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Citation analysis for the 1995 FAO Code of Conduct for Responsible Fisheries

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ABSTRACT

This paper presents the results of a 2008 citation-analysis study that was undertaken for the 1995 FAO Code of Conduct for Responsible Fisheries and its associated instruments. The overall objective of this study was to contribute towards a strategy for improved dissemination, awareness raising and communication about the Code and its implementation. For each citation, additional information was collected to identify patterns by year, topic, author affiliation or type of literature. Results support previously suggested anecdotal patterns, in particular related to the diversity of publishing outlets and the high proportion of fisheries information published as grey literature. The results also point to areas of concern for long-term preservation and dissemination of fisheries information.

1. Introduction

The importance and purpose of the 1995 FAO Code of Conduct for Responsible Fisheries (the Code) is summarized in a short sentence in article 6.1. It states that as a general principle "The right to fish carries with it the obligation to do so in a responsible manner so as to ensure effective conservation and management of the living aquatic resources" [1]. A voluntary international instrument that has six instruments associated with it,[1] the Code seeks to promote greater responsibility and sustainability in fisheries and aquaculture by embedding globally accepted standards and best practices in national, and as appropriate, regional policy, measures and activities.[2]

Taking a holistic approach to fisheries,[3] the Code in its substantive articles[4] addresses general principles, fisheries management, fishing operations, aquaculture development, the integration of fisheries into coastal area management, post-harvest practices and trade and fisheries research. The Code's preambular articles include the objectives, relationship with other international instruments, implementation, monitoring and updating and the special requirements of developing countries.

FAO's role is to support the Code's implementation, rendering advice and technical assistance to broaden and deepen its impact. Part of this assistance involves the elaboration of technical guidelines. They are intended to provide practical guidance to fisheries personnel and other stakeholders on how to implement measures, concepts and approaches. Furthermore, FAO is tasked with a reporting and monitoring role to review progress made with implementation. Progress reports are prepared on a biennial basis for consideration by the FAO Committee on Fisheries.[5]

The Code's implementation challenges many national fisheries administrations, especially those in developing countries. Primarily for this reason implementation tends to be stepwise and incremental: few administrations are in a position to implement the Code in all areas and at the same rate. Many administrations, including those in some of the world's largest and most affluent countries, report to FAO that they face significant human and

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[1] The instruments that form part of the Code include the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas [2]; the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries, the International Plan of Action for the Conservation and Management of Sharks and the International Plan of Management of Fishing Capacity [3]; International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing [4] and the Strategy for Improving Information on Status and Trends of Capture Fisheries [5]. References to the Code refer, as appropriate, to its associated instruments.

[2] The Code was a major item for discussion at the 1995 session of the FAO Committee on Fisheries (COFI). It stressed the Code's importance as an instrument to support the implementation of the 1982 United Nations Convention on the Law of the Sea as well as the outcomes of the United Nation Conference on Environment and Development. COFI also noted that technical guidelines would (*footnote continued*) be developed to support and facilitate the Code's implementation. It was adopted unanimously by the FAO Conference in October 1995.

[3] References to fisheries include aquaculture, as appropriate.

[4] Articles 7–12 of the Code [1].

[5] Reports are based on information gathered from self-assessment questionnaires provided to FAO by Members, regional fishery bodies and non-governmental organizations.

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financial resources constraints in their efforts to implement the Code.

In addition to these constraints, some countries lack accurate, complete and up-to-date information that is vital for the Code's successful implementation. Very often there is a marked absence of information locally and access to it from other sources (e.g. via the Internet) is difficult and/or expensive [6].

The Code's substantive articles recognize the need for two broad categories of information to facilitate implementation.[6] These categories are (i) general information (relating to the Code's goals, coverage, etc.) and (ii) specialized and technical information to support research, resource management and use, policy and development. In encouraging the Code's implementation, FAO has a strong and ongoing interest to promote and improve awareness, accessibility, dissemination and distribution to a large and diverse stakeholder community. Part of this interest involves understanding and assessing the use of the Code by different stakeholder groups. As a contribution to this understanding this paper evaluates Code citations in published literature since 1995.

2. Citation methodology and analysis

Citation analysis is used for a variety of purposes and, despite some of its ambiguities, provides an indicator for assessing the impact of specific authors, organizations or, in the case of this study, a particular set of documents. Looking at the Code's citations in the published output of fisheries scientists, resource users and managers gives an indication of the extent to which the Code is reaching these stakeholders and also the broad topics where the Code appears to be most relevant. The analysis points to several areas that should be taken into consideration when evaluating the Code's availability and use. Not the least of these areas is the English language bias of many databases etc., the language barrier for many stakeholders, and the unequal access to the Internet.

Citation analyses were traditionally performed using Web of Science (or its precursor Science Citation Index), an expensive, subscription only tool. Recent developments in bibliographic databases and Internet search engines have created alternatives. Elsevier released Scopus, a competing commercial bibliographic database and Google introduced a search engine targeting academia and researchers. Google Scholar is a freely available search engine harvesting scholarly literature and citations from a broad range of databases, web sites, repositories and commercial publishers. Recent research found that Google Scholar identified 53% more citations than Web of Science and Scopus combined [7]. When compared directly, Scopus identified 13% more than Web of Science. It was therefore decided that the cost of adding Web of Science data to this analysis could not be justified given the likely low-level return.

In this study Code citations were gathered from Google Scholar using Publish or Perish.[7] Three general citation queries were conducted using the following phrases: Code of Conduct for Responsible Fisheries, FAO Technical Guidelines and International Plan of Action or "IPOA" in English, French and Spanish. Over 1300 citations were initially identified from the Publish or Perish searches.

A corresponding search for the Code using Scopus produced 289 citations in English, three in French and two in Spanish. Searching Scopus for Code related instruments was less effective because of the non-standard ways of citing. For example, FAO Technical Guidelines for Responsible Fisheries retrieved 165 citations in English, none in French and one in Spanish even though all possible abbreviations of the series name were used. Ultimately 67 unique references were identified and added to the overall analysis. To perform the most comprehensive search possible, subject searches were also conducted in the Aquatic Sciences and Fisheries Abstracts and JSTOR[8] adding a further six unique citations.

The results of the analysis were collected in a spreadsheet to allow for further analysis. Each corresponding article was examined to ensure the publication had cited one of the instruments. Additional information was gathered from the source document including the first author's stated affiliation by country, type, topic and year of publication.

For the purpose of the study, the type of publication was identified as a book (including book chapters), a journal article or grey literature. The latter was defined "… as any work produced by a non-commercial agency whose primary activity is not publishing" [8]. Topics were assigned as either law, management including policy or science. For citations of the Technical Guidelines, the specific guideline(s) cited was also noted. Code citations by FAO staff were considered as self-citations and thus not included in the final analysis.

3. Results and discussion of the analysis

After removing duplicates, self-citations and a small number of documents that did not cite the targeted works, 996 citations remained. Of these 647 (65%) were of the Code, 225 (23%) were of a Technical Guideline and 124 (12%) were to an International Plan of Action.[9]

A recent citation analysis of FishBase[10] provided a benchmark for comparing the results obtained for the Code. In 2006, the Fisheries Centre, University of British Columbia, Vancouver, Canada, carried out a citation analysis using "FishBase" as the keyword in all fields for both Scopus and Google Books. For the years 1995–2006 a cumulative citation rate of 653 was considered to put FishBase into a very small group of highly cited published items. It was estimated that 50% of the approximately 38 million items that have been published since 1900 have never been cited. Of the remaining 50% that had been cited at least once, only 21,200 items (0.11%) had been cited more than 500 times [9]. The Code is therefore in the category of highly cited publications.

A 2005 citation analysis of the Code found a total of 126 citations [10]. At that time Web of Science was the only tool available for this type of analysis. This study was not undertaken to compare competing bibliometric tools. However, the tenfold increase in citations of the Code between 2005 and 2008 cannot be linked only to an improvement in the tools available for tracking citations.

Code citations by year and topic are shown in Fig. 1. The general trend is one of an increasing pattern of citations over the 12 years following the instrument's adoption. Although there appears to be a decline in citations between 2006 and 2007 a future analysis should be undertaken to determine if this difference was attributed to publishing time lags.

In more detail, the apparent downward fluctuation of citations by works categorized as "law" is not as easily explained. There is also an upward trend in citations by works categorized as

[6] References to information and/or data are to be found in all of the Code's substantive articles [1].

[7] Available at http://www.harzing.com

[8] A US-based online system for archiving academic journals (http://www.jstor.org).

[9] Unless indicated otherwise, all subsequent references to the Code and its related instruments are referred to as citations of the Code.

[10] Available at http://www.fishbase.org

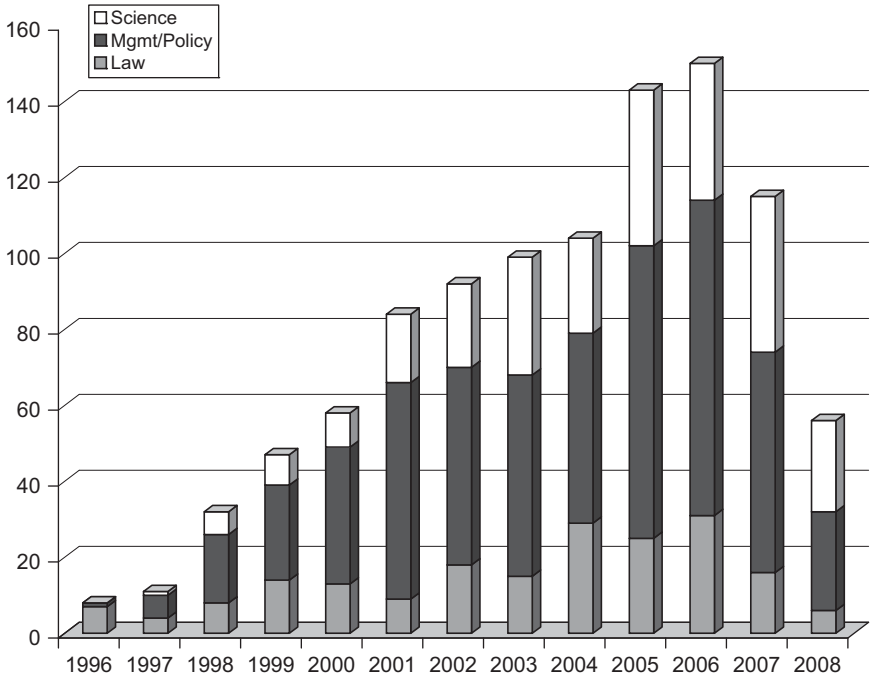

Fig. 1. Number of Code citations by year and topic.

Table 1
Source publications with the highest frequencies of Code citations.

Journal title	Science articles	Management articles
Canadian Journal of Fisheries and Aquatic Sciences	9	7
Fish and Fisheries	7	14
Fisheries Management	4	13
Fisheries Research	20	21
ICES Journal of Marine Science	20	24
Marine Policy	1	42

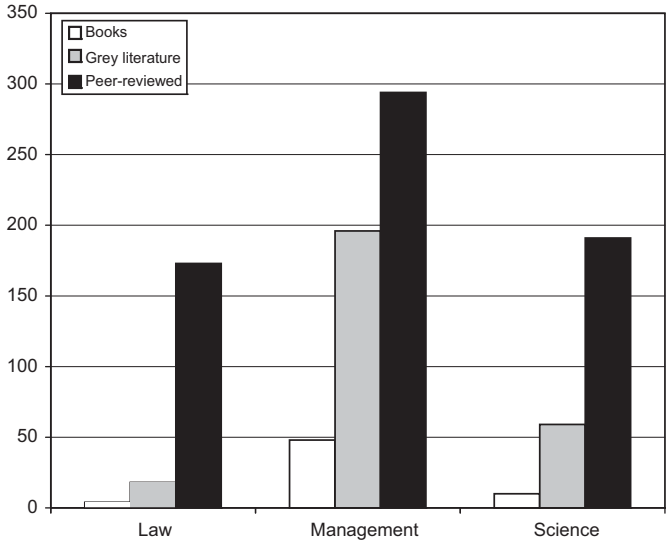

Fig. 2. Number of Code citations by type and topic.

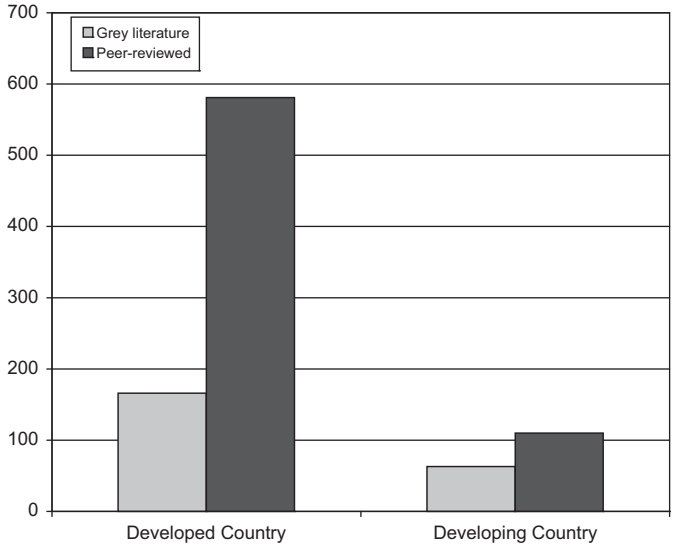

Fig. 3. Number of Code citations by developed or developing country and type of literature (grey or peer reviewed).

"science". This trend may indicate that scientists have become increasingly more aware of the Code and are increasingly interested citing it in scientific literature.

Table 1 presents a sample of journals with large numbers of articles classed as either science or management that cite the Code. One notable finding is that two highly regarded scientific journals, Fisheries Research and ICES Journal of Marine Science, have published similar numbers of science and management articles citing the Code.

Fig. 2 provides a graphic illustration of the differences in publishing outlets available for law, management and science. Nearly 66% of Code citations found in the management literature

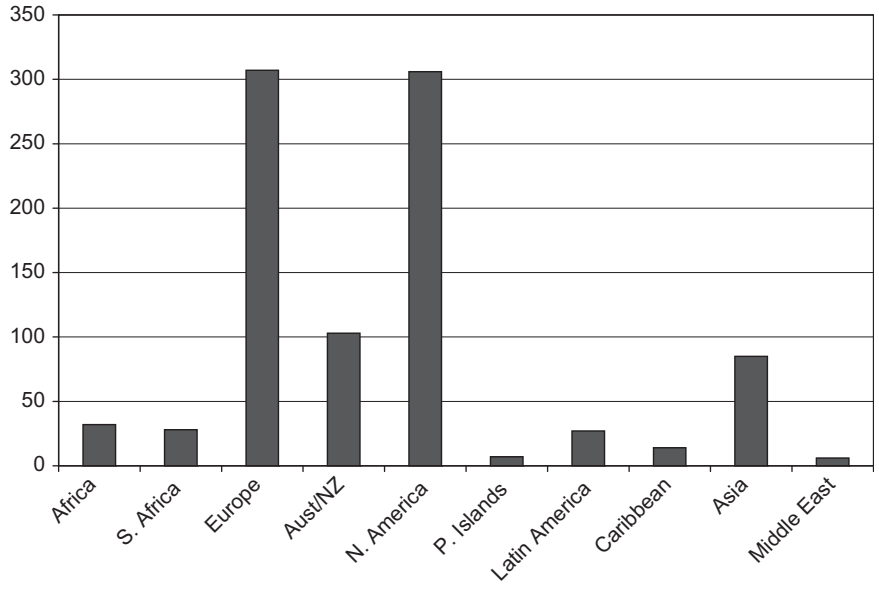

Fig. 4. Number of Code citations by region.

was classified as grey literature. Neither law nor science shows a similar pattern as both are disciplines known to rely heavily on peer-reviewed articles.

The citations were then divided into those published by authors from high-income countries compared with those from all other countries and then by type of publication, combining books with peer-reviewed literature to produce dichotomous results (Fig. 3). Authors from all countries primarily published in peer-reviewed journals. The striking contrast is in the percent of literature published outside the traditional peer-reviewed literature. Authors from low- and middle-income countries published 15% more of their work in the grey literature than did authors from high-income countries.

A more detailed examination of the countries represented in these citations is found in Fig. 4. As expected, authors from Europe and North America represented the overwhelming majority (77%). One important affiliation not indicated in Fig. 4, but nonetheless documented, was that of authors listing their affiliations with a non-governmental (NGO) or intergovernmental organization (IGO) (e.g. Greenpeace or the Commission for the Conservation of Antarctic Marine Living Resources). Significantly, there were 77 Code citations by authors listing their affiliation as an NGO or IGO.

In addition, a detailed analysis was conducted for each of the FAO Technical Guidelines for Responsible Fisheries[11] as these would often have a different target audience depending upon the specific topic. Table 2 presents the titles and year of publication of the Guidelines. The year of publication is a significant parameter when looking at citation frequency.

The pattern shown in Fig. 5 is not attributable to year of publication. Other factors such as intended audience, method of dissemination and level of interest may be important. Two of the Technical Guidelines, namely numbers 2 and 4 including supplements 4.1 and 4.2, are the most widely cited. Anecdotal evidence points to topic as the most likely explanatory factor. The "ecosystem approach to fisheries" and the "precautionary approach" have become highly integrated into both the science and the management literature. The Guidelines primarily directed at the fishing industry, namely fishing operations and responsible[12] fish utilization, are among the least cited. Again, there are several possible explanations for this situation, including poor dissemination to industry or that the published output of industry tends not to cite the Code or is not covered by citation tools.

Table 2
FAO Technical Guidelines for Responsible Fisheries included in the citation analysis.

Number	Year	Guideline title
1	1996	Fishing operations
2	1996	Precautionary approach to capture fisheries and species introductions
3	1996	Integration of fisheries into coastal area management
4	1997	Fisheries management
4.1	2000	Conservation and management of sharks
4.2	2003	Ecosystem approach to fisheries
5	1997	Aquaculture development
6	1997	Inland fisheries
7	1998	Responsible fish utilization
8	1999	Indicators for sustainable development of marine capture fisheries
9	2002	Implementation of the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing
10	2005	Contribution of small-scale fisheries to poverty alleviation

4. Conclusions

The results obtained in the citation analysis provide information about the target audiences that are using and citing the Code

[11] The Technical Guidelines produced within the framework of the Code have no formal legal status and are intended to be practical and flexible and subject to revision in the light of new information and changing circumstances. They are directed at all stakeholders and in particular governments that have a particular role to play in facilitating an enabling environment for the Code's implementation. Guidelines may be developed in different ways, including through specialist meetings, consultations, by consultants and by FAO staff.

[12] Grey literature tends to have a short shelf life in many countries where climatic conditions and a lack of adequate storage facilities impede the maintenance of document quality and retrieval.

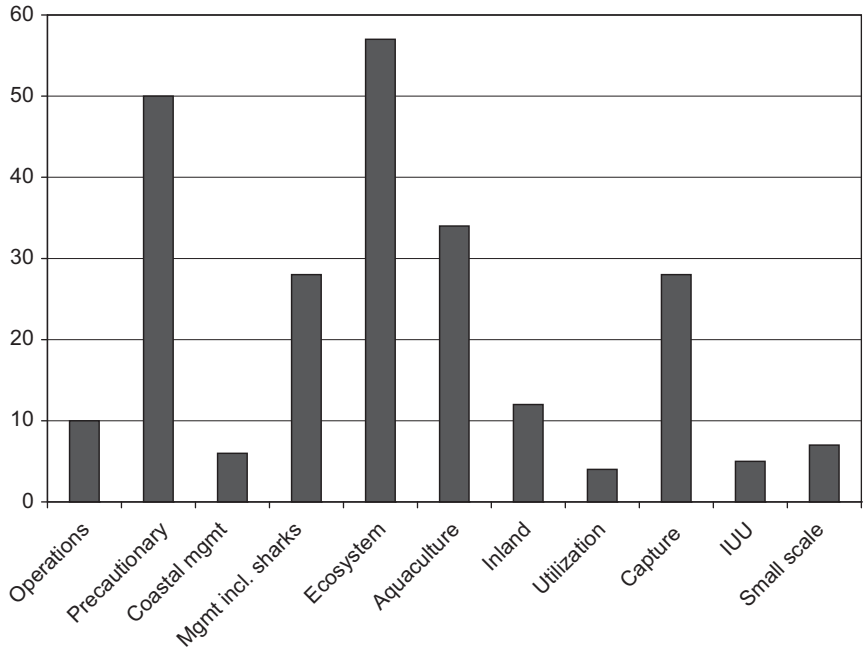

Fig. 5. Number of Technical Guidelines citations.

and where they are publishing their own information. The Code is frequently cited in areas broadly classified as science, law and management and there is a pattern of increasing citation over the years since its adoption in 1995.

The low number of citations to French and Spanish language versions of the Code can be attributed to a number of factors: the English language bias of citation tools, the predominance of English in the fisheries literature and the possibility of poorer dissemination. Tools are not available to facilitate citation analysis in other languages although the Code has been translated into more languages than any other FAO publication. There are currently over 25 language versions including several indigenous languages and it would be interesting to see the extent to which these are being cited.[13]

There has been a steady increase in "management" publications citing the Code in both the peer-reviewed and the grey literature. The predominance of grey literature for much of fisheries management means that it is often difficult to discover and access, particularly over the long term. Fishery management plans, policy guidelines and institutional publications can be difficult to find without knowledge of the originating agency. Additional efforts are needed to improve their accessibility and dissemination, particularly as the grey literature represents data and information that is valuable in a comprehensive and long-term view and in some cases it may be the only source.

The upward trend in citations by works categorized as "science" is notable and may indicate that scientists have become increasingly aware about the Code and are showing greater interest in relating their research to the issues addressed by the Code. Both "science" and "law" are published predominantly in peer-reviewed journals.

The results for the author's affiliation show that those in high-income countries publish primarily in peer-reviewed journals while those in developing countries publish a much higher proportion of their intellectual contribution outside of this scholarly literature. Feedback from FAO members indicates that access to information is only one of a series of related information problems. Poor opportunities to publish and disseminate fisheries information in developing countries are leading to a serious and growing under-representation of their research in the scientific literature. The unavailability of research and management results from countries with some of the world's most intense fisheries problems potentially weakens the future for responsible fisheries on a global basis. There is a significant contribution to the fisheries literature from both NGOs and IGOs. Digital publishing and dissemination offer new opportunities in locations with reliable and affordable Internet access: an increasing amount of grey literature is being published on the World Wide Web. However, for ease of discovery and for longer-term preservation and availability, there is a need for better organization and more secure storage, such as that offered by digital repositories.

The overall objective of this study was to contribute towards a strategy for improved dissemination, awareness raising and communication about the Code and its implementation. Interpreting the citation data by topic, geographical region and type of publication can best be done in the context of other studies and should help to guide a future communication strategy. In promoting more responsible fisheries the challenge is to reach a wider target audience and to gather information on the use of the Code by more diverse stakeholder groups, including those at the grassroots level.

[13] To strengthen dissemination and awareness-building about the Code and its Technical Guidelines, simple language versions are also prepared and translated. The target groups for these publications are fishing communities, fish workers and industry.

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