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What's in there: Common Names of Brazilian Marine Fishes

Kátia M.F. Freire[1,2] & Daniel Pauly[1]
[1] Fisheries Centre, University of British Columbia, Vancouver, Canada, V6T 1Z4 k.freire@fisheries.ubc.ca
[2] Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Brazil

Abstract
The common names of plants and animals carry much of the information that humans have about these organisms. This is illustrated here for a sample of 537 fish species, representing 65% of the marine and brackish water fishes of Brazil, for which 3,012 common names were compiled and analyzed. Overall, 40% of the names originated from Latin (via Portuguese), and 24% from Amerindian languages (Tupi, Guarani). Languages from around the Mediterranean rim (Spanish, French, Greek, Arabic) also contributed numerous names, while names from African languages were relatively rare. The words used to name the Brazilian fishes are mainly primary lexemes, subsequently modified according to morphology, color patterns, non-fish animals and inanimate objects. Attributes earlier hypothesized to lead to fish being given specific common names (commonness, ease of observation, size in relation to humans, and striking appearance) were tested, and three found to apply. On the other hand, a hypothesis initially based on studies of Amazonian fishes and languages, and later corroborated for Austronesian languages, associating low frequency sounds [a] with large fishes, and conversely for high frequency sounds [i], led to ambiguous results. The diversity of Brazilian marine and brackish water fish names, while culturally and linguistically interesting, is a problem in terms of standardizing national fisheries statistics. Thus, the suggestion is made to initiate a consultative process that would extract from the wealth of names documented here a set of standard fish names that would perform for Brazil the same useful roles that the list of North American common names of fish does for Canada and the USA.

Introduction
Inconsistencies in common names of fishes between different places can cause a serious problem when dealing with the scientific literature, or with catch statistics, especially in tropical and developing regions where small-scale fisheries exploiting a wide array of species are very important. Before we can discuss how to incorporate traditional or local ecological knowledge into fisheries management, we must answer what may appear to be a trivial question: which species are we talking about? This is the reason why this work was initiated, later to evolve into an analysis of the way common names are attributed to Brazilian fishes.

There is an extensive literature on why and how organisms are named, constituting a discipline, ethnobiology, which deals with the study of the complex relationships people establish with plants and animals (Berlin 1992). The utilitarian reasons for naming organisms are obvious and long recognized, but have been complemented by Lévi-Strauss (1966), who argued that things are named as a result of an "intellectual need," i.e., because of an inherent striving for order. Indeed, according to this view, it is only after things have been named that they can be evaluated as being useful or not.

This contribution aims to show how fishers and other Brazilians perceive marine fishes and how this may have influenced how these species were named. As well, we re-evaluate the role of 'utility' in the naming process.

Materials & Methods
A database with 3,012 common names of marine fishes from Brazil was compiled based on the following ten sources: Brandão (1964), Carvalho and Branco (1977), Lima and Oliveira (1978), Santos (1982), Nomura (1984), Suzuki (1986), Godoy (1987), Soares (1988), Carvalho-Filho (1999), and Szpilman (2000). According to the detailed taxonomy in FishBase (Froese and Pauly, 2000), these names refer to a total of 537 species representing 65% of the marine and brackish water fishes of Brazil. The broadly asymptotic shape of our plot of cumulative number of names versus source suggests that our sample includes a substantial fraction of the existing names, and hence can be considered representative (Figure 1).

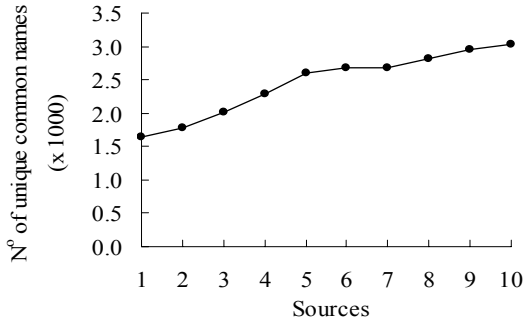

Figure 1. Cumulative number of common names of Brazilian marine fishes successively extracted from ten sources.

The common names of each species were complemented by translations (from Portuguese to English), and information on their gender (female, male or indeterminate), origin (language or language family), structure (multiple choice descriptors of the name's 'core' and theirs modifiers), and life stage (juveniles, adults or both). The origin of the common names was defined according to Tibiriçá (1984), Ferreira (1999) and Bueno (1998).

The four attributes required for fish to be named proposed by Berlin (1992), i.e., commonness, striking appearance, ease of observation and size in relation to humans, were tested using an approach developed by Palomares *et al.* (1999) and data available in FishBase (Froese and Pauly, 2000). The corresponding hypotheses are presented in the next section, along with the results. The influence of size in the naming process was also analyzed using the relationship between an index that represents the total salience of organisms, the 'specific species recognition ratio' (SSRR), and the (base 10) logarithm of the total length (Hunn, 1999). We applied the two methods suggested by this author to analyze this relationship; both are briefly described below:

(a) sampling unit method, where the sampling unit was family; SSRR is the ratio between the number of common names and the number of species included in each family (Hunn 1999). A total of 102 families was included in this analysis.

(b) single species point method, where the sampling unit was species (Hunn 1999). According to this author, "SSRR of a species ... is 1 if it corresponds 1:1 to a basic folk taxon [common name], it is 0.5 if it is one of two species included within a single basic folk taxon; it is 0.33 if it is one of three such species; and it may be 2.0 if it is 'split' between two basic folk taxa; and so on". We introduced a variant to this method, wherein we simultaneously allow for: (i) the same common name to be used for more than one species, and (ii) for each species to have different common names. Then, we add partial SSRRs to obtain the total SSRR.

Sound-symbolism was tested according to Berlin (1992) and gender issues related to the naming process were analysed using maximum length data for each species and gender available in FishBase (Froese and Pauly 2000).

RESULTS & DISCUSSION

Diversity and origin of fish names

The first result of this analysis is the high nomenclatural diversity associated with Brazilian marine fishes. Although this is a locally well-known problem, it had not been previously quantified on a national scale. From the total of 537 species analyzed, about 130 have only one common name, while two or three names are available for 80 and 50 species, respectively (Figure 2 a, b). Conversely, we have the extreme cases of three species with 30 names each, *Cynoscion virescens, Macrodon ancylodon* and *Opisthonema oglinum*, which are widespread along the coast and commercially important (CEPENE, 2000; Godoy, 1987; Szpilman, 2000).

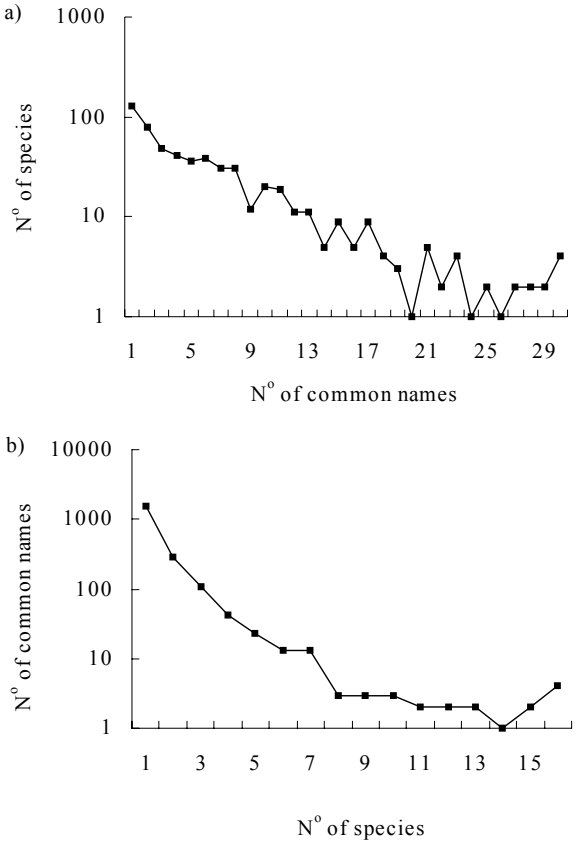

Figure 2. Nomenclatural diversity of Brazilian marine fishes: a) frequency of scientific species that have one to thirty common names; b) frequency of common names that correspond to one to sixteen scientific species.

Each of half of the 3,012 names pertains to only one species (Figure 2 a, b). The other extreme is three cases where the same common name is used for 16 different species, even from distinct families: "sardinha" (sardine) for species included within the families Clupeidae and Engraulidae, "manjuba" (silverside) for

Clupeidae, Engraulidae and Atherinidae, and "solha" (sole) for Achiridae, Bothidae and Paralichthyidae.

Forty percent of the common names of Brazilian marine fishes originated from Latin through Portuguese, followed by Amerindian languages (24%) and others (Greek, Arabic, French). The Amerindian languages represented in our sample names were mainly Tupi and Guarani, both closely related and forming the basis of the called "Língua Ge[ne]ral" encouraged by the Jesuit Order (Bueno 1998). The contribution from African languages is surprisingly low considering that African cultures had a strong impact on Brazilian culture since the late 18th century, (Freyre 2000), and people of African ancestry were predominant among Brazilian fishers in the mid 19th century (Figure 3). Castro (2001) suggests that Brazilian dictionaries frequently attribute words from African languages to Tupi, or do not identify them as such, for reasons that she identifies as "extra-linguistic". We found two examples of this: (a) the word "xangó" (a sardine), derived from a language of the (African) Bantu family, and labelled as a "Brasilianism" in the dictionary issued by Ferreira (1999), and the word "carimbamba" (a jack), also originated from a Bantu language, but attributed to Tupi by the same author.

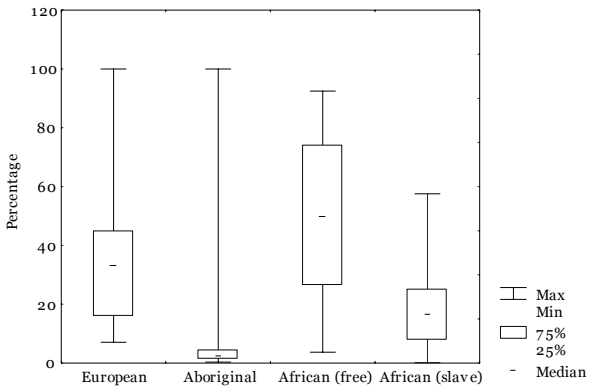

Figure 3. Origin (and status) of the fishers registered in

The core, first and second modifiers of common names of Brazilian fishes consist most frequently of primary lexemes (in 1,793 names or 38% of the total), followed by references to morphology, color pattern, non-fish animals, inanimate objects, size and others (Figure 4). Morphology and other descriptors of the fish body, such as colour patterns and size are quite important in naming fishes in Brazil, while habitat and economic value do not seem to influence this process as much as they do, e.g., in Haïti (Wiener, this volume).

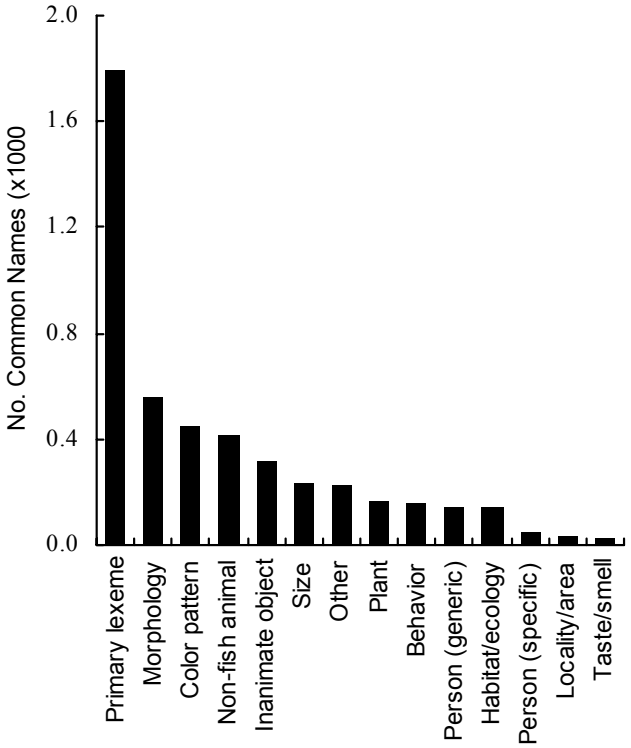

Figure 4. Descriptors used in the core, and in the first and second modifiers of the common names of Brazilian marine fishes.

Test of Berlin's attributes

Attribute (1): Commonness

We tested the hypothesis that the common fish species that sustain fisheries should be named more frequently than those which do not. This is corroborated, as 78% of the species listed in FishBase as exploited by commercial or artisanal Brazilian fisheries have common names (Table 1). Conversely, species identified as "of no interest" were named in only 26% of the cases. Thus, this attribute applies to Brazilian fishes and seems to show the utilitarian influence on the naming process.

Attribute (2): Striking appearance

We followed Palomares *et al.* (1999) in linking striking appearance to monotypy, i.e., the fact that taxonomists tend to create extra families (or higher taxa) to accommodate single species with striking attributes. In general, sixty-two per cent of the monotypic families were named, which is slightly lower than the ratio of 67% for all species included in the analysis (Table 1). This attribute seems not to be pertinent. However, we should consider the confounding effect of the commercial importance, as monotypic families for the exploited category

presented a naming ratio of 71%, while the non-exploited species were named in only 32% of the cases.

Attribute (3): Ease of observation

Ease of observation is an important attribute, as 73 to 75% of the more accessible species (reef-associated and pelagic) were named, while lower values were obtained for species that occur in deeper water (Table 2). Thus, this attribute also applies to Brazilian fishes.

Attribute (4): Size in relation to humans

Among the attributes of fishes, and other organisms for that matter, size is the most important. Notably, people cannot name what they cannot see. On the other hand, what they can see, at least with unaided eyes, is, according to May (1988), only the "tip of the biodiversity iceberg". Thus, the larger the specimens of a given species can be, the higher the probability is of that species having a common name (Table 3); this corroborates Berlin's fourth attribute. We also observed an increase of the number of common names per species with maximum length. JW Wiener (*pers. comm*) has found an opposite trend, and we think this is due to our last length classes being rather large (to account for the fact that large fishes vary more in size than small fishes). To evaluate this issue in a rigorous manner, we used the methodology proposed by Hunn (1999) and the results are presented in the next section.

Size again

Our plots of the scientific species recognition ratio (SSRR) against the logarithm of length at both family and species levels (Figure 5a and b) show a clear, dome-shaped pattern, very different from the linear relationships advocated by Hunn (1999) for mammals, birds and fishes. This pattern may be due in part, to our having counted what may be spelling variants of the same names as full common names. However, these results are consistent with our observations of few names in large species, notably for the largest extant fish, the whale shark, which has only one (exclusive) name in Brazil, "tubarão-baleia". In fact, three out of the seven graphs presented by Hunn (1999), all related to birds, show the same dome-shaped pattern, although he fitted them with a linear relationship. Actually, good linear adjusts occurred only in association with small sample sizes. Thus, we suggest that it is not "large" organisms that have many common names, but "middle-sized" ones, with the size with the most names varying among taxa.

Table 1. Analysis of the first and second of Berlin's attributes: the first is expressed by commercial importance, the second by monotypy (one species per family). Importance and monotypy data from FishBase (Froese and Pauly, 2000).

IMPORTANCE	All Brazilian species	Spp. with local names (%)	Monotypic spp.	Mono. spp. with common names (%)
Exploited[1]	466	78	80	71
Non-exploited[2]	336	26	25	32
TOTAL	802	67	105	62

1) This includes the following categories listed in FishBase: highly commercial, commercial, minor commercial, and artisanal fisheries. The last category also comprises subsistence fisheries; 2) Includes all categories not listed in 1.

Table 2. Analysis of the third of Berlin's attributes (ease of observation), as captured by habitat types. Habitat data from FishBase (Froese and Pauly, 2000).

HABITAT	All Brazilian species	Species with common names (%)
Pelagic	154	75
Reef-associated	162	73
Demersal	300	60
Benthopelagic	73	44
Bathydemersal	40	5
Bathypelagic	73	3
TOTAL	616	56

Table 3. Analysis of the fourth of Berlin's attributes, as expressed by fish size. Length data from FishBase (Froese and Pauly, 2000).

LENGTH (cm)	All Brazilian species	Species with common names (%)	Common names per species
Small (1-30)	204	50	2
Medium (31-70)	176	71	6
Large (71-2000)	179	79	8
TOTAL	559	66	5

'Fishness'

'Fishness' expresses a smooth, slow and continuous flow, and is related to the presence of low-frequency vowels such as [a] in common names (Berlin 1992), and contrasts with the high-frequency sounds of vowels such as [i], related to the rapid motion typical of birds. The common names of Brazilian fishes indicate 'fishness' rather well (Figure 6).

As well, sound-size symbolism implies that high-frequency vowel [i] should be related to small sizes and low-frequency vowels to larger sizes, as shown for frogs and toads, butterflies, and Amazonian fishes by Berlin (1992), and for Philippine fishes by Palomares *et al.* (1999). However, this does not appear to hold for Brazilian marine fishes (Table 4). Moreover,

combinations of these vowels with the two most common consonants in the common names [c] and [p] did not show, either, any relationship with size (data not shown).

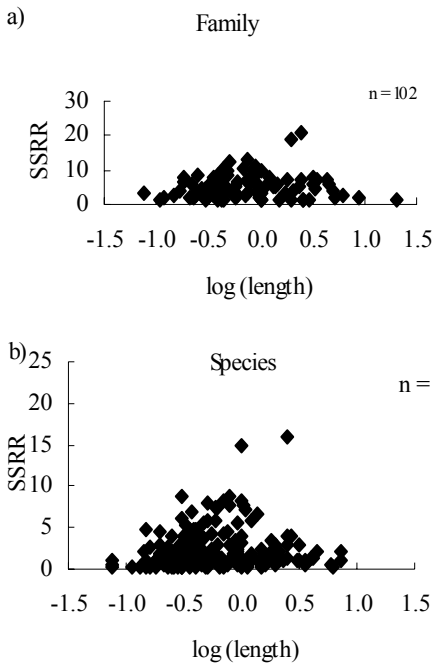

Figure 5. Relationship between the scientific species recognition ratio (SSRR) and the logarithm of length, in meters: a) Sampling unit method (Family level); b) Scientific species point method (Species level).

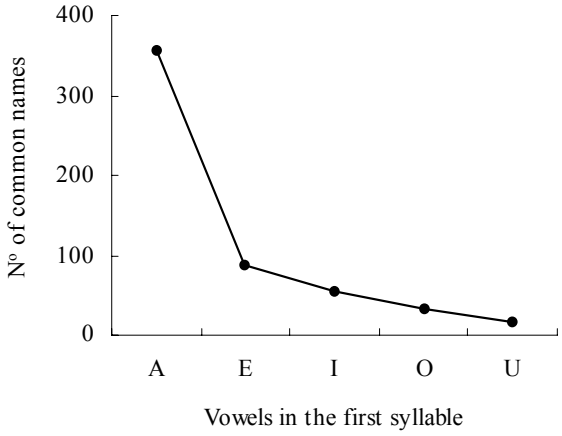

Figure 6. Vowels in the first syllable of the Amerindian names (Tupi and Guarani) of Brazilian fishes.

Table 4. Number of names with [a] or [i] as the first vowel in the common name for three classes of fish length.

LENGTH (cm)	[a]	[i]
Small (1-30)	73	20
Medium (31-70)	165	38
Large (71-2000)	117	29
TOTAL	355	87

Are fishers gender biased?

Fish common names of the masculine gender (in Portuguese) were mainly attributed to larger fish and feminine words to smaller fishes (Table 5). This can be interpreted as reflecting gender bias among the overwhelmingly male fishers, since the females of 64% of fish species reach maximum sizes in excess of those reached by the males (see Pauly 1994, who discusses a related bias among scientists).

Table 5. Mean length of fish species whose names are expressed by a word of masculine or feminine gender as identified by the ending letters.

GENDER (& ENDING)	Number	Length (cm)
Masculine (o)	404	175
Feminine (a)	527	98

Need for standardization

Brazil has longstanding problems with standardization. Thus, the first attempts to introduce the metric system to weights and measures was strongly opposed up to the late 1800s, notably by people who viewed diversity as one of Brazil's strengths (Marcílio and Lisanti 1973). The notion of standardizing the common names of fishes can thus be expected to meet much resistance, in spite of the advantages of such standardization, as evidenced by the wide official use, in the USA and Canada, of the list of common names of North American fishes (Robins *et al.* 1991).

Given this resistance, the success of such standardization demands a broad consultative process, including all parties directly or indirectly involved with fishes: universities, governmental institutions such as the Brazilian Institute for Environment and Renewable Natural Resources (IBAMA), the Ministry of Agriculture, non-governmental organizations, associations of recreational and commercial fishers, etc.

The principles to be used in this process may be based on those used since 1948 by the Committee on Names of Fishes for United States and Canada (Robins *et al.* 1991), with modifications as required by the Brazilian context. The main idea here is to have a unique common name for each species, which should be simple, descriptive (using color pattern, structural attributes, ecological characteristics or geographic distribution), and reflect the ethnic diversity of Brazil in terms of names' origins. Moreover, non-descriptive names,

notably those honouring people should be avoided, along with the names of other organisms.

The final list would be made available by an appropriate national organization, and also through FishBase, a well-established international database on fishes. National fisheries statistics would be presented using this official list, which would avoid the problems due to the use of a multitude of ill-defined names.

Conclusions

Commonness, ease of observation and size are strongly related to the probability of Brazilian marine fishes having common names, and this can be interpreted from both utilitarian and non-utilitarian perspectives.

The nomenclatural diversity of Brazilian marine fishes poses a big problem in the standardization of national fisheries statistics. We recommend start of a consultative process that would extract a set of standard names from the >3,000 names documented here. These standard names would then perform for Brazil the same useful roles that the list of North American common names of fish does for the USA and Canada.

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References

Berlin, B. (1992). *Ethnobiological classification. Principle of categorization of plants and animals in traditional societies*, Princeton, New Jersey. 335 p.

Brandão, J. M. (1964). Glossário de nomes dos peixes: sistemático, português, inglês. *Boletim de Estudos de Pesca* 4 (6): 1-59.

Bueno, F. S. (1998). *Vocabulário Tupi-Guarani - Português*. Éfeta Editora, São Paulo, Brazil. 688 p.

Carvalho, V. A. and R. L. Branco (1977). Relação de espécies marinhas e estuarinas do nordeste brasileiro. *P.D.P. Documentos Técnicos* (25): 1-60.

Carvalho-Filho, A. (1999). *Peixes: costa brasileira*. Melro, São Paulo. 320 p.

Castro, Y. P. (2001). *Falares africanos na Bahia.* Topbooks Editora e Distribuidora de Livros, Rio de Janeiro. 366 p.

CEPENE (2000). Boletim estatístico da pesca marítima e estuarina do nordeste do Brasil - 1999. *Boletim estatístico da pesca marítima e estuarina do nordeste do Brasil*: 1-150.

Ferreira, A. B. H. (1999). Dicionário Aurélio Eletrônico - Século XXI. Lexicon Informática Ltda., Rio de Janeiro, Brasil.

Freyre, G. (2000). *Casa grande & senzala*. Record, Rio de Janeiro. 668 p.

Froese, R. and D. Pauly (2000). *FishBase 2000: concepts, design and data sources*. ICLARM, Los Baños, Laguna, Philipinnes. 344 p.

Godoy, M. P. (1987). *Peixes do estado de Santa Catarina*. Editora da UFSC, Florianópolis, Brazil. 571 p.

Hunn, E. (1999). Size as limiting the recognition of biodiversity in folkbiological classifications: one of four factors governing the cultural recognition of biological taxa. In: Folkbiology. D. L. Medin and S. Atran (eds.). Massacchusetts Institute of Technology, Cambridge, Mass.: 47-69.

Lévi-Strauss, C. (1966). *The savage mind*. The University of Chicago Press, Chicago. 290 p.

Lima, H. H. and A. M. Oliveira (1978). Segunda contribuição ao conhecimento dos nomes vulgares de peixes marinhos do nordeste brasileiro. *Boletim de Ciências do Mar* (29): 1-26.

Marcílio, M. L. and M. L. Lisanti (1973). Problèmes de l'histoire quantitative du Brésil: métrologie et démographie. *Colloques Internationaux du Centre National de la Recherche Scientifique* (543): 29-37.

May, R. M. (1988). How many species are there on Earth? *Science* 241 (4872): 1441-1449.

Nomura, H. (1984). Nomes científicos dos peixes e seus correspondentes nomes vulgares. In: (eds.). Editerra, Brasília, Brasil: 27-63.

Palomares, M. L., C. V. Garilao and D. Pauly (1999). *On the biological information content of common names: a quantitative case study of Philippine fishes*. Proceedings of the 5th Indo-Pacific Fish Conference, Nouméa. p.861-866. Société Française d'Ichtyologie & Institut de Recherche pour le Développement.

Pauly, D. (1994). *On the sex of fish and the gender of scientists*. Chapman & Hall, London. 250 p.

Robins, C. R., R. M. Bailey, C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea and W. B. Scott (1991). Common and scientific names of fishes from the United States and Canada. *American Fisheries Society, Special publication* 20: 183 p.

Santos, E. (1982). *Nossos peixes marinhos (Vida e costume dos peixes do Brasil)*. Editora Itatiaia Limitada, Belo Horizonte, Brasil. 265 p.

Silva, L. G. (1988). *Os pescadores na história do Brasil*. Vozes, Recife. 222 p.

Soares, L. H. (1988). Catálogo dos peixes do litoral do Estado do Rio Grande do Norte. *Boletim do Departamento de Oceanografia e Limnologia do Centro de Biociências da Universidade Federal do Rio Grande do Norte* 7: 1-39.

Suzuki, C. R. (1986). *Guia de peixes do litoral brasileiro*. Edições Marítimas, Rio de Janeiro, Brazil. 394 p.

Szpilman, M. (2000). *Peixes marinhos do Brasil: Guia prático de identificação*. Instituto Ecológico Aqualung, Rio de Janeiro. 288 p.

Tibiriçá, L. C. (1984). *Dicionário Tupi-Português - Com esboço de gramática de tupi antigo*. Traço Editora, Santos, Brasil. 200 p.

Wiener, J. W. (this volume). Marine resource knowledge related to fish classification in Haïti. *Fisheries Centre Research Report*.