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Impacts of Offshore Seismic Survey on Artisanal Fishing and Initiatives to Mediate Small Conflicts with Fishing Communities

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Abstract

The Offshore oil and gas exploration activities contribute significantly to global economic growth. However, in recent years the scientific community has shown a concern about the environmental and social impacts associated, in particular, to offshore seismic surveys. Furthermore, the immediate economic impacts on the structure of small fishing communities, another major concern is directly related to food security, once, fishes are usually the community's main, if not the only source of animal protein. Thus, the current work sought to contribute to the understanding of the events chain that link such conflicts to their causes, using the elaboration of impact diagrams as a supporting technique. The study was based on research of information and data collection that involves different techniques: extensive literature review, document analysis and interviews with the main key actors that work in the environmental licensing process of offshore seismic survey activities. The study demonstrates that seismic survey changes the pattern of spatial distribution of marine fauna species due to sound pulse emissions of seismic data acquisition, it was found as one of the main triggers of negative impacts on artisanal fishery and, consequently, a major cause of conflicts with the communities. Moreover, in general, seismic survey take place in short period of time, for this reason, it was established a well-defined spatial distribution of the seismic survey activities, it led to the adoption of the temporary restriction area in the use of maritime space as an operational security measure in order to avoid accidents between vessels, this interdiction, sometimes does not allow the access to traditional fishing for their activity. In few cases, however, environmental studies have succeeded in defining the fishing territory with greater precision in relation to both its geographic distribution and the period of the seismic survey data acquisition. Thus, allow establishing restrictions on the seismic activities. In any case, it is clear that the weak participation of the fishing communities during the decision-making process for environmental licensing of seismic activities contributes to the intensification of the identified conflicts.

Keywords: Offshore Seismic Survey, Artisanal Fishery, Small Fishing Communities, Social Conflicts, Environmental Impact.

Introduction

The environmental impact assessment (EIA) is both and proactive procedural instrument of systematic and interdisciplinary planning applied worldwide to support decision-making [1-3]. The environmental impact statement (EIS) is part of the EIA process [4, 5]. It is pivotal document for analyzing and reporting the expected socio-environmental impacts of project [6, 7].

Seismic research is the main stage in discovering hydrocarbon deposits located on the seabed, using geophysical methods to map and determine the probability of oil and gas occurring. Seismic surveys use air guns that are responsible for generating sound impulses, a specific volume of air is released under high pressure, its expansion and contraction of released air bubbles create sound waves. The air guns used in seismic surveys are responsible for artificially generating energy for the

subsurface of the Earth's crust and capturing the reflection of this energy, which is transformed into superimposed images of the geological layers of the seabed's inner surface.

In recent years, there has been a considerable increase in anthropogenic activities in the marine environment, which has had a significant impact on noise production levels. Among maritime activities, seismic surveys are the ones that most contribute to this global scenario of concern about the possible noise impacts caused on marine fauna and also cause socio-environmental impacts derived from the interdiction of maritime space, as reported in the literature [8, 9].

Offshore oil and gas exploration activities contribute significantly to global economic growth. However, in recent years the scientific community has shown a concern about the environmental and social impacts associated, in particular to maritime seismic survey, that trigger environmental conflicts which results in the prohibition of the maritime space for artisanal fishing, causing economic and social impacts in traditional fishing communities. Furthermore, the immediate economic impacts on the structure of small fishing communities, another major concern is directly related to food security once fishing is usually the main income source in this communities, and the only source of animal protein. Thus, the present study (held in main 2 Brazilian basins Santos and Campos) sought to contribute to the understanding of the events chain that link such conflicts from seismic survey projects to their causes, using the elaboration of impact diagram as a supporting technique [10]. Therefore, in this paper we will take an exploratory approach to a research gap in the assessment of environmental impacts of projects, on the socio-environmental impacts resulting from offshore oil and gas exploration on artisanal fishing, which extrapolate to socio-environmental conflicts in small fishing communities. Therefore, seismic surveys are today a source of concern that has caused significance impacts on marine fauna as well as potential socio-environmental impacts and conflicts in small fishing communities, and in this context, the environmental impact assessment (EIA) aims to integrate the assessment of the importance of the expected environmental impacts of proposed projects into the decision-making process for approval, placing itself in a prominent position to direct the process in advance, reducing negative impacts and enhancing positive ones [11, 12].

Methodology

This study was predominantly on exploratory descriptive, according to Denzin and Lincoln (2005, p. 107), research on information by using the following approach and data collection that involves different techniques, such as; extensive literature review; document analysis (from 2 main Brazilian Basins Santos and Campos); in this sense publicly accessible documentation regarding the EIA processes coordinated by the Brazilian federal agency called by IBAMA, responsible to licensing environmental procedures nationally and interviews (a total of 5 interviewees) with the main key actors that work in the environmental licensing process for maritime seismic activities. The federal agency was consulted in order to analyze and better the comprehension of the adopted procedures and, more relevant that the argumentations that support the permission granted by the agency. Thus, we elaborated a diagram that focus in the main impacts of offshore seismic survey on artisanal fisheries and conflicts with small fishing communities. Firstly, the aspects of activity ("Sound pulse emissions" and "Risk of collision between vessels") and the components of social-environmental diagnosis impacts in the ("traditional artisanal fishing communities" and "Marine fauna species") were identified with their relationships. Based on this information, the directs and indirect impacts were determined as well as their mitigating measures.

In the following section we present the structure, diagram created, that supports the methodology applied to demonstrate the main impacts found in the study during the document analysis, which was corroborated by the interviewees.

Diagram Methodology that shows the Interrelations of the Aspects and Main Impacts of the Seismic Survey Activity.

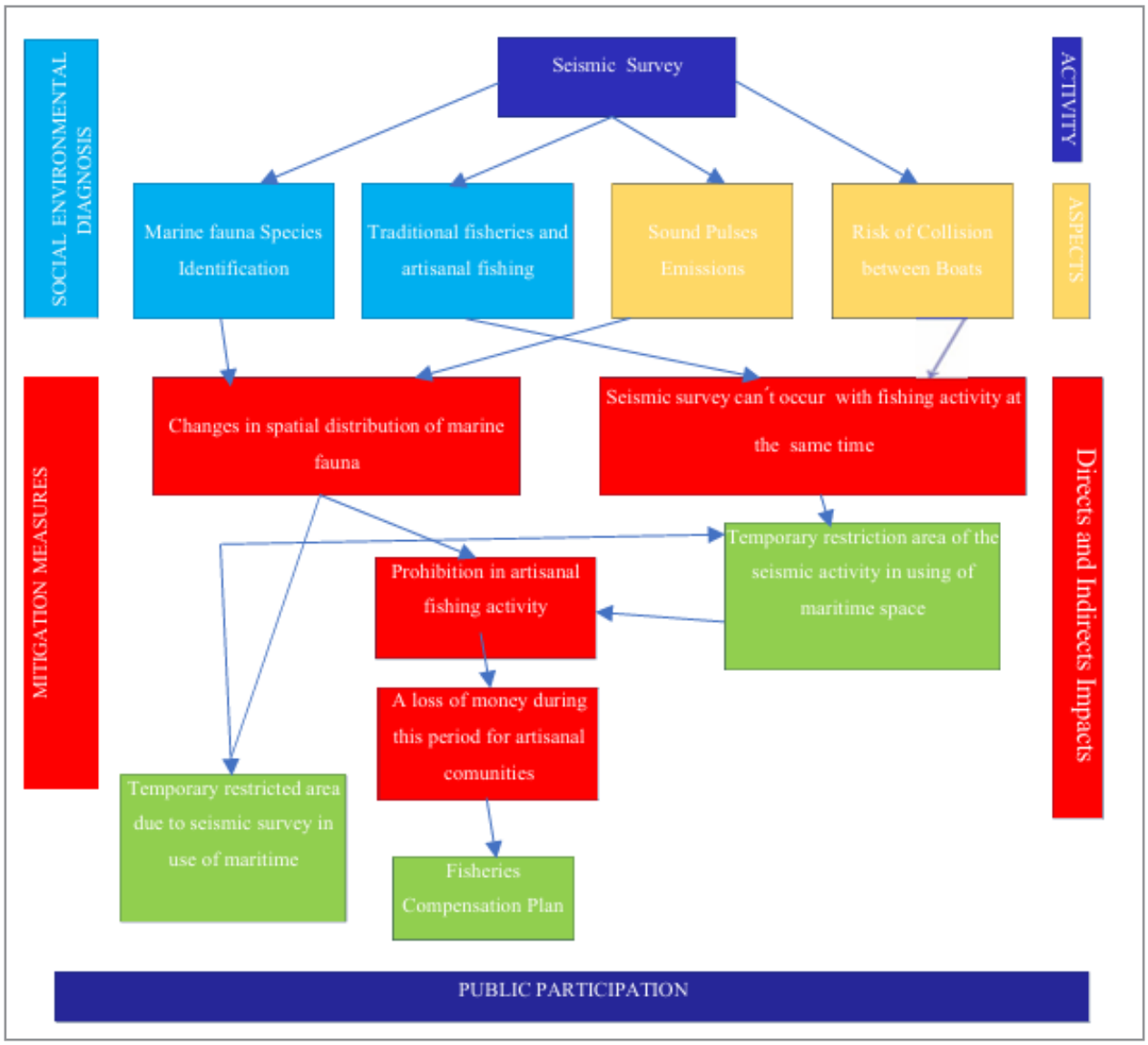

Figure 1: Seismic Survey impact Diagram, elaborated by the auctors, according the information in interviews and the documents data analysis

Results

The study demonstrates that seismic survey changes the pattern of the spatial distribution of marine fauna through emissions of seismic pulses that negatively impacts on artisanal fishery, reducing the fish catch and constitutes the main cause of conflicts in the communities. Moreover, the criteria adopted with generally short deadlines and well-defined spatial distribution for seismic survey data acquisition, as well the establishment of temporary prohibition/restriction areas in the use of maritime space as an operational safety major to prevent accidents between boats, often prohibits artisanal fishing of small traditional fisheries. In this way, the artisanal fishing activity decline and hence the revenue in artisanal fishing community, that cause a great loss of amount of money, families live without an income to buy some goods that they need for their basic necessities, this is one the most dangerous negative impacts in terms of social and economic impacts, with that reality social conflicts can arise among families, which have to turn around to look for other kind of activities to replace with new source of making money, but not all family can do that in short period of time or during the time the restriction to acquire the seismic survey activity take place. Thus, a compensation plan of the fishing activity as it was reported by the interviewees and corroborated with the documents analysis that demonstrates which proves that it has been requested in environmental impact statements as a fundamental requirement adopted as a mitigation measure. However, environmental studies have succeeded in defining the fishing territory with greater precision in relation to both its geographic distribution and activity period, it allows to establish restrictions on the seismic survey. Thus, public participation in environmental assessment process is basically restricted to meetings to present the environmental studies and their conclusions. In few cases, the consultation with fishermen was carried out for social environmental diagnosis, but the result was even better definition of the impacts and a reduction of the conflict.

Furthermore, the present study corroborated with the same line of thought presented in literature, enfasized by Vanderpool (1987) that the lack of an understanding of the role of social impact assessment in fishery conservation and management has hampered the development of social and cultural data bases that can be used to examine the distributional consequences of fishery management plans. That goes along with the diagram of impacts with shows the problems of spatial distribution of the fishes that has been constantly claimed by the fisheries during the operation of seismic survey. On the other hand another problem reported in the study which goes along with the statement of the interviewees, also presented and discussed in the literature is related with the capacity of the entrepreneurs does not see the social effects of the projects in terms negative impacts, but generally, as cited in literature social scientists and social impact assessment practitioners generally understand the social dimensions of impacts, however not all project technical staff fully understand the complex ways projects may affect local people (Hanna et al. 2016b), increasing the awareness of technical staff about social issues and overcoming the a societal mentality remains an ongoing challenge (Vanclay, 2002).

Conclusion

Finally, the results showed that maritime seismic survey have a significant potential to cause negative impacts on artisanal fishing, by decreasing the economic revenues of the affected fishing communities, due to the establishment of the restricted area for artisanal fishing. Although problems were pointed out in the work carried out that corroborate the nuances reported in the literature, the study showed a worrying scenario with the practice of evaluating mitigation measures for seismic activities in the fields and santos basins and fields, however, the lack of systematic evaluation and rigorous inclusion of public participation in the process requires greater attention and consideration of the affected population, especially on the issue of environmental compensation aimed at reducing the socio-environmental conflicts of the activity. The use of the data collection sources analyzed and their results made it possible to identify in the context studied an internal work organization that provides greater sharing of information that can enable improvements in the process of assessing the environmental impacts of seismic research activities. It is worth noting that public participation in the environmental licensing process for offshore seismic surveys, despite initiatives and efforts to improve this channel of communication and participation between the various stakeholders in the process, has weakened this important stage in the process, given that currently environmental projects that require public participation are rarely licensed in shallow or environmentally sensitive waters, although there have been efforts to include communities in fishing compensation projects, this initiative is still considered incipient, given that not even these communities have access to the results of the activities carried out. However, it was found that the weak participation of the artisanal fisheries in the process makes it difficult to improve the treatment of the mitigation of social environmental impacts as well as the mediation of small conflicts in the fishing communities.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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