and intermediaries were obtained through structured (questionnaires) and semi-structured interviews and direct observations. The crab harvesters exist under precarious socioeconomic conditions that place them at the edge of society and therefore often seek loans offered by the intermediaries, generating loyalty and dependence that guarantees the intermediaries a stable supply of crabs needed to supply an avid market. Within this relationship, the intermediaries create pressure on natural crab populations by stimulating non-selective captures, as they buy specimens below the legal size limit (6 cm wide carapace) for meat processing. During crab meat processing, the intermediaries themselves report that the meat is often mixed with cooked and shredded of other marine vertebrates, such as spotted eagle ray (*Aetobatus narinari*) and nurse shark (*Ginglymostoma cirratum*), to increase the weight of the final product. As with the crab harvesters, the women involved in processing the crabmeat often accept loans, resulting in the same type of dependence and loyalty to the intermediaries. The intermediaries, with their strong influence on the crab harvesting, are directly linked to the commercial, social and ecological implications of these harvesting activities, together with the crab harvesters themselves. Hence, to ensure sustainability of the *U. cordatus* fishery and maintain (better improve) dependant livelihoods, all actors involved in the production chain of *U. cordatus* must be considered when developing management strategies, rather than the current approach of considering the crab harvesters only. We advise the development and implementation of fisheries associations to give the crab harvesters (and regulating bodies) greater control over and capital gains from their catches.

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1. Introduction

The production chains of most artisanal fisheries around the world involve intermediaries who have direct commercial contacts with the fishers acquiring their catches and selling them to the final markets

(Gibbon, 1997; Pasquotto, 2007; Platteau and Abraham, 1987). Such commercial relationships have probably existed since the dawn of commercial trade (Platteau and Abraham, 1987; Platteau and Nugent, 1992; Merlijn, 1989; Russel, 1987).

Intermediaries represent a form of informal self-employment based on reciprocity and verbal agreements with fishers. They can be itinerant, work independently, and do not necessarily conform to legal directives, especially in terms of taxes, worker legislation, or fishing regulations

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(Crona et al., 2010; Merlijn, 1989; Platteau and Abraham, 1987). For the fishers, the key motivating factor for such informal agreements is the buffering of the uncertain nature of production volumes throughout the year (Wilson, 1980). In many developing countries, however, the commercial ties between fishers and intermediaries result in a dependence and reliability through accumulation of informal monetary loans (Crona et al., 2010).

In addition to the economic and social implications, the fishers-intermediaries relationship may also have considerable ecological implications, e.g. a direct influence upon yield and size of the captured animals (Wilson, 1980). The ecological effects and how these influence ecosystem services and health are however often understudied (Crona et al., 2010).

In Brazil, the large mangrove crab *U. cordatus* (“caranguejo-uçá”) is a key fisheries resource critical for the sustenance of livelihoods of thousands of people in coastal rural areas (Alves and Nishida, 2002, 2003; Alves et al., 2005; Nascimento et al., 2012; Nishida et al., 2006; Glaser and Diele, 2004). These crabs live in burrows in the mud up to 2 m deep and are harvested by so called “caranguejeiros” (mangrove crab harvesters) who capture them with their hands, hooked sticks, or with traps, such as tangle-netting (*redinha*) that are made from several loose polypropylene threads tied together (Fig. 1), placed onto the entrance of the crab burrows, secured by broken pieces of prop roots, to entangle and trap the animals when they emerge (Nascimento et al., 2012). Crab harvesters are generally socio-economically marginalized (Nordi et al., 2009), typically illiterate or functionally illiterate, and live in very simple houses with little infrastructure under conditions of poor hygiene (Alves and Nishida, 2003).



Fig. 1. Crab harvester shredding polypropylene bags for making the tangle-netting (A) and a tangle-netting manufactured in Tramataia community - PB (B). Photos: Douglas Nascimento.

Despite the socioeconomic importance of *U. cordatus* in Brazil (Diele et al., 2010; Brazilian Institute of the Environment and Natural Resources – IBAMA, 1995; Glaser, 2003; Kjerfve and Lacerda, 1993; Saint-Paul, 2006; Santos, 2002; Vieira et al., 2004; Wolff et al., 2000), especially in Paraíba State where the present research was undertaken (Alves and Nishida, 2003; Alves et al., 2005; Nascimento et al., 2011, 2012; Nordi et al., 2009), there are no comprehensive studies focused on the commercialization of this species and the socio-ecological implications of the relationships between the crab harvesters and intermediaries.

The present work was undertaken in an estuary in northeastern Brazil. It describes the steps in the processing (meat extraction) and commercialization of *U. cordatus* and elucidates the social ecological effects associated with that production. As such, the central question that oriented our study was: Do the intermediaries influence how the crab harvesters exploit the mangrove crab *U. cordatus* and create socio-ecological situations that threaten the sustainability of their harvests?

2. Methods

2.1. Study Area

The study was undertaken in the indigenous village Tramataia, part of the municipality Marcação, Paraíba State (PB), Northeastern Brazil. The village is situated on the banks of the Mamanguape River estuary, the second largest in the State, approximately 70 km north of the state capital of João Pessoa (06°43'02" – 06°51'54" S - 35°07'46" - 34°54'04" W) (Fig. 2). The mangrove-fringed estuary is oriented in a general East-West direction and is approximately 24 km long, with a maximum width of 2,5 km at the coast.

The area of influence of the Mamanguape River estuary is included within the Barra do Rio Mamanguape Environmental Protection Area – APA (Paludo and Klonowski, 1999). The mangrove forest, dominated by tree species such as *Rhizophora mangle*, *Avicennia germinans*, *A. schaueriana* and *Laguncularia racemosa*, is one of the best preserved in Paraíba State and is the second largest in that state, covering approximately 45,65 km² (Sociedade Internacional para Ecossistemas de Manguezal – ISME, 2005).

The APA incorporates the Mamanguape, Miriri, and Estivas rivers, and some small villages and agglomerations of houses within parts of the municipalities of Rio Tinto, Marcação, and Lucena along the coast of Paraíba State (Paludo and Klonowski, 1999).

Villagers of Tramataia (Potiguara ethnic group) regularly perform extractivist activities in the Mamanguape River estuary, harvesting crustaceans, mollusks and fish. The economically most important activity is harvesting of *U. cordatus* (Alves and Nishida, 2003; Alves et al., 2005; Nascimento et al., 2011, 2012; Paludo and Klonowski, 1999) (Fig. 3).

Tramataia community has a total population of 1.110, of which 877 (452 men and 425 women) are native Amerindians, comprising 243 families within 230 residences (SIASI - FUNASA/MS, 07/04/2011).

2.2. Research Authorizations and Methodological Procedures

The Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) authorized scientific research in the APA Barra do Rio Mamanguape through the System of Authorization and Information Concerning Biodiversity (SISBIO) (permit numbers: 36974-1 and 36974-2). The Research Ethics Committee (CEP) of the Universidade de Pernambuco (UPE) granted authorization for research with humans (authorization number: 359.093). The Instituto de Patrimônio Histórico and Artístico Nacional (IPHAN) granted authorization to investigate traditional knowledge without access to genetic heritage (authorization number: 019/2014). Finally, the Fundação Nacional do Índio (FUNAI) granted access to the indigenous lands of the Potiguara for scientific research (authorization number: 97/AEP/PRES/2014).

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