IDENTIFYING CORE MARINE SCIENCE JOURNALS: FACTORS OF EVALUATION

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Abstract:
Journal articles are the most important sources for scientific information. More than 10 years after the “Berlin Declaration”, more and more journals are published with open access. Due to this, the journals market is subject to a lot of change. The main aim is to gather information to establish whether our subscriptions still meet the needs of our scientists. Key factors used to identify the core journals for marine sciences are displayed, at least for the scientists of our institution, which is an interdisciplinary research facility. It specializes in the study of coastal oceans and marginal seas and is divided into four sections which focus on different research activities. Because of this, it is important to find a combined set of core journals which reflect the needs of all scientists involved. Recent budget cuts have made it even more necessary to cut down on journal costs. Certain questions had to be answered during the evaluation process. Topics included in those questions were the definition of what core journals are, where our scientists publish their research, which journals they cite, available open access and institutional access to journals specialized in marine sciences and the cost of journals.

Keywords: Journal evaluation, citation analysis, core journals, bibliometric analysis, journal usage, collection management.

Background

“Because students can’t afford scholarly journals on a Ramen noodle budget.” (American Library Association, 2016). This phrase from a bookmark of the American Library Association represents quite well the situation we were facing in our library. As with many research libraries, we face recent budget cuts, and on the other hand, skyrocketing journal subscription costs. Furthermore, the amount of scientific information increases. The current number of scientific peer-reviewed periodicals is estimated to be approximately 24,000 titles. We can consider an almost constant annual increase of more than 3% in the number of titles. That means that the number of active journals doubles every 20 years (Haustein, 2012).

How can we, as librarians, find the best way to satisfy the information needs of our readers? As a matter of fact we have to cut the costs. This necessity forces us to focus on importance. Importance can be defined as follows: First, most frequently

used journals; second, which journals our scientists choose for publication; and finally, aspects such as quality, content, soft factors and license conditions.

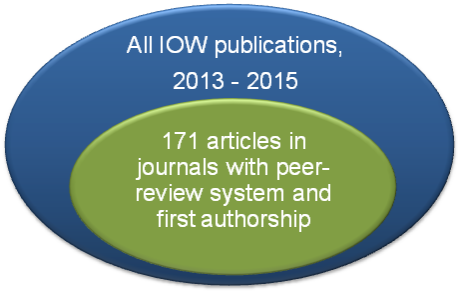
Evaluation process

We approached the issue with journal evaluation based on indicators for core marine science journals.

I. Citation analysis:

We started our study with a citation analysis and set three criteria for our data source:

1. publications within the date range 2013 to 2015;
2. articles in journals with peer-review system;
3. the first author is IOW affiliated.



Overall, 171 articles met our criteria and were included in our citation analysis. Presently, data sources are available from Google Scholar, SCOPUS, and Thomson Reuters. Of these, we have elected to use citation data from Thomson Reuters.

We performed a cited reference search in Web of Science for all 171 articles and obtained 5704 references. We extracted 604 journal titles via some rudimentary data cleaning and examining titles changes. We ranked the journal title list according to the number of citations received (Delwiche, 2003). Bradford's Law of Scattering was applied. Bradford's Law means that a small group of journals in Zone 1 produces the largest number of citations, followed by a second, larger group of journals in Zone 2 that are cited somewhat less frequently. Finally, there is a much larger group of journals in Zone 3, all of which are cited relatively infrequently (Belter & Kaske, 2016).

	Cited journals		**Cited journal references**		
Zone	*No.*	*%*	*No.*	*%*	*Cumulative total*
1	11	1.81%	1882	32.99%	1882
2	39	6.43%	1911	33.50%	3793
3	557	91.76%	1911	33.50%	5704
Total	607	100.00%	5704	100.00%	

Distribution by zone of cited journals and references

The distributions are consistent with those predicted by Bradford's law of scattering. A collection of just 23 journals can provide 50 percent of the cited references. This suggests that the IOW Library can provide for the majority of the references made by IOW authors with a relatively small collection of core journals.

Following is a list of journals in Zone 1, which we would identify as core journals. All of them are subscription based. We cannot identify any Gold open access journal within Zone 1. Some publishers offer delayed open access.

Journal	Publisher	open access
Applied and Environmental Microbiology	American Society for Microbiology	delayed
Journal of Geophysical Research Oceans	Wiley; American Geographical Union	delayed
Journal of Marine Systems	Elsevier	no
Limnology and Oceanography	Wiley-Blackwell; American Society of Limnology and Oceanography	delayed
Marine Ecology Progress Series	Inter-Research	delayed
Science	American Association for the Advancement of Science (AAAS)	no
Journal of Physical Oceanography	American Meteorological Society; Allen Press	delayed
Continental Shelf Research	Elsevier	no
Nature	Nature Publishing Group	no
Marine Pollution Bulletin	Elsevier	no
Geochimica et Cosmochimica Acta	Elsevier	no

Journals in Zone 1 (most cited, according to Bradford's Law)

What does it mean for our collection management? Because not many of the journals are published with open access, we need to pay for access. There is little chance of saving costs.

II. Usage:
Another aspect of identifying the most frequently used journals is the usage. We were interested in the usage of our subscribed journals. Based on the COUNTER Standard, we performed the Journal Report 1. We collected the number of successful full-text article requests by our institution members. The numbers were obtained from each publisher. Due to changing publishers, it is sometimes difficult to collect the correct number of full text downloads. In any case, the quality of underlying database is crucial when it comes to usage-based journal evaluation (Haustein, 2012). The retrieval of high quality usage data can become time consuming. The electronic usage data reflects usage by the whole readership but has advantages in citation analysis, which disregards non-publishing readers (Haustein, 2012). We use the Cost per Use Factor (CPU) to identify cancellation candidates. Cost per use means that the subscription price is divided by the number of absolute downloads as listed in COUNTER Journal Report 1. However, we would like to mention the following: The Journal Report 1 reports the number of download events, but not the number of unique articles accessed. Therefore calculations

based on Cost per Use (CPU) may lead to poor decisions. The reported download events are related to an undefinable large set of articles (Haustein, 2012). Nevertheless, we consider the Cost Per Use (CPU) factor as a decider for renewal or cancellation. However, caution must be exercised when drawing comparisons (Bucknall & Bernhardt, 2014).

Journal Usage, Top 10
Journal of Marine Systems
ISME Journal
Marine Pollution Bulletin
Geochimica et Cosmochimica Acta
Applied and Environmental Microbiology
Marine Ecology Progress Series
Estuarine, Coastal and Shelf Science
Continental Shelf Research
Marine Chemistry
Journal of Geophysical Research: Oceans

III. Publications by IOW affiliated authors:
The third factor is publications. We examined the journals~~,~~ which our scientists choose for their publications.

Journals most published in
Journal of Marine Systems
Biogeosciences
Marine Pollution Bulletin
PLoS One
Ocean Modelling
Continental Shelf Research
Deep Sea Research Part 1
Environmental Microbiology
FEMS Microbiology Ecology
Journal of Coastal Research

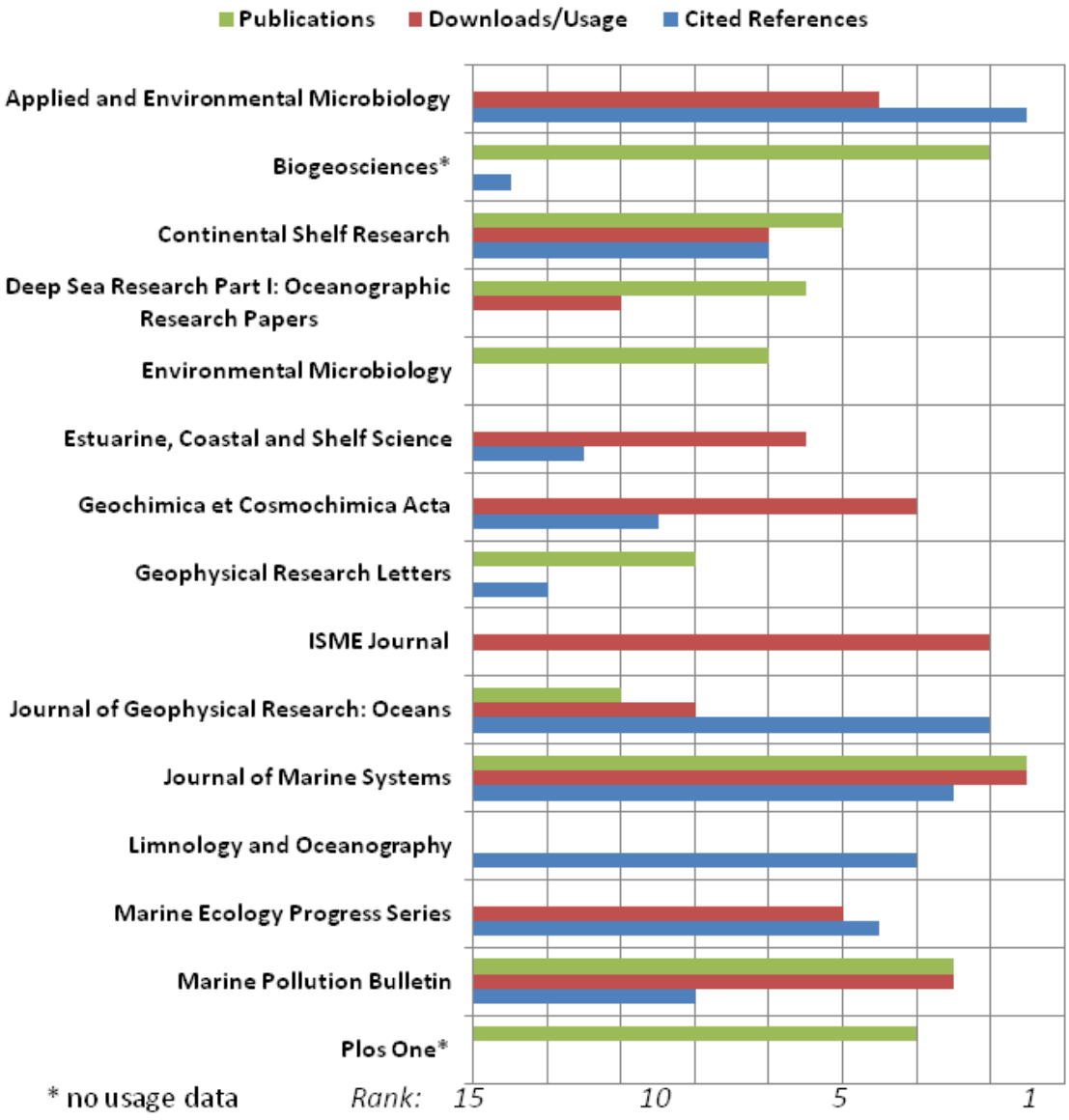
Other Factors in Evaluation
We have described the use of journals by citation analysis and by usage reports. Even though those were quantitative characterizations, this does not necessarily

mean that indicators should be based on measurements; they can also result from qualitative assessments (Kosten, 2016).

- Altmetrics: Scholarly communication is changing and new technologies, like blog posts, blog citations, and social bookmarking are entering the academic world (Tattersall, 2016). Therefore alternative metric source data can be applied to a journal evaluation. We did not examine altmetric sources in our journal evaluation.
- Soft factors: We would describe these as factors to be considered, which can be obtained by a user survey, providing useful information. Although it is an important factor within journal evaluation, we did not conduct a survey for several reasons. It is time consuming, and some discussions about journal evaluation are based on personal preferences.
- Quality: For librarians, it is not easy to assess the quality of scientific journals. The impact factor became a synonym for journal quality and academic prestige. There are many pros and cons. Nevertheless, this indicator became powerful enough to influence researchers' publication patterns in so far as it became one of the most important criteria to select a publication venue (Haustein & Larivière, 2015).
- Content: Furthermore, the journal content is an important factor in analyzing scientific journals. An appropriate way to assess the journal's content is to analyze (1) the author keywords, (2) the noun phrases that appear in titles and (3) the themes of Special Issues (Haustein & Larivière, 2014).
- Access: Access is another fundamental aspect of how we are reformulating the utility and effect of a collection (Horava, 2010). Twenty years after the "Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities" more and more journals are published with open access. Notwithstanding, we note that the majority of scholarly information in marine science is published in subscription based journals by Elsevier, Wiley and Springer.

Summary and Conclusion:
In our journal evaluation we examined the cited references, the downloads and the publications of our scientists. We obtained journal lists and performed a ranking for every list.

Ranking positions of the top 15 journals:



We omit the journals *Science* and *Nature* because these are multidisciplinary journals and we hold these in print. Users can access the archives only, so our usage data are incomplete. Additionally, many researchers cite *Science* and *Nature*, although they may never publish a research article in either.

The differences between the journals are easy to see. Let's have a look at some striking examples.
The *ISME Journal* is frequently used. It is ranked in position 2 in the number of successful full-text downloads, but it isn't among the top 15 cited journals, whereas *Limnology and Oceanography* ranks high among the cited journals but not within the downloads. This shows that considering only one category could be misleading. Therefore we recommend that you consider more than one category in an evaluation process.

The concept of journal evaluation is so multifaceted and therefore complex that it cannot be captured in one single metric (Cheang, Chu, Li, & Lim, 2014). It is important to consider multiple factors and to apply a multidimensional approach (Haustein, 2012). We applied various factors for journal evaluation.

It is essential to preserve the different factors and not to blend them into one composite indicator (Haustein & Larivière, 2014).
The necessity to cut down on journal costs makes journal evaluations more essential (Jasco, 2013). Core marine science journals can be indicated by their relevance and importance. Our journal evaluation was a pilot study. The analysis will be continued in the future to improve local library collection management.

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