
When the traditional meets the modern: the sustainability of the artisanal fishing in Guanabara Bay, Brazil

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Abstract: The industrial development that has contributed to economic prosperity and advancement of standard of living has also brought new risks to people's every day lives and to the environment. This fact has been evident in the multiple uses of environmentally sensitive ecosystems, often resulting in conflicts among the users. This trend is especially apparent in countries like Brazil, where the issues of security, sustainability and equity are incipient and far from solved. This paper seeks to illustrate how the industrial development has impacted the traditional populations and created conflicts. It has been conducted in Guanabara Bay and focuses on current conflicts between industrial and artisanal fisheries. The understanding of the parties' positions in the conflicts was accomplished through frame analysis. The results of this study show that the artisanal fishermen are in a disadvantageous position in the conflicts. Possible facts influencing this position were analysed.

Keywords: sustainability; artisanal fishery; frame analysis; environmental conflict; Brazil.

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1 Introduction

The industrial development that has contributed to economic prosperity and advancement of standard of living has also brought new risks to people's every day lives and to the environment. This fact has been evident in the multiple uses of environmentally sensitive ecosystems, often resulting in conflicts among the users. These conflicts are generally more intense in developing countries, where issues of security, sustainability and equity are not well established. The Brazilian coastal area has been a scenario of several conflicts between industrial enterprises and traditional populations. An example of how the industrial development has impacted the traditional populations and created conflicts can be found in Guanabara Bay, situated in the state of Rio de Janeiro.

It was not until the last centuries that people have become more conscious of how conflicts are created and have increasingly tried to understand how they progress and, in consequence, how to manage them. Several practices have been developed and applied searching to solve problems created during decision-making processes. Although beneficial, these practices have not been entirely successful in solving conflicts, especially when related to sustainable development, to environmental degradation and resource depletion (Schön and Rein, 1994). Analyses have pointed out that difficulties of

solving conflicts result generally from the incapability of the parties in a conflict to fully understand what the issues are about. Furthermore, each of the parties does not see the other's position in the situation of conflict, leading to the intractability of many conflicts (Keel, 2002; Lewicki et al., 2003; Schön and Rein, 1994). It was in this context that frame analysis, based on the concept of frame, was developed and applied as a tool in the studies of environmental conflicts (Elliot, 2003; Kaufman and Smith, 1999; Pinkley and Northcraft, 1994).

Guanabara Bay, due to its beauty, has become a world-known tourist destination and a place of dream for most Brazilians. However, today the outstanding natural beauty of the bay is combined with a blatant abuse of the natural ecosystems by urban-industrial enterprises. Besides the urban-industrial pollution that has deteriorated the natural ecosystems of the bay, it has also been marked by several ecological disasters. One example of such disaster is the oil spill occurred in 2000, when 1.3 million litres of fuel oil was released into the bay.

This magnitude of the oil spill directed the attention of different sectors of the society as well as the national and international media to the abuse of the natural ecosystems. As a consequence, several conflicts were originated and others were aggravated or just made visible. This paper is part of a case study that analysed the cause and consequences of the mentioned spill. During the analysis, we identified several conflicts related to technological risks affecting the natural resources, as for instance the ones related to traditional populations living in the area. The precarious social-economic situation of the artisanal fishermen and their organisations, their lack of power to revert a situation of disadvantage in these conflicts and their growing poverty, directed our attention to the conflicts involving this social group. The orientation to focus the study on conflicts between artisanal and industrial fishing came from the fishermen themselves. To them, much to our own surprise, these conflicts were now more important than the ones originating from oil spills. This paper seeks to illustrate the usefulness of frame analysis in the study of such conflicts.

2 The theoretical concepts

Two theoretical concepts have guided this study. The concept of 'risk perception' is central to the understanding of what people mean when they say that something is (or is not) risky. 'Frame' is the core concept. It is used to understand how people make sense of the world around them, how they make sense of issues in a conflicting situation.

2.1 Perception of risk

The study of risk perception can be traced back to the late 1960s. It started as a response to the public opposition to nuclear technologies. The seminal work of Starr (1969) about the public attitude towards technologies, showed that risk acceptance was related to subjective dimensions of risk and not only to technical estimates of risk. Since then, different approaches have been developed in order to discover what people mean when they say that something is or is not risky and to determine what factors underlie these perceptions.

The debate about the concept of risk perception is well known and has been well documented by Slovic (2000). It started by the scholars of psychology (Fischhoff et al., 1978; Slovic, 1992; Slovic et al., 1982) and was broadened to include scholars of sociology (Jasanoff, 1997; Otway, 1992) as well as those of anthropology (Douglas and Wildavsky, 1982; Thompson et al., 1990). In the course of the debates, social constructionists asserted that it is not possible to evaluate the acceptability of a risk within a society solely on the basis of the risk perceptions of the individual members (Cvetkovich and Earle, 1992), a concept that has guided much of the psychological approaches. On the contrary, the social constructionists give great importance to social aspects of risk.

It is in this respect that the view of other scholars as (Lewicki et al., 2003; Schön and Rein, 1994), and our own view came into consideration. In our understanding the comprehension of a conflict depends on a combination of the social and political context of the conflict, understanding of the characteristics of the individuals involved in the conflict, and how these characteristics may influence their reactions. Considering these assumptions, frame analysis was selected as the main tool for this study.

2.2 Frames

Frame analysis is a tool used for the studies of social conflicts, in our case, social conflicts involving environmental issues. It was developed based on the concept of frame, which, in the sense used in this study, was presented by Goffman in his book *Frame Analysis* (1974, 1986). Schön and Rein (1994) developed the concepts of frame and reframing and applied their ideas to policy-making processes. In 2003, studies using frames in the analysis of environmental conflicts were published in a book edited by Lewicki et al.

Although Goffman never clearly defined the concept of frame, the following statement gives an indication of its meaning:

“...when participant roles in an activity are differentiated... the view that one person has of what is going on is likely to be quite different from that of another. There is a sense in which what is play for the golfer is work for the caddy” (Goffman, 1986, p.8).

Incorporating this idea into conditions of conflict or divergent interests, Schön and Rein (1994) explain that participants in a conflict often have a view of what is going on that differ from that of one another that is, they often develop frames that may differ between one another. The authors further explain that the underlying structure of belief, perception and appreciation held by a person will define the way she or he sees a situation, that is, the way she or he frames a situation.

In environmental conflicts, the parties involved use a variety of frames which shape the conflict. Among the most common are ‘identity frames’ and ‘characterisation frames’. Identity frames focus on how individuals answer the question: ‘Who am I?’ This type of frame is fundamental to the understanding of environmental disputes, since conflicts almost inevitably arise when people’s identities are being threatened (Gray, 2003, p.23). According to Gray “characterisation frames mirror identity frames in that they are statements made by individuals about how they understand someone *else* to be; that is ‘Who are they?’ ” (2003, p.23). One example of a threat to people’s identities and its consequences is illustrated in the case of artisanal fishermen in Guanabara Bay.

Various other types of frames underlie the origins of conflicts. As for instance, divergent frames of risk perception not only directly affect preferences for specific decisions but also aggravate disparities between how people understand their identities in a particular conflict and how they characterise others in the conflict (Elliot, 2003). In addition to these frames, there are the action frames, defined by Schön and Rein (1994, p.32) as the frames that inform policy practice, which are “implicit in the agreements that determine the content of laws, regulations, and procedures”. In our study, action frame and characterisation frame and their roles in the formulation of public policy are illustrated. The risk perception frames were essentials for the understanding of the fishermen position in the conflicts.

3 Methodology

To understand the development of the conflict between the artisanal and industrial fishing in Guanabara Bay, a frame analysis was carried out. The history of the conflict, its socio-political context and the characteristics of the parties involved were analysed.

Data used in this study consists of two parts: primary and secondary data. Primary data were gathered through interviews, on-site observations, archives and official annual statistics. Secondary data were achieved through historical and contemporary research and from the media.

The artisanal fishing in Guanabara Bay is dependent on what happens in the national context. Therefore, data collected, such as fishing statistics and historical data, often refer to the national level. The fieldwork was conducted entirely in Guanabara Bay, during two weeks in 2005. During these weeks visits were made to five fishermen communities at different localities around the Bay; local fishermen and leaders of fishermen organisations were interviewed. In-depth interviews were also conducted with 15 key informants representing governmental agencies, oil companies and petroleum workers. The interviews were carried out in the interviewees’ natural settings, frequently their work place.

Direct observations provided information about the geographical characteristics of the bay, its ecosystems and social environments. Before the start of the fieldwork, we were strongly advised against carrying out this study. Several reliable people alleged violence in the area, which could result in physical damage against us. After a period of uncertainties we decided to make a first attempt visiting a traditional and safe fishermen community situated in a well-known tourist spot in Guanabara Bay, Copacabana Beach. Advised by the fishermen and leaders from this community, we were able to conduct a productive fieldwork, which included 22 interviews with fishermen and fishermen leaders.

In the case of frame analysis, the construction of frames requires a constant appraisal of data and its relation to the frame set, considering the fact that the authors’ own frames may disturb the picture. In order to avoid the influence of our own frames we recurred systematically to triangulation (Denzin, 1970). Therefore, data gathered by one method (e.g. interviews) were verified by using other methods (e.g. direct observation or by the use of secondary sources). Due to the multiple sources of information used, triangulation was a particularly useful method of validation.

3.1 *The case of artisanal fishermen in Guanabara Bay*

In Brazil in general and in Guanabara Bay in particular, serious conflicts connected to the use of water and fishing resources have been occurring since the late 1960s. These conflicts have originated mainly due to the competition between groups of fishermen, representing industrial and artisanal fisheries, which are competing about the available fishing resources. In Guanabara Bay, the exploitation of the ecosystems surrounding the bay by different economic sectors, such as industrial enterprises and the rapid urban expansion, has aggravated this competition even further.

4 **The setting of the conflict**

4.1 *Guanabara Bay – the area of study*

Guanabara Bay is known for its beauty and for centuries the bay has attracted visitors from all over the world. The mix of fresh water from the many rivers and streams entering the bay and the salty ocean water produces an estuarine environment. The sheltered coastal waters include various ecosystems and provide habitats for unique communities of plants and animals.

The coastal waters of Guanabara Bay, however, have not only attracted plants and animals. The bay was already the home of many Indians when the first Portuguese colonisers arrived to the region. Today the Guanabara basin is one of the most densely populated areas in Brazil. The basin stretches over 16 municipalities and houses a population of 7.6 million people. The region is highly developed and contains the major urban centres of the Rio de Janeiro state as well as the majority of its industries, including more than 6000 industries, 10 oil terminals, 2 oil refineries and 32 shipbuilding yards.

The sensitive ecosystems of the Bay basin have been greatly affected by a number of aggressive acts that has provoked environmental degradation in the bay and has impacted negatively on several activities in the area.

4.2 *The artisanal fishery*

Artisanal fishing is an economic sector with a long tradition in Brazil. The sheltered waters and high biological productivity of Guanabara Bay makes it an excellent spot for fishing and for centuries the bay has provided the subsistence for fishermen and their families. Still today, artisanal fishing is an important economic activity in the bay, and in 2001 the estimated number of active artisanal fishermen was 3700 (IBAMA, 2002).

In Brazil, one way used to define artisanal fishing is

“fishing conducted by an independent fish harvester, whose livelihood is based on fishing, conducted on part or full time basis, using family labour on a share basis and using labour and knowledge intensive fishing techniques” (Diegues, 2002).

The great importance of artisanal fishing in Brazil relates both to the volume and value of the catches as well as to the number of people employed in the capturing, processing and marketing of the product. The statistics of artisanal fishery in Brazil are incomplete and contradictive, often organised according to different criteria. However, the demographic census of 2000 identified nearly 400,000 artisanal fishermen in Brazil (IBGE, 2000) and

estimates show that more than one million Brazilians depend economically directly or indirectly on this activity (Diegues, 2004, p.183). Globally, the number of people engaged in artisanal fishery is estimated to reach 10 million, and artisanal fish production accounts for almost half of the total fish production in the world (FAO, not dated).

5 The context of the conflict

The focus of this study is the conflict between the artisanal and industrial fishing in Guanabara Bay. We also believe that the analysis presented illustrates some more general points about this type of conflict in other parts of Brazil, and that the methodology used is adequate to analyse other conflicts of interest in various parts of the world. The analysis starts by placing the conflict in its social and political context, starting in the 1960s.

5.1 The modern fishing industry in Brazil

In the 1967, in response to the increasing demand for fish both nationally and internationally, the Brazilian government formulated a new legislation in order to promote the establishment of a modern fishing industry-based solely on industrial activities. Increasing production and decreasing prices for the consumers was the strategy formulated by the government. In order to achieve this goal, the recently created sector received financial support, which were given only to fishermen who belonged to the industrial fishing sector.

5.2 The increase in fish production

The fiscal incentives resulted in an improvement of the industrial fishing fleet. The sharp increase in the number of big boats belonging to fishing industries illustrates this trend. For example, in Rio de Janeiro there were 40 boats above 20 tonnes in 1950. In 1976 the number of boats in the same area had reached 202 (Diegues, 1983). Industrial fish production experienced a corresponding sharp increase. The total fish production (including both industrial and artisanal fisheries) increased from 276,000 tonnes in 1960¹ to 760,000 tonnes in 1985 (Table 1). Most of this increase can be credited to industrial production. While in the same period, the level of the artisanal fish production remained more or less constant.

Table 1 Brazilian marine industrial and artisanal extractive fish production, (not including aquaculture) from 1960 to 2000

<i>Year</i>	<i>Industrial fishing (tons)</i>	<i>%</i>	<i>Artisanal fishing (tons)</i>	<i>%</i>	<i>Total (tons)</i>
1960	36,000	16	240,000	84	276,000
1970	198,000	46	28,000	54	478,000
1980	392,000	62	244,000	38	636,000
1985	460,000	60	301,000	40	760,000
1988	375,000	60	250,000	40	625,000
1997	274,000	59	192,000	41	466,000
2000	237,000	36	430,000	64	667,000

Source: IBGE (1960, 1970), IBGE (1980–1988), IBAMA (2000) and Diegues (2002).

5.3 *The decline in fish production*

In 1986, the total marine fish production started to decline, reaching its lowest level in 1997 (Table 1). Freire (2003), in her analysis of data of annual landings² for industrial and artisanal marine fisheries between 1980 and 2000, showed an evident decline in landings from the industrial sector from 1986 and onwards. A decline, although smother, was also noted in the artisanal sector until 1997. The decline in fish landings was explained as a result of the typical development of the fishing sector, where the introduction of a new type of fishery (in this case, the industrial) leads to oscillations and decline (Pauly, 1997, cited in Freire, 2003). Brazilian scholars have also explained this decline as being a result of the predatory nature of the modern fishing methods used, which has resulted in over-fishing and consequent scarcity of fish stocks (Diegues, 1998; Jablonski, 2001). The increase in artisanal fishing towards the year 2000 showed in Table 1 has been explained by the increase in artisanal fishing in the North and North-east where the influence of industrial fishing activities is less pronounced. This trend is confirmed in the following years, as shown in Table 2.

Table 2 Estimated fish production in Brazil 2003, 2004

<i>Regions in Brazil</i>	<i>Extractive fishing</i>							
	<i>Industrial fishing (tons)</i>		<i>%</i>		<i>Artisanal fishing (tons)</i>		<i>%</i>	
	<i>2003</i>	<i>2004</i>	<i>2003</i>	<i>2004</i>	<i>2003</i>	<i>2004</i>	<i>2003</i>	<i>2004</i>
North	33.046	1.647	13	8	197.602	214.940	81	85
North-east	9.797	9.619	3	3	187.469	203.804	59	63
South-east	59.810	76.020	40	47	52.128	53.710	35	33
South	140.413	135.677	58	58	19.829	20.600	8	9
Central* east	0	0	0	0	27.055	12.211	5	28
Total	243.067	240.960	24	24	469.076	505.255	47	50

*Central-east is inland.

Note: Participation of industrial and artisanal fish production in total fish production, including marine and continental fishing. The table does not include aquaculture fishing.

Source: IBAMA – Estatística da Pesca (2003, 2004).

5.4 *The predatory fishing*

The decline in marine landings in Brazil has showed similarity with the decline in the global marine fish production, which has been documented by Pauly et al. (2005). Their analysis shows that global landings began to decline in the late 1980s. It was mainly due to the over-fishing, resulting of the growing demands of the international market. In another study, Pauly et al. (1998) showed a decline in the biodiversity of fish stock in many parts of the world. The consequences of the over-fishing have mainly affected developing countries, and people in traditional communities, whose livelihood is directly dependent on the extraction of natural resources, are the first to suffer (Pauly et al., 2005).

Several Brazilian studies have also pointed out that industrial fishing has affected artisanal fishery in many ways, as for example, in the volume and biodiversity of artisanal landings (Begossi, 2006; Diegues, 2002; Jablonski, 2001). Begossi (2006) observed that

“in spite of the assertion that industrial fishers are located in deeper waters, there is real possibility that they could and do invade artisanal fishing waters... it is not uncommon to observe trawlers and large boats very close to shore.”

5.5 The socio-economic role of the artisanal fishery

It has been argued that the new legislation ignores the socio-economic importance of the artisanal fishing sector as well as it ignores its expertise. Yet in the last years, artisanal fishing accounts for about 60% of the value of catches in the country (Geo Brasil, 2002). It is an important source of employment and food for local communities and contributes to between 40% and 60% of all marine production (Silvano, 2004). If considering marine and continental (e.g. river) production, artisanal production reaches 85% of the total volume in the year 2004 (Table 2). In spite of the statistics, the official literature tend to describe artisanal fishermen as indolent, inefficient people who live on a day to day basis and who do not contribute to the national economy; in short a social problem (Begossi, 2006; Diegues, 1995, 2004; Silva, 1997).

5.6 Lack of policies

According to IBAMA (2002) there is a set of legislation protecting areas dedicated to artisanal fishery. For example, since 1994, trawling is prohibited in coastal areas at a distance closer than two nautical miles from the shore (IBAMA, 1994). In the case of estuaries, as in Guanabara Bay, trawling is only allowed in waters deeper than 5 m and at a distance greater than 200 m from any fishing equipment, either fixed or mobile. In spite of the restrictions posed by the legislation, all fishermen and fishermen leaders interviewed stated that it is not uncommon to find big trawlers fishing in prohibited waters. These statements are also confirmed by scientific literature (Begossi, 2006; Carvalho, 2004) and as well as in other interviews: “trawlers are following the fish and cannot abandon them in the last moment just because they are in prohibited areas, it would be such a waste of money” (governmental inspector).

5.7 SEAP – PR

In 2003 the newly established Brazilian government created the Special Secretariat of Aquiculture and Fishing – SEAP PR. Directly linked to the Presidency, the main goal of the new agency is the planning and development of projects to promote sustainable aquiculture and fishing. During the first year of its creation, 27 state conferences were held. One thousand delegates were elected, of which 90% were involved in artisanal fishing. The movement resulted in a set of resolutions to be implemented in a near future. In the view of one of the project planners at SEAP, the expectations among the fishermen were enormous (Costa, 2005). However, “unfortunately, the irrelevant budget, the lack of knowledge and the incapability of the staff” impeded the realisations of the planned actions. The artisanal fishermen’s unaccomplished expectations left them very

disappointed. In the course of this research, three years after the creation of SEAP, observations on site confirmed the state of poverty, lack of basic infrastructure and of opportunities experienced by the artisanal fishermen in Guanabara Bay.

5.8 The environmental deterioration of Guanabara Bay

During the last decades Guanabara Bay has experienced problems related to the deterioration of its ecosystem from the intense urban-industrial activities. Industrial waste, domestic sewage and garbage are thrown daily into the water. The pollution combined with several technological catastrophes experienced in the bay, has aggravated the conflicts between artisanal and industrial fisheries. In order to improve the environmental conditions in the bay a sanitation programme was established, Programme for Removing Pollution from Guanabara Bay – PDBG. The programme started in 1994 and has been carried out with the support of international financing agencies. The programme consists of six subprojects, of which the most urgent is to improve the collection of sewage. In spite of the great amount of money spent since the start of the programme, more than one decade ago, the results of the programme have not yet been visible. In February 2003, a parliamentary commission (CPI) was established to investigate the use of the financial resources of the PDGB. The commission concluded that the ineffectiveness of the programme resulted from misuse of public financial resources in the development of the programme (Assembléia Legislativa, 2003).

6 The perception of risks

In this section the results from the interviews with the artisanal fishermen and their leaders are presented. The aim of the interviews was to assess the perspective of local artisanal fishermen on the risks posed to the sustainability of their economical activities. The results from the interviews indicate that over-fishing, lack of policies and the environmental degradation of Guanabara Bay were perceived as the most important risks to their profession.

6.1 Risk derived from over-fishing

The artisanal fishermen perceived over-fishing as the main threat to their professional activities. The over-fishing in the bay is believed to be an important contributor to the decreasing volumes and diversity of their catches. It is believed to be caused by big shrimp-trawlers encroaching into forbidden coastal areas and into the bay. The trawlers are mainly industrial boats which are claimed to use nets with very small mesh size and therefore scoop up everything in their path.

“The main problem is the predatory fishing. When using the small nets they bring small fishes and small shrimps and fishes with eggs. Of one kilo used fish, 12 kilos are thrown away” (Artisanal fisherman).

“Over-fishing, for example by shrimp trawlers. For many years they have been fishing by trawling and are still doing it along the coast. They kill tons of fish in order to catch the shrimps. There are many young fishes caught in the nets and when returned to the sea they are already dead. This type of fishing has a big impact on the artisanal fishermen, because they do not use trawling” (Fishermen representative).

According to the fishermen, these trawlers are only allowed in the open sea, not closer than two nautical miles from the coast. This regulation, however, is not properly enforced and the boats can, at times, get as close as 50 m from the coast.

6.2 Risks derived from lack of policies

The main reasons given by the fishermen to explain the lack of enforcement of laws protecting artisanal fishery are lack of resources and lack of interest from the environmental authorities. Corruption was also seen as a possible reason. A constant and spontaneous complaint made by the artisanal fishermen was that governmental officials accepted bribes as payment for not performing their duties.³

“These trawlers take everything. There is law against this, but it is not enforced. If there is an inspector, the fishermen in boat give them a bag of money – you know how it is here” (Artisanal fisherman).

“There are laws to prohibit this type of fishing (trawling), but the laws are no reinforced” (Artisanal fisherman).

This view is echoed in the scientific literature (Carvalho, 2004). The contacts and interviews of another research conducted in Guanabara Bay revealed that:

“the social actors involved in the Bay environment perceive that the environmental agencies do not act rigorously, and in addition they are aware that when these agencies act, they are frequently under the egis of questionable ethics, lacking effectiveness, justice and coherence in exercising control and performing inspection” (Teixeira et al., 2000).

Lack of interest from authorities charged with regulating fishing activities is also how the fishermen characterise their relationship with governmental institutions. Lack of knowledge about artisanal fishery is cited as a cause to the absence of policies for protecting their interests. The responsible agency, SEARP-PR, is believed by the interviewees to have little knowledge about the livelihood and working conditions of the artisanal fishermen, resulting that governmental policies tend to favour industrial fishing.

During the field study, several interviewees explained the difficulties of artisanal fishermen in receiving financial incentives:

“they are generally very poor, they are not familiar with the procedures to apply for a loan or they do not have the guarantee required. Another contributing fact is that they do not feel at ease with their physical appearance, which denounces a status of poverty” (leader of fishermen association).

6.3 Risks derived from pollution

Domestic sewage and garbage are seen as the main problems of environmental degradation in the bay. Large amounts of waste enter the bay from the many rivers in its basin and the fishermen state that their nets are always full of garbage. The garbage is of industrial, commercial and residential origin. Untreated domestic sewage and industrial pollution are also problems of great concern. All the fishermen affirm that garbage sometimes is trapped in their nets. The artisanal fishermen could be employed in the environmental programmes aiming at improving their environment. For example, fishermen could be given economical incentives for the collection of garbage. These

types of activities could be performed alongside the traditional activities of fishing and would provide extra income in addition to fishing. Some fishermen have already abandoned fishing for the collection of PET-bottles within the bay.

“The population is increasing and there is no public policy concerning sanitary issues. This is also a problem of public health, because when the water is so polluted it can cause diseases” (Leader of fishermen organisation).

Oil spills from routine tasks in terminals and tankers are problems also mentioned by fishermen in all communities. The oil industries were before considered to be a great contributor to the high pollution in the bay. But lately the oil pollution comes mainly from the tankers.

“The main problems are garbage and sewage. There are no more oil spills from REDUC [the oil refinery] just from boats washing their tanks” (Artisanal fisherman).

Five years after the oil spill, the interviews revealed that the fishermen no longer considered accidental oil spill as a threat to their activities. They were unanimous in affirming that, after the oil spill occurred in 2000, a change in the safety culture of the main refinery in the bay has changed. This change in the safety culture has been analysed elsewhere (Galli, 2007).

7 Discussion

The main purpose of this study has been to investigate the usefulness of frame analysis in the study of environmental conflicts. The tools used to carry out the frame analyses have been:

- 1 to place the conflict in a historical and socio-political context
- 2 to understand the physical and organisational settings that led to the conflicts
- 3 to identify interested parties
- 4 to analyse the parties position within the conflict.

In our specific case, the history of fishing in Brazil, including its socioeconomic aspects, has been essential for understanding the conflict between artisanal and industrial fishing. The good acquaintance with the physical settings that surround Guanabara Bay was of great importance for identifying the local populations and their way of living, and how they frame the risks to the sustainability of their activities. Through the study of the organisational settings, the trend of the governmental actions toward industrial development and the inability of the environmental agencies to fulfil their role were made visible.

The case of artisanal fishery in Guanabara Bay can be seen as part of an extensive conflict between the traditional and the modern. Intense industrial development and its effects on vulnerable populations, the invisibility of such populations to decision makers and the lack of policies to protect less favoured sectors of the society are visible not only in Guanabara Bay, but in many parts of the world (Diegues, 1998; Pauly et al., 2005).

Studies by Begossi (2006), Freire (2003), Silva (1997) and Diegues (1983, 2002), among many others, have shown the socio-economic importance of artisanal fishery in

Brazil. In 1967, with the creation of the industrial fishing sector in Brazil, strong incentives were given exclusively to the industrial sector, while the socio-economic importance of the artisanal fishing was not recognised (Diegues, 1998). However, in spite of the unfavourable economic conditions experienced by the artisanal fishermen, the sector of artisanal fishery in Brazil has survived and in some parts of the country it is on a steady increase. In 2004, artisanal fishery counted for 50% of the total marine fish production of the country, and in the North, where the influence of capital intensive industrial fishing activities is less pronounced, it totals 85% of the total fish production (IBAMA, 2005).

Artisanal fishermen are directly dependent on the natural resources of their surroundings, and are therefore severely affected by the loss of biodiversity and by the degradation of these natural resources. However, decisions concerning environmental resources are made by national governments, far from local resource users. The artisanal fishermen, used to the uncertainties of their water resources and as inheritors of a knowledge that has been achieved through centuries of experience, have developed an expertise that is highly relevant to the sustainable use of these resources (Moberg, 2003). Yet, in spite of the existence of this expertise, decision makers have not taken the time to listen to the various categories of fishermen.

Governmental policies, favouring industrial fishing, have aggravated the state of artisanal fishing in Brazil. The action frame held by the state when the new legislation was passed in 1967 prioritised the modern fishing industries in detriment of the artisanal sector. The action frame was market oriented, based on the belief that increased capital investments in the sector would inevitably have positive consequences on productivity levels while simultaneously reduce prices for the consumer, and possibly result in increased export earnings. Besides the market-oriented frame, a negative characterisation frame towards artisanal fishing also influenced the actions taken by the national government. Otherwise, the socio-economic importance of artisanal fishing in the country would have been recognised and their expertise would have been consulted when designing the new legislation.

In the study of artisanal fishermen in Guanabara Bay, it was seen that continuous over-fishing and high levels of environmental degradation in the area have resulted in a trend of declining fish stocks. To the artisanal fishermen, decreasing volumes of catch mean longer working hours and increased travel distances as well as decreasing profits. The artisanal fishermen interviewed expressed that they no longer have any faith in the future of their profession and that they are advising their children to leave their communities to take other kind of jobs. However, in a country stressed by high unemployment rates, the search for new jobs may be problematic.

In Guanabara Bay, the threat posed to artisanal fishery by over-fishing, chaotic urban expansion and pollution cannot be denied. The question is why the claims of the artisanal fishermen have not resulted in a social problem? Why have the artisanal fishermen failed in persuading other social actors, as for example governmental authorities, of their own relevance? A constructivist approach is helpful when seeking the answer to such questions (Hannigan, 2002, p.47). According to this scholar, the environmental problems faced by the fishermen has not turned into a social issue since the fishermen have not been able to attract sufficient media attention or involve some arm of the government, and because the issues claimed are not related to the interests of a significant number of citizens. In other words, artisanal fishermen lack political force and financial resources, and are thus not relevant to the holders of an industrial ethos.

In a situation like this, a reframing process involving social actors on decision-making levels seems necessary. A new action frame is needed, which, in addition to its market-orientated character, also focus on the sustainability of vulnerable populations and the management of natural resources. Unfortunately, with the current socio-political setting prevailing in the country, a reframing process of this magnitude is not foreseen in a near future. Meanwhile, the problems faced by the artisanal fishermen will remain with their communities and a few academic studies.

8 Conclusions

The overall results suggested the usefulness of frame analysis for the understanding of conflicts, and the position of the parties in relation to the conflicting issues. This study has suggested that the state of poverty and lack of power of the artisanal fishermen have made this social group invisible in the formulation of public policies, which constantly favours industrial fishing activities. In order to change such a situation new frames are needed, which recognises the socio-economic importance of artisanal fishing. To achieve this, artisanal fishermen need to be given the opportunity to express their perception on the risks to the sustainability of their professional activities, and that their opinions are listened to and considered by the governmental authorities.

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Notes

¹In 1960 the Brazilian population was 70 millions inhabitants and the population of professional fishermen was 240,000 (IBGE, 1960).

²Landings data refers to weight in tons of the taxa caught, but excluding discards or other unreported catches (Freire, 2003).

³In the process of writing this paper, 29 inspectors and related persons from IBAMA were arrested. The number of arrested people totals 30% of the IBAMA staff in the state of Rio de Janeiro. The reason claimed was that they were part of a corruption system in the state (TV Globo, Jornal Nacional, 29 August 2006).