A literature for all conservationists, everywhere?

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Forty-five years ago the engineer John Joseph Leeming observed that widening roads to ease traffic congestion encourages the problem it aims to solve (Leeming, 1969). This is induced demand: increased supply drives an increase in demand. Is induced demand also afflicting the peer-reviewed scientific literature? Both in conservation science and science generally there are new, and more voluminous, journals each year. Estimates of annual growth in the number of journals range from 3.5% (Mabe, 2003) to 4.7% (Larsen & von Ins, 2010). In 2010 there were an estimated 24,000 scientific journals (Larsen & von Ins, 2010), and more than 1 million articles are published annually (Björk et al., 2009; Larsen & von Ins, 2010). A recent cartoon (Munroe, 2013) depicted the publication of a new scientific article every 20 seconds. As a single, outstanding example of this trend *PLoS ONE*, launched in 2006, published its 100,000th article 7 years later (Pattinson, 2014).

Although training of more scientists, increases in research funding, growth of universities internationally and emergence of new areas of research—including conservation science—must be contributing to this rise in research output, the main driver of induced demand for journal space may lie elsewhere. Publish or perish is alive and well. Researchers have to publish to secure their careers, and use of publication metrics to measure merit exacerbates demand for pages in higher-scoring journals. The most widely used metric, the Thomson ISI Impact Factor, evaluates a journal by its citation score. Although 'it is one thing to use impact factors to compare journals and quite another to use them to compare authors' (Garfield, 2006), the influence of this metric continues because it provides a convenient, albeit one-dimensional, measure of the multi-dimensional output of a researcher. This is despite its documented failings (Kokko & Sutherland, 1999) and despite the call of The San Francisco Declaration on Research Assessment (2012) for a halt to the practice of using it to assess individuals.

Citation is not all, however. For example, citations to articles in *Oryx* represent only c. 5% of the number of times an article is downloaded. How is this literature otherwise used? In conservation science an article commonly has aims beyond its contribution to scholarship, such as to influence policy-makers and inform conservation practice. It remains unclear how we can best measure the full influence of an individual article—or even to what extent this is important—but new methods for evaluating the impacts of conservation research (Sutherland et al., 2011) may illuminate, or even change, the relationship that researchers have with the conservation literature.

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An increasing proportion of research output is in new, open access journals. During 2000–2009 the mean annual growth of these journals and their articles were 18 and 30%, respectively (Laakso et al., 2011), markedly more than that of journals overall. In contrast to the traditional model, where the reader pays, in open access publishing the author pays—through the article processing charge. Naturally, there is enthusiasm for this amongst readers. Cost aside, open access is also an attractive option for authors as it means greater reach and more citations (Eysenbach, 2006). There are also hybrid journals, such as this one, in which authors may pay the article processing charge for open access in an otherwise subscription journal. For conservation researchers and practitioners who do not have access to institutional libraries, open access articles and journals are a convenient window into the relevant literature, albeit only in part.

Editorial quality and publishing costs, and therefore the article processing charge, are highly variable across publication models and journals. It remains unclear whether market forces will drive down article processing charges and whether funding bodies will in the future provide sufficient support to allow all scientific journals to be fully open access. A recent review of 20 conservation journals found that only c. 5% of the peer-reviewed literature published since 2000 was open access and that an estimated USD 51 million would be required to make it all available via payment of article processing charges (Fuller et al., 2014).

This revolution in scholarly publishing has a dark side (Butler, 2013), however. As authors, rather than subscribers, are the customers, a powerful incentive to maintain quality has been removed (Beall, 2012) and a new industry has been spawned, driven by electronic publishing. On his Scholarly Open Access blog, the librarian Jeffrey Beall maintains a list of 'potential, possible, or probable predatory scholarly open-access publishers' and journals (Beall, 2014a). He provides insights into a murky world of non-existent peer review, hijacked journal titles, unaffiliated editors and fake impact metrics, and monitors the appearance of new open access journals, such as the recently launched, and improbably titled *Integrated Journal of British* (Beall, 2014c). Concern that unwitting, and witting, authors under pressure to publish are being lured, often by spam e-mail, to submit manuscripts to journals that have little, if any, quality control, has prompted recent stings, and subsequent damning revelations (Davis, 2009; Bohannon, 2013)—demonstrating that it is now possible, for a fee, to publish in a supposedly peer-reviewed journal no matter the quality of the research (Colquhoun, 2011). The novel, internet-based tools that can help identify relevant research in the burgeoning literature (Gibney, 2014) do not necessarily shield us from this dark side, with literature search

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engines, including the widely used Google Scholar, 'becoming polluted with junk science' (Beall, 2014b). Reflecting on the dark side, Beall (2012) advises us to look after peer review: 'To compete in a crowded market, legitimate open-access publishers are being forced to promise shorter submission-to-publication times; this weakens the peer-review process, which takes time to do properly'.

What options are available for conservation scientists who do not have funds for publication yet seek to publish under open access—in a legitimate journal? For authors in developed countries the options are currently unclear. For authors in developing countries some open access journals will waive the article processing charge. Waivers, however, are not enough: authors publishing in international conservation journals, whether open access, subscription-based or hybrid, 'remain an elite minority, generally with high-level English language skills and predominantly working in North America, Europe and some of the English-speaking countries of the Southern Hemisphere' (Milner-Gulland et al., 2010). Thus, although conservation researchers and practitioners in developing countries value and use the literature available to them (Gossa et al., 2014), and access to read this literature has improved under open access and the research4life programme (research4life, 2014), access as an author remains problematic. As some of the most pressing conservation concerns and greatest biodiversity lie in the tropical and subtropical regions of developing countries, there is unfortunate irony in this.

Debate about the influence and role of peer-reviewed literature in conservation (Amend et al., 2014) is taking place against a backdrop of dramatic evolution in scientific journal publication. Much discussion has focused on the relationship between published research and conservation practice, and whether new, open access journals will supplant the role of the more traditional society journals despite the respected history of the latter in nurturing the study of conservation science and curating its literature. An equally important matter has yet to be fully discussed, however. Conservation researchers and practitioners working in some of the places most requiring conservation attention are still struggling to reach an international audience with their writing. Surely we need a literature for all conservationists, everywhere, written, read and utilized by researchers and practitioners wherever they may live and work? In the enthusiasm to embrace the increasing volume and openness of the literature, we must not forget that both getting read and getting published need to be equally available, to all.

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