Cognitive Constructions of Fishery Resources Among the Fishers of Southwestern Puerto Rico

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ABSTRACT

Fishery and marine resources exist in two different dimensions: in the environment and habitats, and in the cognitive (cultural) constructions of the fishers. Popular (folk) knowledge of marine resources and their spatial distribution is the result of years of observation, formal/informal learning through information transfer, and experimentation. More important, it is based upon the formulation and articulation of a schema, or cognitive model developed over time. This paper discusses the results of an interdisciplinary project (anthropology, popular knowledge and fisheries' biology) that explores the schema and local system of classification and understanding of fishery resources. Data employed is derived form ethnographic observations, informal interviews, and various in-depth interviews that included free-listing and pile sorting procedures. Preliminary analysis shows that species are grouped by habitat and behavior which correlates to fishers productive behavior.

KEY WORDS: Cognition, fisheries, popular (folk) knowledge

INTRODUCTION

The fundamental premise for this project is that state fishery management often tends to regard over fishing is the main cause of resource depletion and ,therefore, to conserve those resources fishing practices must be modified through regulation, legislation and enforcement. To stop the ill defined "tragedy of the commons", caused by the lack of conservation ethics on behalf of the fishermen, they must be regulated. This, oftentimes, inhibits their participation in the process of fishery management. The difficult predicament is that, in order to develop Marine Fisheries Reserves (MFR), the participation of the fishermen is essential (see Fiske, 1992; Pomeroy, 1993). This project was developed to find the basis of environmental knowledge and conservation practices of the fishermen in three dimensions of reality (according to the social sciences):

history, cognition and behavior. The project is also based upon various theoretical assumptions:

i) Resource users have complex systems of resource management that must be understood, prior to any reflection on "scientifically" based managerial practices
ii) Examples of successful local-level commons management are numerous and include cases of artisanal or petty-commodity production fisheries (Cordell, 1989)
iii) Erosion of traditional resource management and tenure systems, particularly in fisheries, arise as a function of a diversity of factors such as: incorporation of the fishermen into a market economy, cultural disruption and the intervention of a new political (colonial) power in the area of fisheries, modernization and capitalization of the production units, competition among production units to repay investments or financing of productive activities
iv) It is possible to find forms of community-based resource management that use the resources in a sustainable manner, even in context of state intervention, government property and socioeconomic change, and
v) In commercialized contexts, access to the resources follow well-structured patterns of resource utilization, management and territoriality that must be understood.

The understanding and "testing" of these assumptions is essential to the process of developing systems of collaborative management in the fisheries, particularly in the context of marine fisheries reserves.

METHODS

Key informants

For this study we selected 33 participants from the municipalities of Cabo Rojo, Lajas and Guánica. We constructed a panel of 20 people considered by us "knowledgeable" of the fishing sector. They were fishermen, merchants, government officials and community leaders. Each participant provided an open (no limits) list of people. The selection criteria were the following: 1) must be considered by their peers to be "extremely" knowledgeable about fishing and marine resources, 2) They may be engaged in fishing as a semi-proletarianized strategy, as independent producers, de-proletarized workers, or retired (by age) fishermen, 3) In terms of gear and species targeted they must be selected from all the gears employed, namely: gill nets and trammel nets, traps, hand lines and reel lines, and diving; 4) All age cohorts must be represented, 5) In terms of

gender, most fishermen are males. However, representation of female participants will be encouraged in the selection process.

Selection Procedure

The panel offered a list of 194 names from which to select. Using ANTHROPAC, we constructed a list with measurements of frequency, average ranking and saliency (a measurement of the ranking with the frequency). From that list we selected 40 fishermen from the higher ranks. However, the list was completed with names from the lower ranks, in an attempt to have represented all landing centers and types of gears. Thirty three fishermen were selected to participate in the study. Two fishermen declined to participate, two could not be found, and three were unavailable.

Each fishermen was visited and their participation formally requested, for several interviews. Their overall selection was explained to them, as well as their rights as respondents-participants in the study. The terms of their participation was read to them, and the information provided for their examination and files. This part of the project was initiated with a relatively lengthy interview to assess their social and economic characteristics, as well as an array of information needed for our study. This was the first step for the understanding of the dimensions of history, cognition and behavior.

RESULTS

History

The present use of the fishery resource must be understood in the light of the historical (economic) process of these communities. We argue that, similar to other societies elsewhere, these fishers presented a system of sustainable use of the environment with appropriate practices of resource conservation, which was the product of two hundred years of active fishing and cognitive explorations of the surrounding environments. The process of socio-economic development and the ensuing market pressures has distorted the conservation practices of the local fishermen. Through observations, interviews and field activities we are understanding the current perceptions and practices of conservation.

The use of archival data, and interviews is allowing us to understand better past fishing practices, in order to test the assumptions that guide our research. One area to explore is that of the historical and present boundaries of a territory employed by fishers of specific communities. The use of data from preceding studies in the selected communities will be employed to construct a model of the

historical development of this fishery. This is already the selected topic from a master's thesis in anthropology, from one of the members of this team.

Cognition

With respect to cognition and perception, the first interview elicited information on a variety of items related to their knowledge, and perception of events related to fishery management. Data gathered in the first interview gave us an idea of their feeling towards: resource conservation by the fishermen, the status of the local fisheries, the main problems confronted (by fishers and by the resource), the meaning of fishing for them, knowledge of FMPs and the MRF, resource protection by the state, and fishermen's participation in management. Qualitative data on these questions are being analyzed.

Participants for the second interview were selected from fishermen with the highest scores (or simply, numbers of fishes listed) in the first interview. Again, we also selected them using the criteria of representation of areas and gears. Nine (9) fishermen participated in this part of the project. These fishers were asked to provide a free list of all the fish and shellfish they know. This exercise provided us with a comprehensive list of "species" and their local names. The fishermen interviewed mentioned as few as 70 (mainly divers) and as many as 125. A preliminary analysis of the list provided by the fishers showed that:

i) Fishers were able to provide 245 different names of fish, shellfish and marine mammals they knew. In the second interview we gathered 14 additonal names for a total of 259.

ii) From that list of 259, they were able to mention a total of 169 specific common names for species (identified by us using their scientific name), and 43 common names for species.

iii) The key informants were able to provide general information on: 1) the area (either by name or type of environment) in which they catch those species, or where they inhabit, and 2) the time of the year in which they are more abundant. The result is an extensive list that presents a cognitive (perceptual, based on their knowledge, experience and information disclosure at the time of the interview) correlation of the variables: space (environments)--time (seasons)--species. Data on their perception of space-time-species will be analyzed in relation to their listings of species that they catch more often, and the areas were they invest most of their time fishing. That information, combined with field visits and "reconstruction" of the fishing activities through limited observations will provide a

"perceptual map" of fishing activities in the area of our research. Patterns of territoriality, resource use, intensity of utilization, and target species-areas should emerge in a geographical manner.

Folk taxonomies?

One of our interests was to gather information on the folk knowledge and the local (or folk) taxonomies used by the fishers to identify the fish. As suggested in various studies on folk knowledge (Jonannes, 1989; Ruddle, 1994) we expected to find a "functional criteria" as the dominant criteria for sorting and organizing names of fish and shellfish. Examples of those functional criteria are: use of gear (in association with species caught), form and shapes, and resemblances among the sorted fishes. For this part of the study we selected 10 fishermen from La Parguera to engage in a pile sorting procedure. The respondents were asked to sort the 245 names of fishes (written in an index card, and numerated in the back) in N number of groups as they saw fit. The main reason for the grouping was because the respondent thought that they "went together in the group". The fishers chose their own criteria for sorting the cards (names) into a pile. Invariably, they asked the interviewer if we wanted them to sort the names by the "sales class" (primera, segunda, tercera --brosa-- clase) used as a standard in the fish market. Since that system of grouping is already known, the strategy was to tell them that such system "was not necessarily the way to sort them", but they should feel free to use that and any other criteria to sort the cards in piles. The fishers then proceeded to make the piles. Their comments on the names in the cards were recorded while they sorted the cards. After the sorting and piling process, each pile was numbered, and the fishermen were asked to provide their criteria for the grouping of fish names.

Quantitative and qualitative analysis of the sorting and comments was schedule. We expected to perform a Multi-Dimensional Scaling (MAS) analysis to present a "perceptual map" of the similarities-dissimilarities and distances among the names sorted, and the clustering of the fish groups. Unfortunately, this analysis is not available at this moment. In its place we analyzed the criteria employed for the grouping. The main results are as follows:

i) Fishers used a diversity of criteria for grouping the fishes. The different comments and discursive constructions for the sorting was structured a list of labels

ii) In terms of saliency, the first criteria employed in sorting the piles was the

specific habitat in which the fish lived, used or was found in a consistent manner. The fishers mentioned that the fish piled in the group lived in the reef areas, or in the sand flats or in the thalassia beds. They also offered a moe general criteria on habitat, which refers to categories such as: water column, deep water, bottoms, or shallow waters. The combination of general and specific habitat criteria make a strong showing in frequency. But the general criteria is too weak, in comparison to the descriptions offered in the specifi c habitat. After the criteria of habitat, the fishers selected the following in order of importance: the group is related ("are family... brothers"), they are alone (they either do not have connection with any other fish, or are fishes that cannot be associated with others), and patterns of mobility in the habitats. The criteria of "family" is perhaps larger than expected since it can also include other criteria with high saliency. However, if combined, it still cannot measure up to the main criteria of specific habitat.

iii) A large amount of the groups "constructed" by the fishermen had several comments attached to it as a criteria for sorting, or as clarifications on the construction of the pile. A multiple-response frequency analysis was performed on all the comments for the groups. These results confirm the tendency shown in the very first responses.

DISCUSSION

Data suggests that the fishermen tend to use habitat-behavior information and characteristics to cognitively sort and group fish and shellfish. In such sorting, the fishers demonstrated the use of an array of information learned through the practice of observation and fishing (and some, by reading and learning from local scientists), as well as the mental schemas on ecosystemic relations. Fishers also used a variety of specific information on fish behavior, such as: feeding behavior, patterns of mobility, feeding behavior in the context of the trophic chain, assemblages of fish in certain areas, reproductive behavior, and seasonality. Even some of the comments on specific habitat included pieces of information on some behavioral aspects.

Another key aspect was that extremely functional criteria, such as "sales classes", fishing gear (fishes associated to the employment of certain gear to fish them), and edibility (both bad and good) were unimportant. In addition, the fishers shared with us a diverse number of comments on those fishes grouped as similar (same species, family, etc) by which they added subtle distinctions on

some of the components of the group, such as "because they are family", but added information on sexual dimorphism, body distinctions (color, size, other), patterns of mobility, and difference in habitats for some members of the groups. Finally, they also commented on the status of the stocks. Fishers presented information on the availability of certain fishes, and their frail condition and need for conservation.

CONCLUSION

Our project represents the first step in the understanding of popular knowledge in the Puerto Rican fisheries. The use of pile sorting and other techniques from Cognitive Anthropology may prove useful in undertanding the knowledge and perceptions that the fishers have on their environment and the species they use (see D'Andrade, 1995). In terms of our study, MDS will be the next step in the anaalysis, jointly with more qualitative analysis of the classification systems, and a depuration of the methodology to gather information on local taxonomies. The fish are, as Claude Levi-Strauss may have suggested, part of a complex system of thought and understanding, not because they are good to eat, but becacause they are good to think. We need to think more, and do more research on this critical aspect of the fishers' behavior. The results may change the way we see them, and perhaps it will help to incorporate them in the process of co-management (see Rnard, 1991).

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