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To be submitted to *Science of the Total Environment*

Comments on “Factors affecting global flow of scientific knowledge in environmental sciences” by Sonne et al. (2020)

Olivier Pourret^{1,*}, Dasapta Erwin Irawan², Jonathan P. Tennant³, Charlotte Wien⁴, Bertil F. Dorch⁵

¹ UniLaSalle, Aghyle, 19 rue Pierre Waguët, 60026 Beauvais cedex, France

² Faculty of Earth Sciences and Technology, Institut Teknologi Bandung, Bandung, Indonesia

³ Institute for Globally Distributed Open Research and Education

⁴ SDU, Faculty of Health, Clinical Department/The University Library of Southern Denmark, Odense, Denmark

⁵ University Library of Southern Denmark, SDU, Denmark

*corresponding author: olivier.pourret@unilasalle.fr

Abstract

There are major challenges that need to be addressed in the world of scholarly communication, especially in the field of environmental studies and in the context of the United Nations Sustainable Development Goals. Recently, Sonne et al. (2020) published an article in *Science of the Total Environment* discussing some of these challenges. However, we feel that many of the arguments misrepresent critical elements of Open Access (OA), Plan S, and broader issues in scholarly publishing. In our response, we focus on addressing key elements of their discussion on (i) OA and Plan S, as well as (ii) Open Access Predatory Journals (OAPJ). The authors describe OA and Plan S as restricting author choice, especially through the payment of article-processing charges. The reality is that ‘green OA’ self-archiving options alleviate virtually all of the risks they mention, and are even the preferred ‘routes’ to OA as stated by both institutional and national policies in Denmark. In alignment with this, Plan S is also taking a progressive stance on reforming research evaluation. The assumptions these authors make about OA in the “global south” also largely fail to acknowledge some of the progressive work being done in regions like Indonesia and Latin America. Finally, Sonne et al. (2020) highlight the threat that OAPJs face to our scholarly knowledge production system. While we agree generally that OAPJs are problematic, the authors simultaneously fail to mention many of the excellent initiatives helping to combat this threat (e.g., the Directory of Open Access Journals). We call for researchers to more effectively equip themselves with sufficient knowledge of relevant systems before making public statements about them, in order to prevent misinformation from polluting the debate about the future of scholarly communication.

Introduction

We agree with Sonne et al. (2020) that there are major challenges that need to be addressed in the world of scholarly communication, especially in the field of environmental studies. However, we feel that many of the arguments fail to account for many critical elements of scholarly publishing systems. In this commentary, we will focus on responding to their discussion on (i) Open Access (OA) and Plan S, as well as (ii) Open Access Predatory Journals (OAPJ). We also note that many of these incorrect arguments were previously published by the same authors as a Nature Correspondence piece (Sonne et al., 2019), which we feel also lacked sufficient understanding of the scholarly publishing ecosystem.

(i) Open Access (OA) and Plan S

Our primary concern is that Sonne et al. (2020) seem to critically misunderstand the diversity of the OA landscape, as well as the guidelines associated with Plan S. Too often OA gets conflated with just one way to achieve it (Tennant et al., 2019): the author-facing Article Processing Charge (APC) business model, whereby authors (or their respective institutions or research funders, on their behalf) pay an APC to cover publishing costs. Yet, there are a number of ‘routes’ to achieve OA. These are usually identified by ‘gold’, ‘bronze’, ‘green’, or ‘diamond’; with the latter two explicitly having no APCs. Green OA refers to author self-archiving of a near-final and peer reviewed version of their work (usually the accepted manuscript or ‘postprint’, prior to any typesetting or copy-editing by the publisher) on a personal website or general-purpose (e.g.,

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EarthArXiv for environmental science) or institutional repository (IR), in parallel with publishing in a subscription journal. Publishing in an IR is usually preferable due to better long-term preservation. Diamond (or sometimes ‘platinum’) OA refers to the free article availability on a journal website without payment of any APCs; costs are usually covered by external means. Gold OA often requires payment of additional APCs for immediate access upon publication (i.e., all APC-based OA is gold OA, but not all gold OA is APC-based). Bronze OA refers to articles made free-to-read on the publisher website, but without any explicit open license (e.g., CC BY), which potentially inhibits their future re-use. Indeed, according to the Directory of Open Access Journals (DOAJ; <https://doaj.org/>), around 71% of fully OA journals do not levy APCs; however, perhaps counter-intuitively, most articles published OA are published in journals with APCs (Crawford, 2018). The highest APCs are typically those leveraged by the large commercial publishing houses (e.g., in palaeontology journals; Tennant and Lomax, 2019), but are not broadly representative of the wider system of scholarly publishing in different research sectors (e.g., in geochemistry; Pourret et al., 2019). Moreover, Indonesia is one of the countries in the “global south” which has more than 1500 OA journals (second rank after UK in DOAJ database), in which most of them are locally published and funded by universities and research institutions. More than 70% of them are APC-free (Irawan et al., 2018). The remaining 30% charge a very low to moderate APC (usually under USD \$350). The 1571 journals listed in the DOAJ, which are mostly publishing English-language articles, is only around one-sixth of the OA Indonesian journals listed in the national database, GARUDA (<http://garuda.ristekdikti.go.id/>). Interestingly, the journals which charge a moderate APC (relative to Indonesia’s income level; an average of US\$ 183 per month in December 2019 [<https://www.ceicdata.com/en/indicator/indonesia/monthly-earnings>]) are mostly the ones that have been indexed by “western” indexing services (e.g., Scopus). However, even

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indexing services such as Scopus have been infiltrated by predatory journals which continue to inflict a number of problems on scholarship systems (e.g., Cortegiani et al., 2019). The regulation of Indonesia's higher education system gives a higher score to articles published in journals listed in Scopus, which are now only 47 journals. Those journals are now considered to be the elite journals in Indonesia. This means that, in the future, we might see the start of a correlation between APC and scientific scoring system in Indonesia, and possibly other countries in SE Asia should they follow suit. Eventually, worldwide, only 27 environmental sciences journals are referenced by DOAJ, among them none are well-respected high impact journals (like *Science of the Total Environment*). Indeed, historically, more traditional journals are now mostly hybrid with APC between US\$1000-5000 and green color in the SHERPA-RoMEO database.

In Denmark, where Sonne and colleagues are based, there is a 'green' Open Access policy (Ministry of Higher Education and Science Denmark, 2018) which has existed since 2016. This policy means that, to the largest possible extent, researchers and their institutes ensure that a peer reviewed copy of a manuscript accepted for publication is uploaded to the appropriate institutional repositories whenever legally and technically possible (i.e., the green route). As such, this does not constrain researchers in their choice of publishing channel, as virtually all journals, including Nature, Science, Cell, and all 'high impact' environmental sciences journals allow this or even deposit articles automatically after an embargo period, often on behalf of authors in repositories like PubMed Central (e.g., *Proceedings of the National Academy of Sciences*). At the moment, approximately 45 percent of the Danish annual research production is being uploaded into the universities' repositories (<https://www.oaindikator.dk/en/>). Furthermore, some research libraries in Denmark have allocated specific funds for paying of APCs, albeit requiring that the

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corresponding manuscripts are made available through institutional repositories as well, in order to count as green Open Access in the sense of the national policy. We feel that both the national and institutional policies in Denmark (e.g., <https://medarbejdere.au.dk/en/open-access/open-access-policy/>) are sufficient in addressing most of the issues that Sonne et al. (2020) raise, as they allow authors to continue publishing in ‘high impact’ journals while also publishing OA in parallel at no cost to them (besides that of the time spent uploading a copy of their work to a relevant repository). Even *Science of the Total Environment* is a ‘Green’ journal according to SHERPA/RoMEO (<http://sherpa.ac.uk/romeo/search.php?issn=0048-9697>). This means that authors can freely available upload a copy of their preprint whenever they wish, or of their postprint to their personal website upon article acceptance; in theory, the entire journal could potentially be made OA at zero cost to authors if all of them made efforts to follow the self-archiving policies. Now, more two months after being published online, we can find no trace of Sonne et al. (2020) in relevant repositories or using Unpaywall or the CORE Discovery plugin in accordance with this policy.

In the context of the rapid evolution of scientific publishing models, it seems necessary to draw attention to the situation of hybrid journals, which include the majority of traditional historical journals from major publishers. Plan S (<https://www.coalition-s.org/>) recommends supporting fully open access publications and, therefore, excludes hybrid journals. It formally discourages researchers and institutions from having to pay additional fees in a subscription-based journal and specifically does not support a model that introduces ‘double-dipping’. As recalled by Pourret et al. (2019), it is indeed possible to publish in a hybrid journal, such as *Science of the Total Environment*, without paying an APC and to disseminate any manuscript in open archives in a

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repository. On the website of the journal, the article will be accessible only to subscribers, and it will be accessible to all on the open archive (the green route).

Regarding Plan S, there are a number of statements made by Sonne et al. (2020) that require clarification. First of all, the Wellcome Trust is based in London in the UK not in Seattle, USA. Coalition S are also behind Plan S, representing an initial consortium of thirteen national research funders from Europe. The authors fall into the easy trap of conflating Plan S and OA with an APC-only model, implying that they will only be able to publish in low-ranked journals. Such a statement or proposal has never been made public or implied by any of those behind Plan S, and yet remains one of its most common and unfounded misconceptions, as we have detailed above. Indeed, through Plan S there are currently nine different routes for authors to achieve compliance (Bosman and Kramer, 2019), only some of which have author-facing costs. The funders behind Plan S will allocate additional funding to researchers to cover associated costs from APCs, and there should be no increased financial burden on authors. If authors are not funded by Coalition S, then they have nothing to worry about as they will not be forced to comply with a policy that does not concern them. If anything, we should be concerned that Plan S seems to be directly financially biased towards covering APCs, based on ongoing trends around “transformative agreements”, rather than the other potentially more sustainable and fair methods of achieving OA, as we have briefly discussed.

Part of Plan S also involves reforming the evaluation system, particularly by encouraging the wider adoption of the San Francisco Declaration On Research Assessment and Leiden Manifesto (sfDORA, 2012; de Rijcke, 2014). Neither of these initiatives, or many of the others spearheading the movement towards responsible research evaluation are mentioned, and it does not seem that either of the authors are among the 15,000+ individual signatories of sfDORA. Furthermore, Sonne

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et al. (2020) use statistics to support their arguments incorrectly. There are not 2.5 million OA articles published per year; the STM report 2018 indicates that in total, there are around 3 million articles published per year in English-language STM journals (Johnson et al., 2018). This is not the same thing. The quote of €1-8 billion is also mis-used, and again the STM Report 2018 estimates that the total revenue for the English-language STM market is around \$10 billion per year, as of 2017. There is substantial scope to reinvest these funds, and make dramatic savings to researchers and library budgets, with a system-wide ‘transformative’ flip to OA; something which is slowly and incrementally happening at the present, and particularly in Europe (Schimmer et al., 2015). Many of the ‘negative’ consequences they propose as a result of OA and Plan S are thus incorrect. Virtually each one they mention is already a symptom of the present subscription-dominated system and the pervasive ‘publish or perish’ culture, and the authors do not seem to have grasped a full understanding of the systemic socio-economic problems and injustices that this system has already been imposing for decades now. The authors call for a cross-stakeholder dialogue on the future of scholarly publishing. Yet, such has already been happening, around the world, for around two decades, and even earlier in some cases with the launch of arXiv in 1991. In particular, in Denmark, there has been a strong cross-stakeholder dialogue for some time now at the institutional and national level about the future of scholarly communication, leading, for example, to the development of a national OA policy in 2018, with developments for this dating as far back as 2014.

One other point that Sonne et al. (2020) attempt to address is the impact of OA and Plan S on nations in the ‘global south’; a complex issue also discussed in the response to their article by Hedding (2020). The present subscription-based model already systematically discriminates against researchers, particularly from lower income countries (see Hedding, 2020). We also need

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to look at journal management in general in the southern part of the globe, where most of the journals are OA with no fee for the authors (i.e., follow the ‘diamond’ model; DOAJ). The operation of the journals is largely built upon the scientific community with low- to moderate-sized institutional funding; for example, in Latin America, SE Asia (Van Noorden, 2019). Ironically, researchers from those two regions commonly think that the western OA (with high APC) model is the best in the world, as it is associated with higher ‘prestige’. Most of them also believe that such a model should be applied to their countries, although Suber (2012) and some other international and local OA leaders have continuously mentioned that OA should not be directly associated with the APC model. Indeed, initiatives such as SciELO (<https://scielo.org/>) and REDALYC (<https://www.redalyc.org/>) in Latin America already provide cross-national non-profit infrastructural support to research communities and journals at a large scale, which we believe demonstrate a far superior model of publishing to that which dominates western scholarly discourses. These initiatives recently coalesced around AmeliCA (<http://amelica.org>), which is the Latin American counterpart to Plan S, and in our view far more effective and sustainable in both theory and practice. Even UNESCO have recognised the great value in these initiatives, especially in the context of the Sustainable Development Goals, coalescing in the launch of the Global Alliance of Open Access Scholarly Communication Platforms (GLOALL) in 2019 (<https://en.unesco.org/news/launch-global-alliance-open-access-scholarly-communication-platforms-democratize-knowledge>).

(ii) Open Access Predatory Journals

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Finally, we are also concerned with some of the arguments that Sonne et al. (2020) propose about OAPJs. First of all, we should note that the problems surrounding OAPJs are largely over-emphasised, and especially with respect to the enormous issues that the large commercial publishing houses continue to impose on the scholarly communication system (Tennant et al., 2019). The definitions of ‘predatory’, ‘deceptive’, or ‘questionable’ publishers/journals are often vague, opaque, and confusing, and can also include fully legitimate journals, such as those indexed by PubMed Central. In this sense, Grudniewicz et al. (2019) recently proposed a consensus definition that needs to be shared: “*Predatory journals and publishers are entities that prioritize self-interest at the expense of scholarship and are characterized by false or misleading information, deviation from best editorial and publication practices, a lack of transparency, and/or the use of aggressive and indiscriminate solicitation practices.*” Note that this definition was published after the article by Sonne et al. (2020). Eve and Priego (2017) have also queried who is actually harmed by “predatory publishers”, concluding that any real harm is negligible to virtually all stakeholder groups, including researchers. They also stated that “established publishers have a strong motivation to hype claims of predation as damaging to the scholarly and scientific endeavour while noting that, in fact, systems of peer review are themselves already acknowledged as deeply flawed”. As researchers, it is our duty to remain critical of the relative impacts of predatory publishers on different communities, and also to recognise them in the context of wider issues in scholarly publishing and research evaluation.

Publishers have always been in the lucrative business of making money off of researchers, and the largest publishing houses are among the most profitable companies in the world, often at the expense of vast amounts of taxpayer funds. Predatory publishers are no worse in this regard than any other commercial publishing house, except that the scale of their threat is relatively minute at

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the present. However, the problem of predatory publishers can be easily alleviated with a little knowledge and training, and we strongly encourage universities to more widely adopt training programs regarding the ethics of scholarly communication. One simple rule for researchers is that if you do not recognise a journal, invoke some scholarly intellect and act sensibly and do not publish with them. There now exist a number of alternatives to the defamed “Beall’s List”, including Cabell’s Whitelist and Blacklist (commercial), as well as the DOAJ. Web of Science and Scopus also offer whitelists of a sort, and a tool dedicated to this specific problem, Think Check Submit, is freely available for researchers. None of these are mentioned by Sonne et al. (2020). The authors, in their analysis of detection of emails from predatory publishers, seem to do more than a satisfactory job of identifying those with questionable practices, and thus cannot be much of an issue; that is, unless they then were to go on to submit a paper to a journal, knowingly that it was an OAPJ.

The tools and services mentioned above will not stop the ‘pollution’ of the scholarly record. With or without OA journals and OAPJs, there has always been harmful research published in journals. One of the most harmful papers ever published, associating vaccines with autism, was published in the ‘top’ journal, *Science*, retracted finally 12 years after publication, and continues to create major global health problems to this day (Godlee et al., 2011). There is absolutely no evidence to support the assertion that OAPJs lead to a decline in the public trust in science; and indeed, with more open research practices, public trust in science is actually on the rise (Iyengar and Massey, 2019; Harris, 2019). In terms of the ‘fight’ against questionable publishing, many organisations, groups, and individuals have already in part taken on this burden (e.g., COPE, <https://publicationethics.org/>, DOAJ). At an institutional level in Denmark, France and many other countries, it is now commonly a requirement for students at different levels to pass a ‘responsible

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research and integrity' course of some sort, including ethical research conduct, plagiarism, and identification of predatory journals. We do not believe that judges are required to fix this problem, but that training, support, and education can help. If we want to resolve the problem at its source, the solution is easy: require all journals to publish their review reports alongside articles, and thus prove that they operate a rigorous peer review procedure.

Given the major changes currently happening in scholarly publishing, there is a clear imperative here for those behind Plan S, and other OA policies, to be absolutely clear about the different pathways to compliance, and any associated author-facing costs with them. There are many different ways to achieving OA, many of which are both cost- and risk-free for authors, depending on the options available to them. It is our collective responsibility, as members of the international research community, to ensure that we have accurate information and understanding of the scholarly publishing landscape, and communicate this wisely and carefully. We feel that graduate schools and training programs have a greater responsibility to uphold here, by training researchers as early as possible on ethical and responsible research conduct, including elements of scholarly publishing and communication. This statement by Sonne et al. (2020) is not the only one of its kind to recently make erroneous statements about Open Access and scholarly communication. We are deeply concerned that such arguments are being allowed to make their way into the published scholarly record within reputable journals like *Science of the Total Environment*, and compromise progress towards an OA future. Especially in the context of environmental science, where there has never been a greater imperative for accurate information and practices regarding open science than now, particularly in the context of the United Nations Sustainable Development Goals (<https://sustainabledevelopment.un.org/>), where the environment features prominently.

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CRedit authorship contribution statement

Olivier Pourret, Dasapta Erwin Irawan, Jonathan P. Tennant: Conceptualization, Writing - original draft, Writing - review & editing. Charlotte Wien and Bertil F. Dorch: Writing - review & editing.

Declaration of competing interest

Charlotte Wien and Bertil F. Dorch were formally involved in implementing the Danish national strategy during 2014-2018. No other potential conflicts of interest are reported by the authors.

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