

Fishing for Responses: A Local Experts Consultation Approach on the Brazilian Sardine Fishery Sustainability

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ABSTRACT

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Fisheries sustainability is one of the major challenges concerning the ocean use rationalization, especially in the coastal zone. The increasing conflicts between users, many different interests on common resources and the failure of traditional policy strategies, create a demand for consultative approaches that could orientate the incorporation of human values into coastal management. A consultative process of local experts perceptions on management issues of Southeastern Brazil coastal fisheries were undertaken between 1999 and 2002. Sardine overfishing and management issues addressed during the survey are here analyzed with the aim to: (1) highlight the factors that a panel of experts believe have the greatest importance towards sustainability, (2) map the discourse and arguments of key social actors within the fishery sector, and (3) provide an understanding of the perception of different interest groups. "Experts" were considered individuals regarded as qualified by their colleagues in a "snow-ball" perspective. Respondents were classified into 4 categories, such as artisanal, industrial, scientists, and government technicians. Topics include management performance, reasons explaining catch decline and overfishing, and sector's myths and perspectives. Each category showed distinct discourse and conceptualization but consensus was identified in several topics. Accordingly to the survey, present regulatory system does not seem to be appropriate to actual needs and do not facilitate communication between actors and decision-making. In the face of stocks declining and fishery diversification, future challenges will include the integration of diverse voices and a new adjustment of institutions, policies and research concerning the management of coastal fisheries ecosystems in practice.

ADDITIONAL INDEX WORDS: *Fisheries management, perceptions, overfishing, policies, interest groups, conflicts.*

INTRODUCTION

One of the most crucial human use of the oceans is surely that of marine fisheries, a highly complex biosocioeconomic dynamic system, source of food and livelihood for millions, and hence difficult to manage (CHARLES, 1997). Especially in the coastal zone, the increasing conflicts between users, many different interests on common resources, the non-sustainable state of most fisheries and the failure of traditional policy strategies, create a demand for alternative approaches that study fishing in a systemic view, with multidisciplinary basis. A consultation approach of different interest groups and their particular value judgments concerning "sustainability" can provide some orientation to conflict resolution and governance in order to achieve balanced sustainability objectives.

Sustainability is a highly dimensional concept, and appear to be related to values and norms about environmental, economic, social, ethical and other forms of "well-being" strongly influenced by cultural biases and local specific parameters (BILHARZ and MOLDAN, 1996; GARCIA and STAPLES, 2000). Different groups of people have different views and perceptions about sustainability and management that can often come into contact and conflict (i.e. sustainable yields and ecological sustainability may differ in objectives from the socio-economic sustainability, which aims to maximize rents, or from the community sustainability, concerned on the well-being of people in coastal communities).

Hence, conflicts in fisheries can arise due to differences over desired objectives (CHARLES, 1997), and policy arena is characterized by networks of social actors that seek to forward their own views and concepts.

A consultative process of local experts perceptions on management issues of Southeastern Brazil coastal fisheries were undertaken between 1999 and 2002. The approach and some preliminary results were previously presented in GASALLA (2002) and GASALLA and TUTUI (2000; 2003). This

paper will focus on the consultation survey with key "experts" of the Brazilian fishery sector about their perception on the sardine fishery management and (un)sustainability.

The very first records of the Brazilian sardine (*Sardinella brasiliensis*) fishery dated from 1910, and engine purse-seiners already supplied sardine can industry in late 1930s when it was considered an intensive fishery (DIEGUES, 1983). Nevertheless, it was only in mid-1960s that it became an industrial activity, characterized by a rapid catch increase. In early 1970s, government subsidies stimulated fishery dynamics and sardine reached about 228 thousand tons, in 1973, showing an abrupt downward trend until the 1990s as an undesirable effect. In 1988, sardine collapse had already been recognized, when technical working groups proposed more severe recommendation for management (SUDEPE/PDP, 1989; ROSSI-WONGTSCHOWSKI *et al.*, 1995). Nevertheless, after the most critical point of 32 thousand tons in 1990, and some recuperation signal in the following years, the stock never again recovered to previous levels.

Sardine fishery regulation efforts begun in 1977, and have not been based on quantitative or adaptative management procedures, but rather on often static rules, that include limiting licenses, spawning and recruitment time closures ("defesos"), and minimum catch fish length.

METHODS

Surveys were conducted with 75 sardine fishery experts in their own working places (i.e. Landing points, cooperatives, unions and associations, enterprises, universities, research institutes, government offices, etc.) with a base-line questionnaire interviewing of about one hour length. Open-ended questions were complemented by multiple choice and true-false stating on specific topics. "Experts" were considered individuals regarded as qualified by their colleagues in a "snow-ball" perspective. Respondents were classified into 4

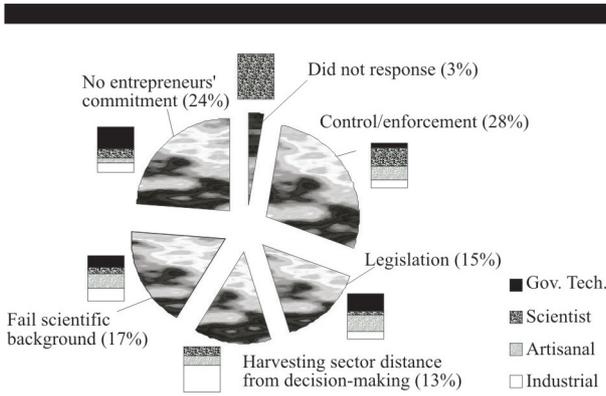


Figure 1. Most critical constraints in management performance. (Vertical rectangles show the importance given by each category within each reported topic).

categories, such as artisanal (fishermen and representatives), industrial (fishers, skippers, vessel owners and representatives), scientists (with emphasis in sardine specialists), and government technicians (from public institutions dealing with fisheries in the federal, state or local governments). Topics included management performance and critical constraints, reasons explaining catch decline and overfishing, sector's myths and perspectives.

RESULTS

Management Performance

Some sector's perception on fisheries management performance can be shown in Figures 1, 2 and 3. "Enforcement, control and surveillance" was considered the most critical constraint, especially by scientists, followed by the "no commitment of entrepreneurs", also more emphasized by non-productive respondents (Figure 1). The implementation of measures was the most constrained aspect, where both entrepreneurs, government and science had its part in the failure depending on each group's point of view (Figures 1, 2). Nevertheless, perceptions on what kind of interests had "de facto" power in legislation formulation were divided especially between conservation (more assigned by productive sector) or entrepreneurs interests (more assigned by non-productive sector) (Figure 2), showing the most dichotomist known aspect of fisheries management.

In terms of already implemented measures, most of respondents agreed that license control has not been efficient, questioning if the licensing system really works (Figure 3).

In terms of time closure measures, sampled population was divided between if they have or have not been useful in practice for stock conservation (Figure 3). It can be somehow associated by the "enforcement" constraint showed in Figure 1. Also, legislation-related problems concerning those measures

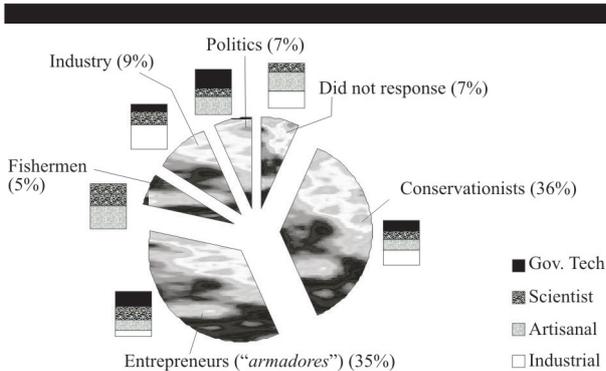


Figure 2. Interest groups' "de facto" power in fisheries management laws elaboration. (Vertical rectangles show the importance given by each category within each assigned interest group)An example of a figure considered to one column.

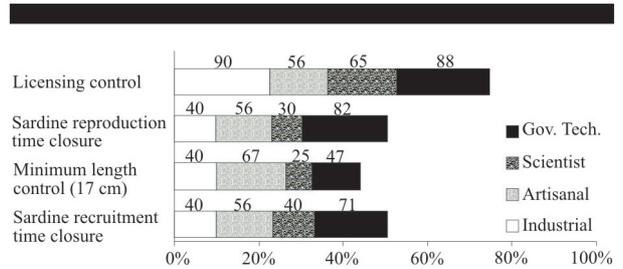


Figure 3. Percentages of affirmative responses when asked if each implemented measure have not been useful to sardine stock conservation. (Upper numbers in bars indicate the frequency of affirmative responses given by each category within each measure performance).

settings were assigned to be the most critical management constraint by 15% of respondents (Figure 1), challenged especially by the artisanal sector. Survey showed that, in practice, the control of minimum fish size was considered "useful" by almost 60% of respondents.

Overfishing and Catch Decline

The perception on the causes of both sardine catch decline and overfishing are shown in figures 4 and 5.

Excessive effort was considered the main cause of catch decline, especially for artisanal and technician respondents. Scientists were divided between natural recruitment failures/oceanographic anomalies and excessive effort, similarly to industrial sector, although industrials did not put emphasis in recruitment failures (Figure 4). Excessive fleet size was the most popular cause to sardine overfishing, followed by juveniles and mature female catch. Scientists were more concerned on fleet effect while artisans with the catch of juvenile sardine (Figure 5).

Myths

The perception on three sector's myths is shown in the Figure 6 below. The most part of respondents agreed that it is not true that fishers usually try to avoid the catch of small sardines. As expected, it was assigned to be true only by a part of productive sector (industrial and artisanal). Also, 90% agreed that sardine stock couldn't sustain an effort increase and almost 80% that fishing power should not be improved. It seems that as the improvement of the fleet is a strong myth in the industrial sector, some respondents answered oppositely when asked about "fishing power", and a political bias could explain the fact that some technicians assigned that last statement to be true.

Predictions on Industry Prospects

Figure 7 shows different expert's points of view when asked about sardine industry future. Here a general skepticism show that future would be subject to changes that are required.

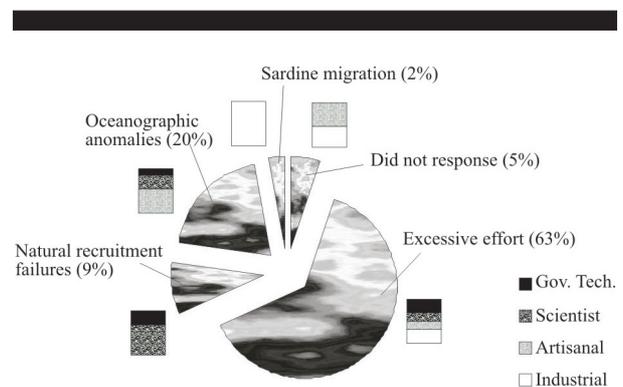


Figure 4. Causes of sardine catch decline as perceived by respondents. (Vertical rectangles show the importance given by each category within each reported cause).

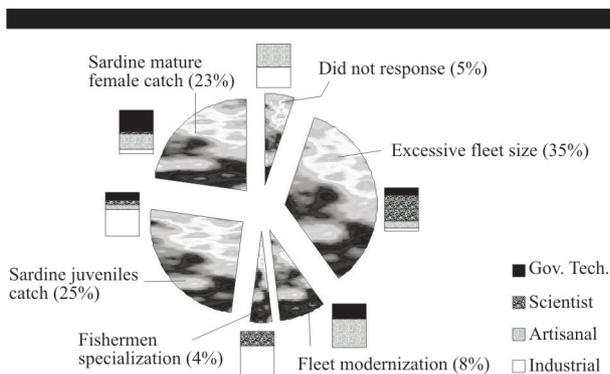


Figure 5. Causes of sardine overfishing, as perceived by respondents. (Vertical rectangles show the importance given by each category within each reported cause).

However, the so-called optimistic group were composed especially by scientists and technicians, while on the other hand, the industrial sector seemed to be almost negative concerning sardine industry perspectives.

How to Control Effort

Expert's perspectives on what policies can be efficient to control sardine fishery system are shown in Figures 8 (already existing measures) and 9 (interesting perspectives). An effective control of both fleet size and spawning closure were the most popular policies considered by respondents. Marine protected areas were selected by only 7% of the survey, and by none industrials (Figure 8).

In terms of future management perspectives, catch quota management and policies that could protect sardine-spawning areas were the most popular, followed by the promotion of a shift in effort to fisheries for non-sardine species (Figure 9).

Suggestions

Experts provided 4 topics as main suggestions for the sardine fishery crisis, as being: (1) an "improvement" of scientific research and monitoring (90%), (2) an "effective effort control" (47%), (3) an improvement of closure settings (32%), and (4) purse-seiners fleet reduction (28%) (Figure 10). Also, they suggested proposals both for management decision-making and research demands (Table 1). The discourse of each category can be also noted into the suggestion and proposals views (Table 1, Figure 10).

DISCUSSIONS AND CONCLUSIONS

By understanding the points of view of different interest groups one can provide advice to coastal or fishery management in order to minimize conflicts and develop perspective and trust. However, meaningful co-management arrangements must obviously go beyond consultation.

Participation is a process through which stakeholders influence and share control over development initiatives and the decisions and resources which affect them (WORLD BANK,

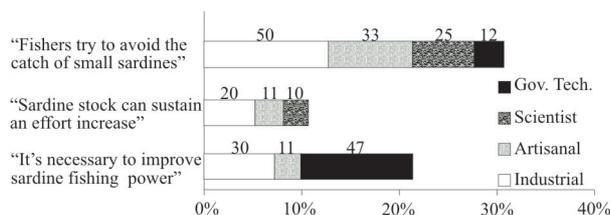


Figure 6. Percentages of affirmative responses when asked about the true of the three statements in the left numbers in bars indicate the frequency of affirmative responses given by each category within each statement).

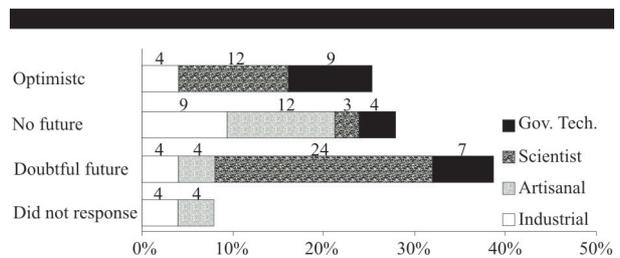


Figure 7. Predictions on the sardine industry future. (Upper numbers in bars indicate the frequency in which each opinion was given by each category).

1998). By considering stakeholders as being individuals with an interest in or an impact on given objectives or who otherwise might be impacted by them (FAO, 1997), results have shown that some stakeholders can actually have more influence and power than others. When changes are needed in issues like overfishing it seems to be very important that all stakeholders perspectives are well-known, in order to reduce conflicts, inadequate consequences and preparation of those who are involved to change.

Results showed the factors that local experts believe have the greatest importance towards fishery sustainability, however, it can be noted that conservation perspectives often conflict with economic or social ones. In this sense, it might be stressed that ensuring fish resources for the future implies that also basic needs for those who are involved are covered in a long-term perspective.

Though conflicts arise in the short-term, immediate sound measures are required in present times of both sardine stock reduction and shifts in effort to multispecies resources to supplement incomes (GASALLA *et al.*, 2003).

A mapping of discourse and arguments of key social actors within the sardine fishery sector was also attempted. Industrial group recognized effort related factors as part of the overfishing problem and argued that they are far from decision-making and they need new fleets (Figs. 1,4,5,8; Table 1). On the other hand, the perception of several respondents (35%) about "de facto" interest groups' power recognizes the power of the industrial group into the Brazilian fishery management scenario (i.e. by lobbying and direct agreements) (Figure 2). Scientists have shown a more theoretical and technical perspective and often controversial as expected.

They showed their obvious concern in scientific literature in several topics. Decadal fluctuations and other scientific findings, such as the recognition that environmental factors trigger sardine spawning and larval conditions and recruitment, were obviously more common into that group (Figs. 4,5,8,9; Table 1).

The artisanal sector has been constrained by the industrial fishing pressure, and they seem to be the most concerned group about predatory fishing and conservation needs. Consensus in this sector was not easily found and their opinions diverge maybe reflecting their lack of organization.

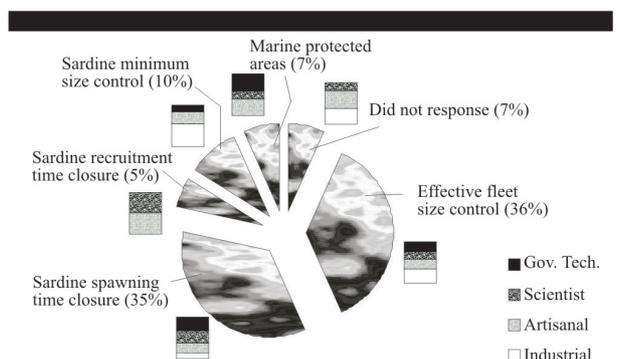


Figure 8. Most efficient selected policies to the sardine fishing regulation. (Vertical rectangles show the importance given by each category within each reported measure).

Table 1. *Proposals (P) for management decision-making and research demands (R) as suggested by survey respondents.*

Artisanal	Industrial	Scientists	Government technicians
(P) Improvement enforcement/surveillance	(P) Subsidize new fleets	(P) Promote harvest sectors cooperation	(P) Implementation of catch planning
	(P) Ban small pelagics live-bait fleet	(P) Implementation of quota management	(P) Definition of more realistic frameworks for fisheries
(R) Biomass monitoring	(P) Education for fishers	(P) Review of government structure for fisheries management	(P) Discourage industrial activity
(R) Stock assessment	(P) Improvement enforcement/surveillance	(P) Implementation of conservation measures and precautionary approach	(P) Stop fishing but giving alternatives ("Its easy to say that who do not have a boat")
(R) Understanding why there is no sardines anymore	(R) Full-time monitoring stock-related factors	(P) Use of the best available science	(P) Promote integration with coastal zone management
(R) Schools detection by satellite		(P) Burden of proof for users	
(R) More sardine prospection surveys		(R) Stock monitoring and predictions	(R) Multidisciplinary studies on both stocks and harvest sector
		(R) Definitions of reference points	(R) More realistic fisheries status approach and assessment

Although government technicians' answers could have some bias (i.e. political), they seemed to be in a mid-line between practical experience and technical advising. They appear to have realistic concern in several topics (i.e. Table 1).

Each part of the chain showed his different perspective, but there is a general consensus that present regulatory system does not seem to be appropriate to actual needs (i.e. effort control) and do not facilitate communication between actors and decision-making.

Moreover, it seems to be clear that in this typical "tragedy of the commons" (HARDIN, 1968), industrial needs confront with small-scale fisheries and fish stocks health, while government intervention would be needed although there is no such an expected management structure.

Conflicts in the capture fisheries arena arise from the three fleet sectors that presently explore the sardine stock: artisanal fishers, industrial purse-seiners and the bonito live-baitfish fleet. Self-regulation of those competing sectors does not seem to be feasible. When putting together all the demands showed in the results section below, it seems that more investment will be necessary into the construction of a real regional coastal fishery management system.

Future challenges will include the integration of diverse voices and a new adjustment of old and new institutions, policies and research capabilities concerning the management of coastal fisheries ecosystems in practice.

In terms of fisheries research, there is a need for a wide range of demands, from stock assessment to schools monitoring, and from a systemic view of fisheries and ecosystems to a more integrated research with coastal and fishery management.

Will it be possible to have such an expectation in the country present context? At least, a first consultation appraisal seemed to be have been promising to capture the complete picture.

Even though all the topics suggested from the consultation below, appear to be an immense challenge, it seems that, as SHREIBER (2001) stated, unless local sectors are allow to

share responsibilities with government managers both fish stocks and fishing as a way of life are really in danger of vanishing.

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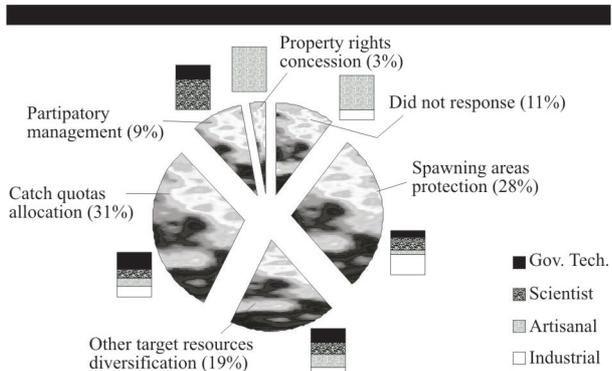


Figure 9. Most interesting policies selected as perspectives for management. (Vertical rectangles show the importance given by each category within each reported policy).

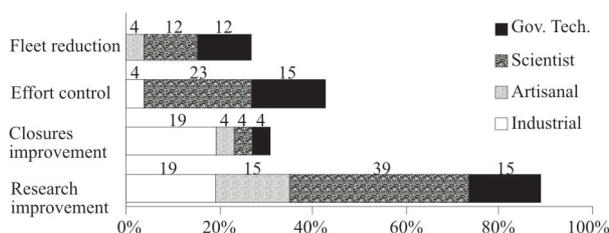


Figure 10. Most popular free suggestions as given by respondents towards sardine fishery sustainability (Upper numbers in bars indicate the frequency in which each opinion was given by each category).

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