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Is there dialogue between researchers and traditional community members? The importance of integration between traditional knowledge and scientific knowledge to coastal management

Juliana Silva Abreu [a], Camila Domit [b], Camilah Antunes Zappes [c, *]

[a] Laboratório de Geografia Física, Instituto de Ciências da Sociedade e Desenvolvimento Regional, Universidade Federal Fluminense, Rua José do Patrocínio, 71, Campos dos Goytacazes, RJ, 28010-385, Brazil
[b] Laboratório de Ecologia e Conservação, Centro de Estudos do Mar, Universidade Federal do Paraná, Av. Beira Mar, s/n, Pontal do Sul, PR, Brazil
[c] Programa de Pós-Graduação em Geografia, Laboratório de Geografia Física, Instituto de Ciências da Sociedade e Desenvolvimento Regional, Universidade Federal Fluminense, Rua José do Patrocínio, 71, Campos dos Goytacazes, RJ, 28010-385, Brazil

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ABSTRACT

The Paranaguá Estuarine Complex (PEC), Paraná State, southern Brazil, has rich biodiversity and attracts the attention of researchers in several areas. In this region, there is a mosaic of protected areas that aim to maintain the natural heritage through regulation of the use of the area and natural resources and are also home to traditional extractive communities, such as fisherfolk. These coastal communities are dependent on local resources and are continually in contact with researchers working mainly on studies related to coastal environmental issues. However, the results generated in these studies realized in marine environment are rarely shared or discussed with these traditional communities before being taken to decision makers, which can result in conflicts between those involved, the acceptance of reduced management measures and the loss of research credibility. The objective of this article is to describe the perception of marine traditional fishermen from the village of Ilha das Peças (VIP) and the village of Ilha do Superagui (VIS), both located in the vicinity of the protected areas, regarding the scientific research conducted in the PEC. In 2012, ethnographic interviews were conducted through semi-structured questionnaires given to fisherfolk in the VIP (n = 40) and the VIS (n = 50). The level of education among the fishermen in the two villages is low, which can influence the perception of the research conducted in the region. All respondents in the VIP and VIS described not receiving reports from researchers regarding the results. Therefore, there is a feeling of dissatisfaction regarding the lines of research in general, which is extended to the funding agencies and the presence of researchers in the area, representing conflicts with the management of marine resources. According to the respondents, the research does not seek solutions to social and environmental problems but only evaluates and seeks to preserve the fauna and flora, excluding the human component of the broader ecological processes. Dialogue between scientific and traditional knowledge is essential in the joint search for effective solutions to social and environmental problems, especially in areas designated as priorities for biological conservation in the coastal environment.

1. Introduction

Coastal areas are local that have natural resources disponible for survival and development of traditional communities that depends of fishery (Fitton et al., 2016). The maintenance of these resources allow the development of activities of traditional communities that inhabits the coastal environments (Özyurt and Ergin, 2009). So, is importante to consider the perception and legitimate culture of these stakeholders to promote the fisheries management (Wilson et al., 2006). In some countries, there are traditional communities that live in areas with conservation problems and with this there is a need to carry out management activities.

In Brazil, traditional community is defined by two federal laws as a "*population living in close relationship with the natural*

* Corresponding author.
E-mail addresses: juliana_abreu@id.uff.br (J.S. Abreu), cadomit@gmail.com (C. Domit), camilahaz@yahoo.com.br (C.A. Zappes).

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environment, depending on natural resources for their socio-cultural reproduction through low-impact activities" (Federal Law N° 11.428/2006 Art. 3° section II) and as "*culturally different groups and are recognized as such, which have their own forms of social organization and which occupy and use territories and natural resources as a condition for their cultural, social, religious, ancestral and economic use using knowledge, innovations and practices generated and transmitted by tradition*" (Federal Law N° 6.040/2007 Art. 3° section I).

The traditional knowledge belonging to these communities is the daily expression of life of each community members and is understood as the knowledge and experience of the individual in relation to the natural and spiritual world, for which there is a link between the environment, the supernatural and social organization in these populations (Davis and Wagner, 2003; Diegues, 2000; Usher, 2000). Community members that inhabit in coastal environment exhibit in-depth knowledge about the occurrence and distribution of marine resources and an understanding of environmental dynamics and establish their beliefs based on this empirical knowledge, which has been passed on orally from other members (Berkes, 2003). In this way, through the daily observation of the coastal environment, knowledge regarding the processes of nature is developed, thereby ensuring the maintenance of the social and cultural system of the people over generations (Davis and Wagner, 2003; Wenzel, 1999).

On the other hand, scientific knowledge is established differently and tends to avoid engagement with mythical questions. It is based on methodical observation and experimentation through a rigid scientific method to seek explanations for the occurrence of observed facts (Carey and Smith, 1993; Galliano, 1986). Such knowledge is not passed among researchers only through an oral tradition but through writing texts with technical language. Such texts require the methods be presented with precision and reproducibility, generating information that can be critiqued and discussed in the context of disproved hypotheses (Nagel, 1961).

Scientific research conducted in coastal areas inhabited by traditional communities and focusing on the management and assessment of natural communities may include the participation of these people during their execution. Such participation becomes limited from the moment that the objectives of the research are not disclosed to community members as well as when the results are generated. These communities are often ignored and their contributions are often not considered during the preparation of projects for the public good (Arruda, 1999). Despite the simple way of life of traditional communities, it is important to present to community members the new information generated from research carried out in their territory so that they may consider the results that may alter their welfare (Albagli, 2006; Baptista, 2007). Some studies considered/included the participation of stakeholders in process of management and development some practices and codes of conduct and the results were positive (see Table 1).

The importance of the transmission of the information obtained from scientific research to traditional communities was identified in 1992 in the promulgation of the Convention on Biological Diversity (CBD). This return of results has been identified as an important step in the completion of projects directly involving communities or affecting their territory and resources. In Brazil, this idea was strengthened in 2001 with the measure of the institution Provisional 2.186–16 and Federal Law 13.123/15, which provide for access to genetic resources, the protection of traditional knowledge associated with benefit sharing and access to technology and the use of resources (Albagli, 2006).

A mosaic of conservation units in coastal environment is located in the Paranaguá Estuarine Complex (PEC), Paraná State, southern Brazil, each of which has specific characteristics regarding the use of natural resources. Traditional communities also live in this region, which are highlighted as featured members claiming public policies for cultural and territorial identity (Montenegro, 2012). Among the protected areas is the Superagui National Park, which includes in its territory and surroundings traditional caiçara communities, two of which are the village of Ilha das Peças (VIP), located on Peças Island, and the village of Ilha do Superagui (VIS), located on Superagui Island. These communities depend mainly on fishing and tourism for their local income. The PEC region is considered a World Heritage Site by UNESCO (1999) based on its biological and cultural diversity, and several groups of researchers have been attracted to the region to conduct scientific projects that include several thematic lines. The residents of communities such as the VIP and VIS are usually addressed by researchers to achieve the objectives of the research by seeking information related to empirical knowledge or by obtaining logistical aid from the communities. Generally, the research groups working in the area used by traditional communities do not report the results generated by scientific research to these communities (Patzlaff and Peixoto, 2009).

Dialogue between traditional and scientific knowledge allows new perspectives for the development of scientific research and opens the possibility for effective responses for the management of coastal areas and the use of natural resources. Thus, researchers should seek to understand the culture, concepts, customs and regional rites of the traditional community, i.e., the community's way of life, assimilating all traditional knowledge acquired in contact with members and transferring it to the scientific community (Patzlaff and Peixoto, 2009). The information acquired from traditional knowledge can be used in the search for effective solutions to coastal environmental problems, which means that researchers can use the local perception in developing hypotheses and techniques and in conflict resolution (Moura and Marques, 2007).

This dialogue between traditional and scientific knowledge and the incorporation of human dynamics into studies provides perspectives on coastal co-management. The integration of stakeholders, researchers and public managers establishes avenues for discussion to find solutions to problems and conflicts, thereby ensuring coastal environmental conservation and social justice (Marangon and Agudelo, 2004). In this sense, based on the importance of dialogue between researchers that act in coastal environment and traditional communities, the aims of this study were to describe the perception of traditional fishermen from VIP and VIS within the PEC on the scientific research carried out in the region; and to propose actions as a model for the integration of traditional knowledge and scientific knowledge to contribute to the development of dialogue between the groups involved in research and traditional communities that inhabit coastal environment.

2. Materials and methods

2.1. Study area

This study was conducted with the traditional fishing communities residing in the village of Ilha das Peças (VIP) (25°27′S; 48°20′W) and the village of Ilha do Superagui (VIS) (25°28′S; 48°13′W), belonging to the municipality of Guaraqueçaba (25°18′S; 48°19′O), Paraná State, southern Brazil (Fig. 1). These fishermen are registered in Fishing Community Z-2 Guaraqueçaba and include 62 fishermen and 41 boats in the VIP and 130 fishermen and 92 boats in the VIS (Mafra, 2012; Malheiros, 2008).

This region is located in the Paranaguá Estuarine Complex (PEC), considered a World Heritage Site (UNESCO, 1999) and part of the Biosphere Reserve. The entire area is composed of a mosaic of