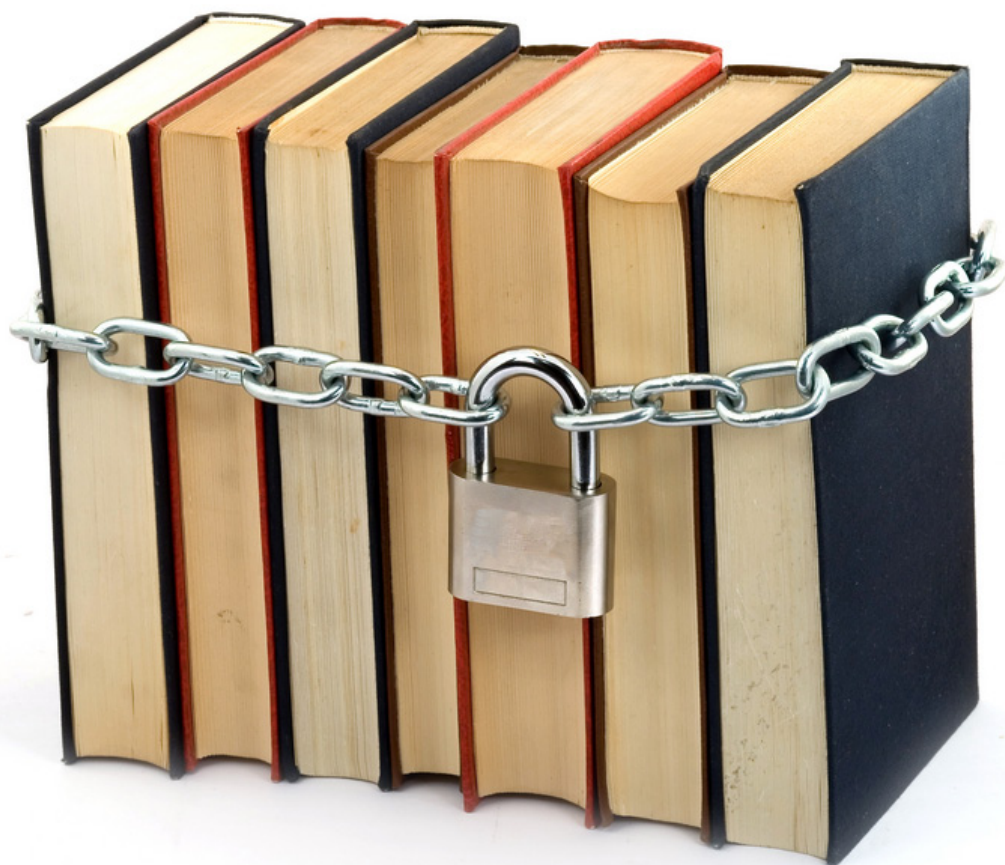




Consumption of Scientific Information and the Open Access publishing debate



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About the Institution of Environmental Sciences (IES):

The IES is a visionary organisation leading debate, dissemination and promotion of environmental science and sustainability. We promote an evidence-based approach to decision and policy making.

We are devoted to championing the crucial role of environmental science in ensuring the well-being of humanity now and in the future.

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Executive summary

The Issue: The UK Government has recently backed The Wellcome Trust – the largest non-governmental funder of medical research – in their decision to make all of the research that it funds widely available in the public domain. Open access publishing, where articles are made freely available as soon as they are published, provides an alternative model whose popularity over traditional subscription publishing is growing.

The publishing landscape: For over 350 years the communication of research findings, through the medium of scientific publishing, has been at the heart of scientific enterprise. Scientific publications have enabled researchers to use targeted research to achieve scientific progress through building on the work of others, contributing additional ideas and observations and developing new questions and theories. Currently there are three methods by which scientific information is accessed:

1. *Traditional Subscription publications*
2. *Open access publications*
3. *(Institutional) Repositories.*

The Report: This report documents how frequently and by what medium environmental scientists access scientific information. It evaluates IES members' opinions of open access publishing in order to establish whether this issue has made an impact on the membership as a whole. IES members are specialists and professionals that come from all areas of the environment sector, wherever jobs are underpinned by sound science.

Method: In order to establish opinions on open accessing publishing models IES members were encouraged to complete a survey that gathered responses in spring 2012.

Profile of participants: The largest profession represented by respondents was consultancy. The sector that was best represented in the results was air quality management (20% of respondents). 28% of respondents worked in academia or were currently still studying. This may impact the results of questions around access to and frequency of use of journals, as academics and students have greater access to journals and are therefore likely to use a greater number of journals more frequently than those in other sectors.

How and why environmental scientists access scientific information

Key Finding: 50% of respondents access journals for personal or general interest suggesting that members read scientific literature outside of their employment field for interest.

The primary ways that members accessed scientific information are through online journal material, seminars/conferences/lectures, websites and printed journals. Predominantly, members accessed scientific information for research (73%) and/or to keep up with current trends (71%).

Frequency of journal use

Key Finding: The majority of members use journals on a regular basis. Most members had used between one and 10 journals in the last month (74% of respondents fall in these categories).

When considering all respondents, most members access journals on at least a monthly basis. This frequency shifts when student members are excluded as fewer members fall into the 'daily' and 'weekly' frequency categories. Similarly, the number of journals accessed by respondents in the past month is lower when students are excluded. 75% of respondents use specialist journals, general scientific journals and professional body journals were the next most-accessed at 60% each. It can be assumed from these figures that most IES members are familiar with journals as portals for scientific information.

Journal access

Key Finding: Members' preferred method for accessing journal content is online: through general sources such as Google Scholar (65%) and through specific websites such as online research databases (58%); followed by print form (35%).

Predominantly, it is the employers or universities who pay for members' access to journal content (69%), although a significant proportion of members also personally pay for content (30%). Despite a small proportion of members accessing journal content in print form, a significant majority use online sources indicating that a shift to open access would not drastically change the way that members access content.

Journal subscriptions

Key Finding: Financial considerations are cited as the primary cause of subscription lapses (59% of respondents) and also the reasons preventing other members from taking out subscriptions to journals in the first place (51% of respondents).

The majority of members (51%) do not subscribe to any journals. Of those members that do subscribe, the largest proportion have subscribed to journals for six years or longer. Where members have allowed subscriptions to lapse, the primary reason given was cost (59%). Similarly, for those members who have never subscribed to journals, the primary reasons given were 'financial costs' (51%) and 'Availability of material through work or university' (58%).

Journal follow up

Key Finding: While the majority of members are satisfied, 34% would appreciate the provision of online forums or comment boards to enable further discussion.

The primary ways in which members follow up after accessing journal content are through further research or discussion with friends/colleagues. The majority of members (44%) are satisfied with the opportunities they have for discussing journal articles.

Open Access journals

Key Finding: 49% of respondents consider the effect of restricting content on scientific progress to be 'severe' or 'bad'.

Most respondents were either unsure whether or not they had used an open access journal or did not think that they had. When asked why they considered open access journals to be different from traditional subscription journals, more respondents felt that open access journals were 'better' or 'much better' than felt they were 'worse' or 'much worse'. The mixed messages in these results suggest that members are still unsure about the nature of open access publishing. For example, of the 39 'open access' journals listed by name that members access, 14 were not open access publications. Given that most respondents had no opinion as to whether open access journals were the same, better or worse than traditional subscription journals it was surprising that the majority of respondents answered 'yes' when questioned on whether they would like more journals to be open access.

This suggests that the theory of open access publishing is more attractive to environmental scientists than the reality of it.

Conclusion

The report concludes that a lack of available information about open access publishing and open access journals is hindering uptake of this model among environmental scientists. Positive opinions about the theory of open access publishing does not seem to translate to motivation to be involved with open access publishing or increased likelihood of using these sources with 'scientific quality and integrity' of journal content being cited as a concern.

Introduction

The IES has produced this report in response to the recent UK Government backing of the Wellcome Trust's decision to make all the research it funds widely available in the public domain. This brings the Wellcome Trust into line with organisations such as JISC, whose work rests on the principle that “publicly-funded research should be available to the public” (Beddoes *et al.*, 2012). Currently three publishing companies – Elsevier, Springer and Wiley – own most of the world's 20,000 academic journals and account for approximately 42% of all journal articles published. Subscription fees to journals, as well as their online versions, have risen by over 200 per cent in the last decade (Wellcome Trust, 2004).

The purpose of this report is to establish how environmental scientists access scientific information and to gauge opinion on the matter of open access and the future of academic publishing. For the purpose of this report we are defining ‘open access’ to mean that “user groups are able to read, download and print a scholarly article without additional cash payment by them or their institution” (RIN, 2011).

The apparent monopoly on scientific information by a few publishing companies has sparked a protest movement within the academic community and moved academics to boycott the aforementioned publishers in favour of publishing through open access journals

Characteristics of subscription publishing

- Primary focus of coverage is scholarly journals and journal articles
- Quality control, with much of the content being peer reviewed prior to publication
- Reader access requires a toll payment by the reader or an intermediary (e.g. research library)
- Authors do not typically pay for publication, although in some areas it is quite common for publishers to levy page or plate charges
- Publisher intellectual property requirements and/or licensing conditions set limitations on access to and use of the content; and
- Online access to a particular publisher's title is typically provided through proprietary access systems and/or access restricted websites.

From Houghton et al. (2009: p7)

Characteristics of open access publishing

- Focus of coverage is primarily scholarly journals and journal articles, although open access book publishing is also emerging
- Quality control, with much of the content being peer reviewed prior to publication
- Toll-free reader access to the online version of journal articles or books to anyone with internet access
- Authors, their funders or supporting institutions may be required to pay publication fees (e.g. in the ‘author pays model’, although they are often not; and
- Less restrictive conditions are placed on use, although practices vary depending on publisher choice – with some publishers demanding copyright while others adopt more flexible licensing alternatives (e.g. creative commons or similar licensing).

From Houghton et al. (2009: p7)

The issue that is currently being debated is how to responsibly and sustainably improve access to research publications for the benefit of all who have a stake or interest in research and its results, whilst not forgoing the quality of that research. Barriers to access, in any guise, and particularly when the research is publicly-funded, are becoming more and more unacceptable in the rapidly-growing online community. Any barriers to access restrict “the innovation, growth and other benefits which can flow from research” (Finch Group, 2012). Currently, in the majority of scientific fields, open access journals are not the primary source of information for researchers. There are, however, a very few fields (such as High Energy Physics) where open access reached 100 per cent.

Where this is the case, the journals in those fields have reported that they can “detect no subscription decline as a result of this open access” (Harnard, S., 2011). At the time of writing, the Directory of Open Access Journals (DOAJ) held 7821 journals in total; 3789 journals searchable at article level, and 809223 articles (DOAJ, 2012). The ten best represented subject areas in the DOAJ were:

1. Health Sciences – 2091 journals
2. Social Sciences – 1615 journals
3. Technology and Engineering – 872 journals
4. Biology and Life Sciences – 704 journals
5. Earth and Environmental Sciences – 557 journals
6. Languages and Literatures – 508 journals
7. Business and Economics – 432 journals
8. Agriculture and Food Sciences – 407 journals
9. Law and Political Science – 319 journals
10. Philosophy and Religion – 277 journals

It is clear from these numbers that open access journals now represent a significant proportion of the journals published globally (Finch Group, 2012).

The purpose of accessing scientific information ranges from conceptual uses, such as raising awareness and increasing knowledge, to more instrumental uses such as changing attitudes and adapting policy, as can be seen in **Figure 1** below. Beddoes et al. (2012) show that the increasing presence of open access journals is likely to extend the ‘conceptual’ end of the spectrum to include an ‘enlighten’ category as more people are likely to engage in non-directed general reading (browsing) as it may “spark new ideas or ways of approaching a particular issue”.



Figure 1: What is research used for? Adapted from Beddoes et al (2012: pp16-17).



Figure 2: Problems associated with barriers to accessing scientific information. Adapted from Beddoes et al. (2012)

The current publishing landscape

For over 350 years the communication of research findings, through the medium of scientific publishing, has been at the heart of scientific enterprise. Scientific publications have enabled researchers to: build on the work of others, scrutinise and refine their results, contribute additional ideas and observations and formulate new questions and theories (Finch Group, 2012).

The internet has transformed this landscape and thus the way that scientific information is accessed and consumed, changing the way that relationships and interactions occur and develop. The publishing landscape has also dramatically changed since the widespread promotion of open access publishing. There are now three main channels for disseminating, publishing and gaining access to research findings:

1) Traditional subscription-based journals–

These hold the major share of the publishing arena at present. They are published by a wide range of organisations, including the larger commercial publishers as well as the not-for-profit publishers, that count amongst their number many learned societies. Many of the commercial publishers offer ‘big deals’ whereby subscribing institutions can access many or all of the journals held by that publisher for a discounted price. But individuals who do not work for larger organisations with substantial research budgets have, at best, very little access to scientific information through this medium.

2) Open access journals–

These models reverse the cost of scientific information, transferring it from the reader to the author. The number of journals that use this model has increased exponentially recently, as will be investigated later in the report.

3) Repositories–

These services do not strictly act as publishers as they neither promote nor disseminate material. Instead, they provide access to, in general, an author’s draft of an article or, sometimes, the final published article after an embargo period has passed. The majority of UK universities have established repositories but the rate of deposition thus far is disappointing. As with the uptake of open access journals, there are certain subject areas, such as physics, where the use of repositories is much more widely spread and they have already become an important tool for the work of these researchers.

The situation for the environmental sciences

For individuals or organisations outside of the Higher Education sector or large research-intensive companies, such as those represented by the breadth of the environmental sciences, i.e. those in public services, in the voluntary sector, in business and the professions, and members of the public at large—the benefits that the online environment is able to provide are yet to be realised. For many organisations, including those involved with the environmental sciences, who have a broad range of interests and therefore for whom traditional subscriptions are not viable, the only way in which they can gain access to quality-assured research publications is to pay a ‘pay-per-view’ fee in order to read a single journal article.

Recent policy developments

The Government recently backed the decision of The Wellcome Trust to ensure that all of the research that it funds is made open access as soon as it is published and commissioned a report, published by The Finch Group, to establish a sustainable future for academic publishing.

“There is an increasing tendency across Government and other bodies, in the UK and elsewhere, to regard the information generated by researchers as a public good; and to promote the reduction, if not the complete removal, of barriers to access... There is also a recognition, however, that existing barriers should not be replaced by new ones; that moves to promote open access must therefore include measures to ensure that the costs can be met; and that the performance and standing of the UK research community should not be put at risk” (Finch Group, 2012: p53).

The Open Access debate

Open access journals are those that grant lawful free access to journal content on the internet with production funded by means other than subscriptions (Schroter and Tite, 2006; European Commission, 2012). It is important to note here that open access publishing is not free (without cost) to produce, it is however free of charge (without price) for readers and users (Suber, P., n.d.).

Open access is becoming a global phenomenon, it is estimated that there are currently over 530 societies globally that publish at least one open access journal (Phelps et al., 2012).

The decision of the Wellcome Trust (one of the world's largest funders of scientific research) to allow all research papers to be shared online has come at a time when 12,410 researchers (at the time of writing) have already signed up to a boycott of journals that restrict free sharing, part of a campaign that has been dubbed the "academic spring" by its supporters (Jha, A., 2012; Neylon, n.d.; Fister, B., 2012).

The reason that open access sources seem to have been so successful, particularly recently, is that they remove the main barriers that many organisations face in accessing scholarly

research i.e. cost and time (Beddoes *et al.*, 2012). Cost is a barrier as many organisations are unable to pay the requisite fees to access scientific information. This was brought into sharp relief in April 2012 when Harvard, the prestigious American university, released a statement explaining they could no longer afford the price hikes imposed by many large journal publishers, which bill the library around \$3.5m a year (Sample, 2012). Time can be a barrier as many organisations must devote additional time to finding relevant, high-quality and peer-reviewed scientific information as they are unable to access it through traditional subscription publishing models. Open access has removed the need for organisations to compromise on services and products because they have limited access to the latest research, it also improves organisational policy and lobbying capabilities as backing up positions with evidence can be achieved under open access where before it was too costly (Beddoes *et al.*, 2012).

Table 1 below explains the two most common open access models that are used currently.

Table 1: Definitions of the two most commonly used open access models. From Open Access (2011), Bell et al. (2012), and RIN (2011).

Green open access model	Individual researchers publish their work in the traditional manner, but self-archive their pre-prints or post-prints in an institutional or subject repository where it will be freely available to anyone with internet access. In some studies the green open access model also includes 'delayed access' where articles are made available online after an embargo period.
Gold open access model	Researchers publish their work directly into an open access journal. They may also archive their pre-prints or post-prints in an institutional or subject repository. Generally, the costs of gold open access publishing are borne by the authors or their employer/funding organisations.

"Belief in the benefits of open access publishing continues to grow demonstrated by a reported 47% growth in open access articles published in 2011 compared to 2010 and 24% growth in the number of journals in the Directory of Open Access Journals"

DOAJ Phelps *et al.*, 2012.

The Finch Report

The Finch Report, published in June 2012, was the product of a year's work by a committed and knowledgeable group of individuals drawn from academia, research funders and publishing. The report was commissioned by the government and was tasked with recommending how to develop a model, which would be both effective and sustainable over time, for expanding access to the published findings of research.

On the back of the findings from The Finch Report the Government has now moved to ensure that all publicly funded research be made freely available by 2014.

The report makes ten recommendations, summarised in **Table 2** below.

Table 2: Recommendations made by The Finch Report (Finch Group, 2012: pp. 7-8)

<p>i. a clear policy direction should be set towards support for publication in open access or hybrid journals, funded by APCs, as the main vehicle for the publication of research, especially when it is publicly funded;</p>	<p>ii. the Research Councils and other public sector bodies funding research in the UK should – following the Wellcome Trust's initiative in this area but recognising the specific natures of different funding streams—establish more effective and flexible arrangements to meet the costs of publishing in open access and hybrid journals;</p>
<p>iii. support for open access publication should be accompanied by policies to minimise restrictions on the rights of use and re-use, especially for non-commercial purposes, and on the ability to use the latest tools and services to organise and manipulate text and other content;</p>	<p>iv. during the period of transition to open access publishing worldwide, in order to maximise access in the HE and health sectors to journals and articles produced by authors in the UK and from across the world that are not accessible on open access terms, funds should be found to extend and rationalise current licences to cover all the institutions in those sectors;</p>
<p>v. the current discussions on how to implement the proposal for walk-in access to the majority of journals to be provided in public libraries across the UK should be pursued with vigour, along with an effective publicity and marketing campaign;</p>	<p>vi. representative bodies for key sectors including central and local Government, voluntary organisations, and businesses, should work together with publishers, learned societies, libraries and others with relevant expertise to consider the terms and costs of licences to provide access to a broad range of relevant content for the benefit of consortia of organisations within their sectors; and how such licences might be funded;</p>
<p>vii. future discussions and negotiations between universities and publishers (including learned societies) on the pricing of big deals and other subscriptions should take into account the financial implications of the shift to publication in open access and hybrid journals, of extensions to licensing, and the resultant changes in revenues provided to publishers;</p>	<p>viii. universities, funders, publishers, and learned societies should continue to work together to promote further experimentation in open access publishing for scholarly monographs;</p>
<p>ix. the infrastructure of subject and institutional repositories should be developed so that they play a valuable role complementary to formal publishing, particularly in providing access to research data and to grey literature, and in digital preservation.</p>	<p>x. funders' limitations on the length of embargo periods, and on any other restrictions on access to content not published on open access terms, should be considered carefully, to avoid undue risk to valuable journals that are not funded in the main by APCs. Rules should be kept under review in the light of the available evidence as to their likely impact on such journals.</p>

Benefits of the traditional subscription model

The main benefits conferred by traditional subscription publishing are those associated with filtering the articles and the brand and impact awareness of the academic community. Currently publishers act as a filter for quality and accuracy both through the selection process and through the peer-review service. There are concerns among the academic community that the proliferation of open access journals could lead to confusion about where best to publish research.

Impact metrics are also a key concern for publishing academics as funding is more widely available for research that is published in 'high-impact' journals. Open access journals will have increasingly more impact as they become more popular but are still some way behind traditional subscription journals.

Case study

“Scientific progress has been very impressive. And even under the subscription model, scientists now have access to more information than ever before. But I accept that in some cases, open access might help speed progress.”

David Hoole–NPG

David Hoole, Marketing Director–Nature Publishing Group



David Hoole has worked in publishing for 20 years, 10 at Nature Publishing Group (NPG). He is currently NPG’s Marketing Director.

Nature Publishing Group is a publisher of high impact scientific and medical information in print and online.

NPG publishes journals, online databases, and services across the life, physical, chemical and applied sciences and clinical medicine.

Currently NPG publishes about 100 titles, with about 20 owned by third-party (academic) societies.

Millions of people use nature.com every year.

Traditional subscription publishing

Most publishers, NPG included, have reacted to the recent publicity surrounding open access journals by introducing hybrid open access options on many of their subscription journals.

The open access debate within the scientific community can be considered a reflection of the wider desire for people to have information for free. The internet has created a culture of access, and Google has helped to push the idea of democratisation of access and open source materials.

In terms of whether the traditional subscription model is better suited to certain types of publication; when a journal has a relatively low number of readers, and a high number of authors, it makes a lot of sense to spread the costs across authors (i.e. in the case of specialist journals). When a journal has a lot more readers than authors, the costs per author would be very high (i.e. for journals such as Nature and Science, with high rejection rates). So introducing an open access business model on high impact journals is not easy. The subscription model makes perfect sense with printed editions requiring posting. It also focuses attention on satisfying readers, rather than authors. So the subscription model might encourage a more reader-oriented product. It also has benefits to the publisher—cash up front and a documented readership, which better supports advertising sales, potentially reducing subscription costs.]

Nature Publishing Group

Over the last decade NPG has seen print subscriptions dropping as online subscription numbers increase. We are reacting to the open access debate similarly to other publishers; we have introduced hybrid options, and launched online-only open access journals. Developing our open access business is our top priority. At the moment it is too early to say what that means for the Nature journals. But our self-archiving policy allows for green open access on all our titles. At NPG, we see our primary purpose as a filter for quality science. NPG and the environmental sciences

The way that NPG, and most subscription publishers, accommodate the fact that some sectors are inter-disciplinary is by offering pay-per-view options and discounted pay-per-view for bulk purchase to provide a financial incentive to those for whom a single subscription is not financially viable.

Our survey of the IES membership showed that members would appreciate the provision of a forum where they could follow up on their reading.

NPG have comment functionality on many articles. They also provide links to Readcube PDFs, which authors can annotate and share.

Benefits of OA

One of the most often cited benefits of open access publishing rather than subscription access is the reduced cost to researchers and organisations. The Wellcome Trust (2004) suggests that making scientific research freely available on the internet could remove up to 30 per cent of publishing costs.

Houghton et al. (2009) suggest that open access publishing could bring “system savings of around £215 million per annum in the UK” (at 2007 levels of publishing activity), of which £165 million would benefit organisations involved in higher education.

“[Open access is] Good for researchers, good for the economy, good for society.”

Chris Bird, Senior Lawyer – Wellcome Trust

The same study suggests that open access publishing alternatives could be achieved “within existing budgetary allocations,” suggesting that publishers’ fears of increased cost are, to a certain extent, unfounded.

“It seems likely that more open access would have substantial net benefits in the longer term and, while net benefits may be lower during a transitional period they are likely to be positive for both open access publishing and self-archiving alternatives (i.e. Gold OA) and for parallel subscription publishing and self-archiving (i.e. Green OA). This suggests that there are gains to be realised from moving towards more open access publishing models and that, despite the lag between the costs and the realisation of benefits, the transition would probably be affordable within current system-wide budgetary allocations.”

Houghton et al., 2009

Open access also fits well with many institutional missions to encourage advancement and dissemination of information more widely with no barriers to access (Phelps et al., 2012).

Open access models have made research available to a much wider range of readers than traditional subscription models. They also allow more equitable access to science for researchers in the developing world (Willinsky, 2003; Schroter & Tite, 2006).

“Over the last 10 years, open access publishing has evolved to become a significant force in the communication of scientific research. As the original and leading open access publisher, BioMed Central has demonstrated that this is a sustainable model for publishing high quality peer reviewed research. This is evidenced by our rapidly growing portfolio of journals and increasing number of publications. The open access movement is gaining momentum and BioMed Central is well placed to cater for the needs of authors, readers, funders and societies.”

Deborah Kahn, Publishing Director – BioMed Central

It has been suggested that making more research available through open access publishing models could accelerate scientific progress. This would be achieved through a greater number of research teams having access to the most relevant information, and through analysis and trending of multiple datasets using data and text mining techniques (Phelps et al., 2012; European Commission, 2012).

An additional benefit for researchers who make their work freely available is that, in every discipline where it has been tested, the practice of making peer-reviewed articles open access has significantly increased their citation rates as well as their download counts (Harnard, 2011; Bell et al., 2012).

This in turn has increased the impact of the research as calculated by standard industry impact calculations (Bell et al., 2012).

Institutionally, open access is a useful tool as creating an open access repository can form “a complete record of the research output of an institution” that is easily accessible, this in turn makes it easier for institutions to manage, measure and assess their research programmes (Open Oasis, 2009).

Recent evidence suggests that making research open access can increase citation rates, in some cases tenfold. Currently over 90% of journals already officially endorse making the author’s draft of a research article open access in some form (Harnard, S., 2011).

Limitations of open access

There are some pitfalls of open access publishing that have been highlighted in recent studies. Primarily, with traditional subscription journals, there are often no costs for authors to publish whereas publishing in open access journals often required a mandatory publication fee, sometimes paid by research funding bodies such as the Wellcome Trust, but often paid for by the authors from their own pockets (Graf, C., 2012).

Another challenge for open access publishing is that the benefits are not widely known or accepted, for example a recent study by Harnard (2011) found that only 15% of authors were “spontaneously making their published articles open access – by making them freely accessible on the web”.

Rationale for the report

The IES has undertaken this report because the open access phenomenon has been given much more prominence in recent months and many funding bodies and institutions are surveying their membership to gauge opinions. The JISC recently commissioned a survey that found that one in three respondents currently access research through open access journals (Beddoes *et al.*, 2012).

“The principle that the results of research that has been publicly funded should be freely accessible in the public domain is a compelling one, and fundamentally unanswerable”

Finch Report (2012).

Individual institutions such as Bucknell University in the US have also become more aware of the issue. In a recent survey of its academic staff Bucknell found that 64% of staff think that changes should be made to scholarly communications in their disciplines. 80% of staff were interested in varying degrees to open access issues and policies (Asher, 2011). What is clear from most of the studies that form the basis of this report is that most respondents consider themselves not to have a clear understanding of the concept of open access, which, once explained, is preferred by a significant proportion of respondents (Beddoes *et al.*, 2012; Asher, 2011; Graf, 2012; Bell *et al.*, 2012)

It is also worth noting that a recent review of open access business models suggested that all open access publishing systems would require a degree of public funding and could never be financially sustained purely on private income alone, the review states that “the factor distinguishing open access business models from subscription or licensing business models is the higher level of benefit from open access in relation to the cost of the taxpayer (Friend, 2011).

Figures 3 and 4 highlight the key findings from Beddoes *et al* (2012), which focuses on the impacts of open access publishing on the voluntary and charitable sector. The results of this study are particularly relevant to the IES as they recognise that the organisations in the study have broad interests across the spectrum of academic work, as does the IES given its diverse membership.

The main reasons that respondents gave for not using scholarly research outputs were cost and uncertainty over where or how to access such research. Similarly, when asked what would help respondents to access research journals, 94% of respondents said that “Having more of it freely available on the internet” would increase the amount of research they accessed. This finding is significant as, increasingly, organisations are looking to base policy decisions on sound science and peer-reviewed research and so significant resources (time, cost or otherwise) must be devoted to trying to access quality research in a cost-effective way.

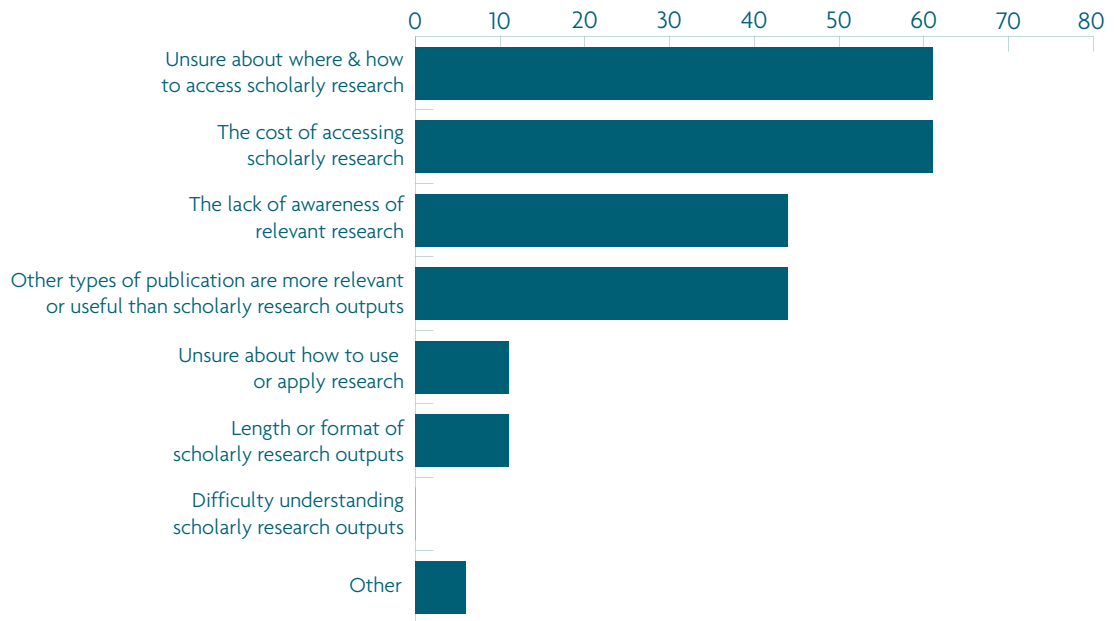


Figure 3: A graph showing why survey respondents do not use scholarly research outputs. (Values do not sum to 100% because respondents were able to make multiple selections). From Beddoes et al (2012: p59).

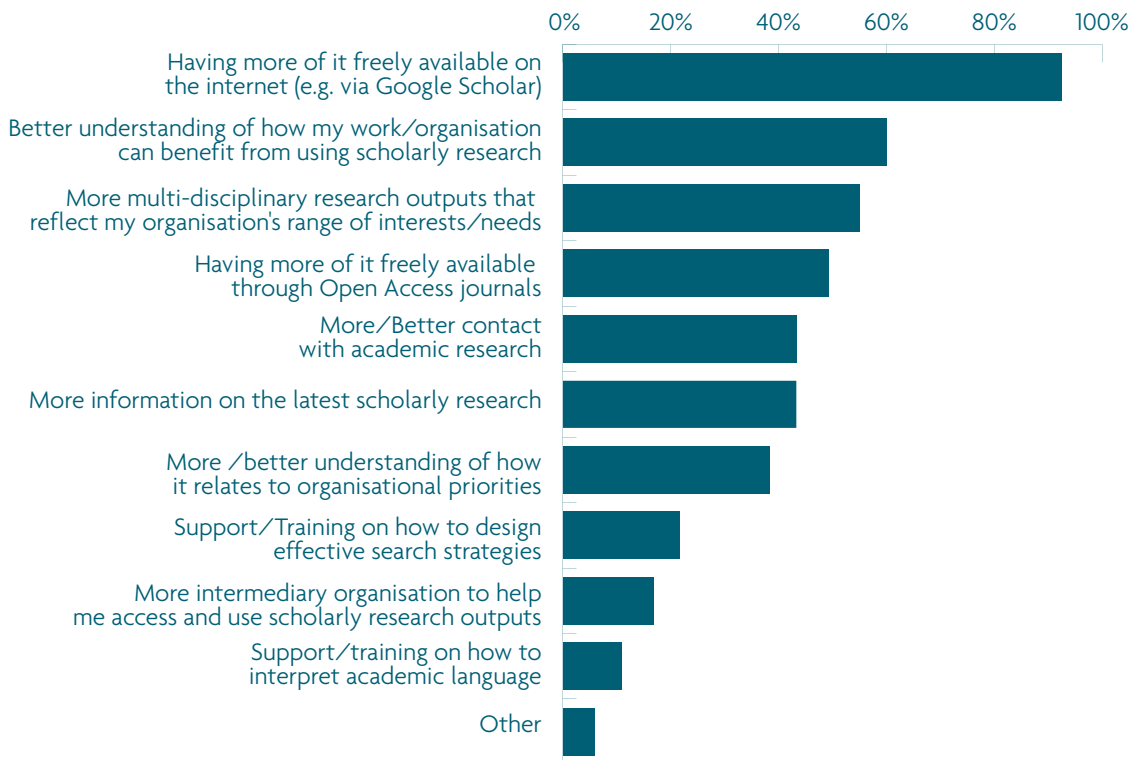


Figure 4: What would help survey respondents to use scholarly research journals. Values do not sum to 100% because respondents were able to make multiple selections. From Beddoes et al (2012: p60).

Methodology

The IES conducted a survey entitled 'Access to Scientific Information' in April and May 2012 using the online survey tool SurveyMonkey. The survey generated both quantitative (e.g. how many members used academic journals) as well as qualitative (e.g. why do you think the IES should / should not restrict access to the latest version of the journal) information on how environmental scientists access scientific information and their views on open access publishing.

The survey was sent out to all IES members on 25th April 2012 and was closed on the 8th May 2012. There were 226 respondents in total.

The main objectives of the survey were to answer the following questions:

- How do environmental scientists consume scientific information?
- Is the way that scientific information is accessed changing in the light of advances in digital media?
- How environmental scientists use and access journals?
- What are current opinions and experiences with open access publishing amongst environmental scientists?

The survey was directly emailed to all subscribing members and featured in the monthly newsletter therefore all IES members were informed of the survey. The main limitation of the survey therefore, was the relatively low response rate which represents only approximately 14% of members.

Profile of participants

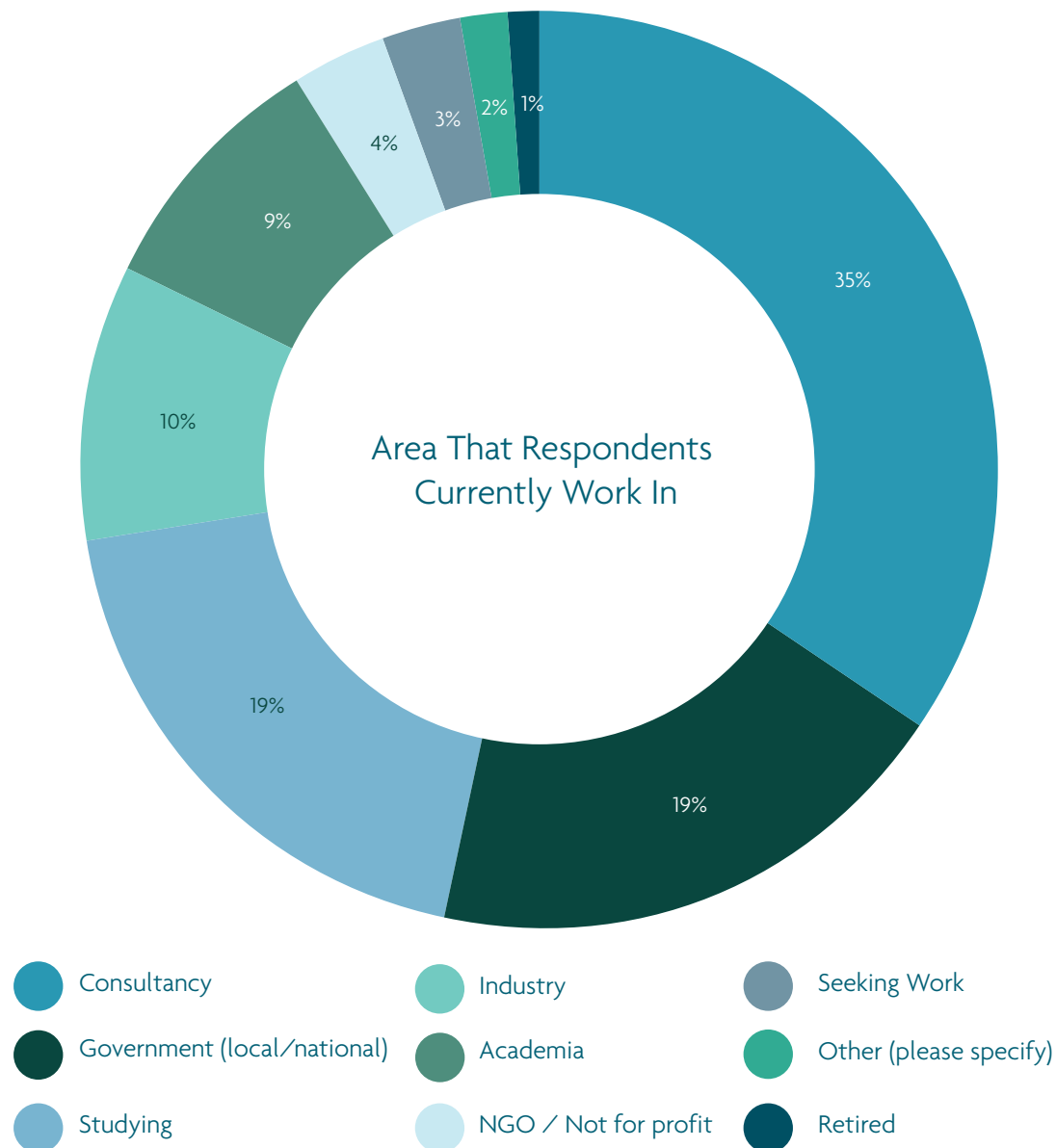


Figure 5: Profile of the area that respondents are currently working in.

Figure 5 shows the breakdown of the areas that respondents are currently working in.

From the data it was determined how many of the respondents are student members of the IES and thus theoretically have very good access to scientific information. Some subsequent results are therefore displayed with and without the student members' answers as the unrestricted access that is provided by many universities could artificially weight the results in favour of increased journal use or availability.

Figure 6 shows the sectors that the respondents work in. Where respondents answered 'other' (28 instances), the most common responses were 'environmental management', 'climate change' and 'waste management', showing that the respondents were surveyed from a large range of backgrounds. This is important as if one category were to be more heavily weighted than others it would not be representative of the breadth of the environmental sciences. Furthermore, employees of certain sectors are expected to record greater journal use and possibly access such as those working in academia.

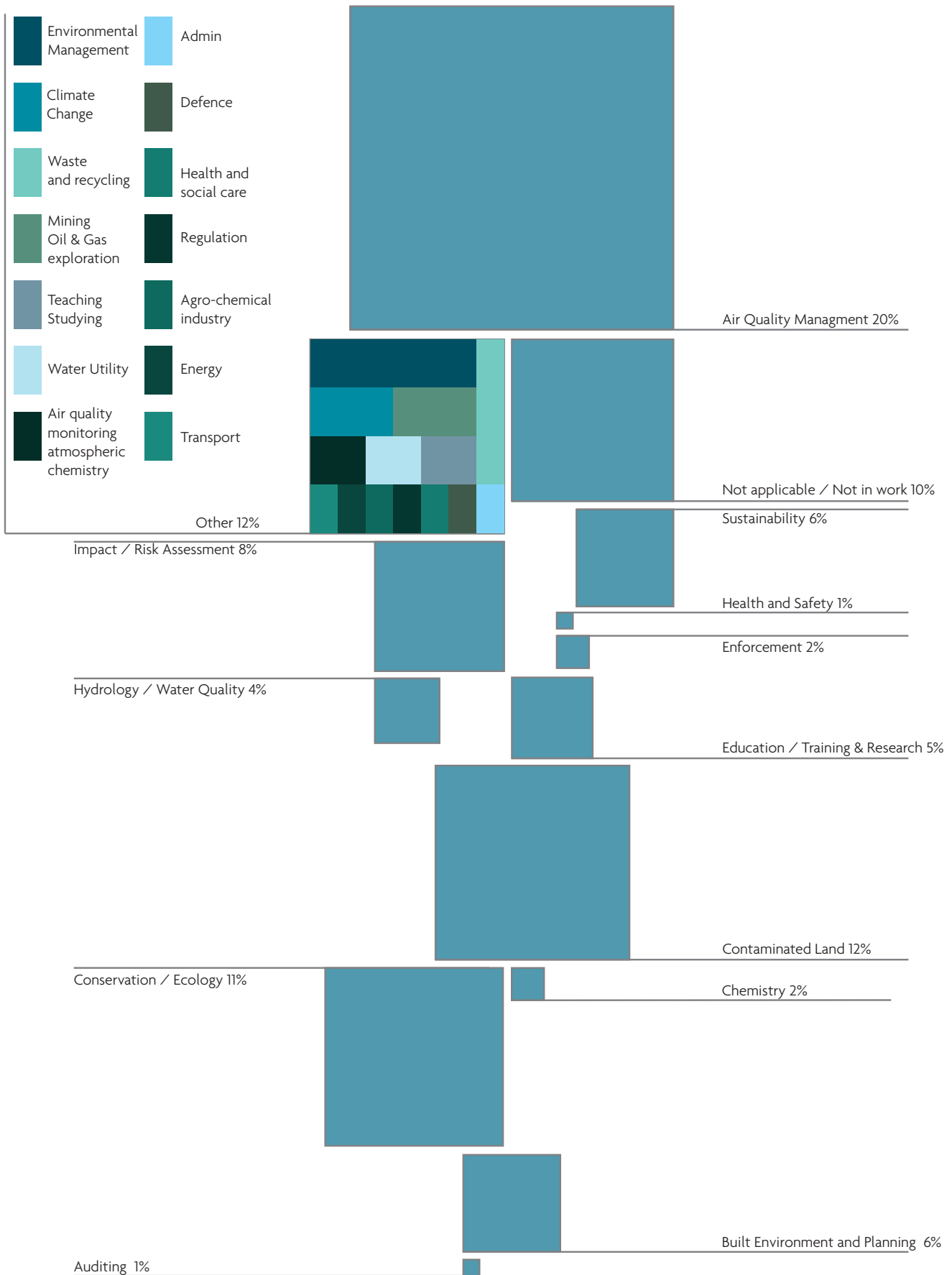


Figure 6: Profile of the sector that the survey respondents work in (including the student members).

The survey sought to establish if respondents' involvement with journals and journal publishing extends to contributing to the process in any way. It could be suggested that, if environmental scientists have a greater involvement in the publishing process, they are more likely to have a greater knowledge of the open access publishing phenomenon and are likely to have greater experience of open access publications.

As can be seen from **Figure 7**, the majority of respondents had no additional involvement in journal publishing. For those respondents that had been involved in publishing in some capacity, this was more frequently with traditional, subscription access journals than with open access journals, with the exception where the respondent had 'acted as an editor'. This activity was marginally more common in open access journals than traditional subscription journals (but not statistically so).

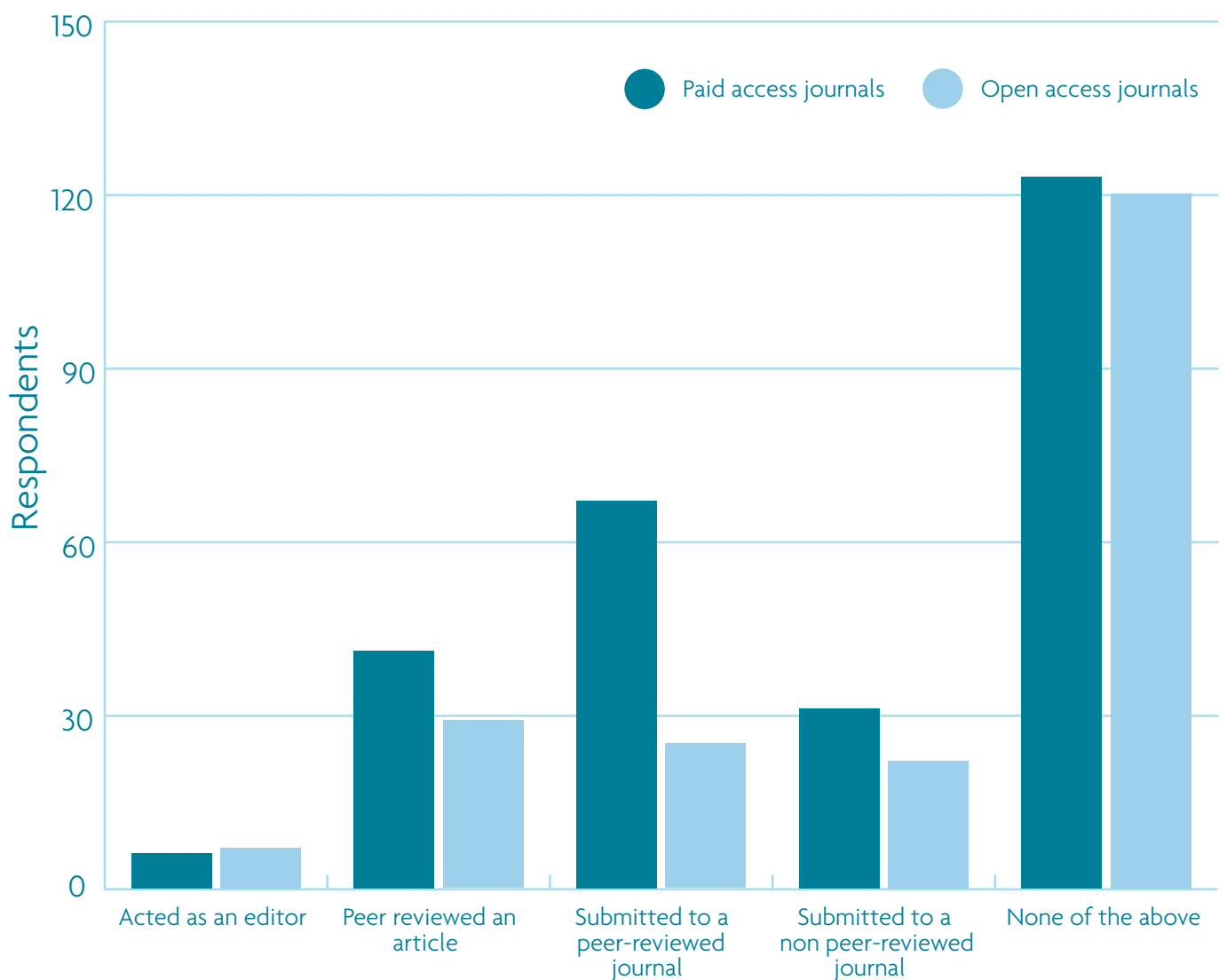


Figure 7: How respondents have been involved with journal editing and publishing (n=220).

Results and discussion

How and why do environmental scientists access scientific information?

Figure 8 shows the ways that the survey respondents access scientific information. Where respondents answered ‘other’ (11 instances), the most common response was ‘bulletins – email and magazine’. One respondent mentioned Twitter, which is in line with recent research noting the increasing importance of social media as a source of scientific information. Eysenbach (2011) states that those articles that are ‘tweeted’ more frequently are 11 times more likely to be highly cited than those that are tweeted less so. He also suggests that the number of times an article is tweeted can predict, within the first three days of publishing, which articles will be highly cited.

“Social media activity either increases citations or reflects the underlying qualities of the article that also predict citations.”

Eysenbach, 2011

The chart shows that, most commonly, respondents use online journal content to access scientific information, although seminars, conferences and lectures are also frequently used, as well as academic and non-academic websites.

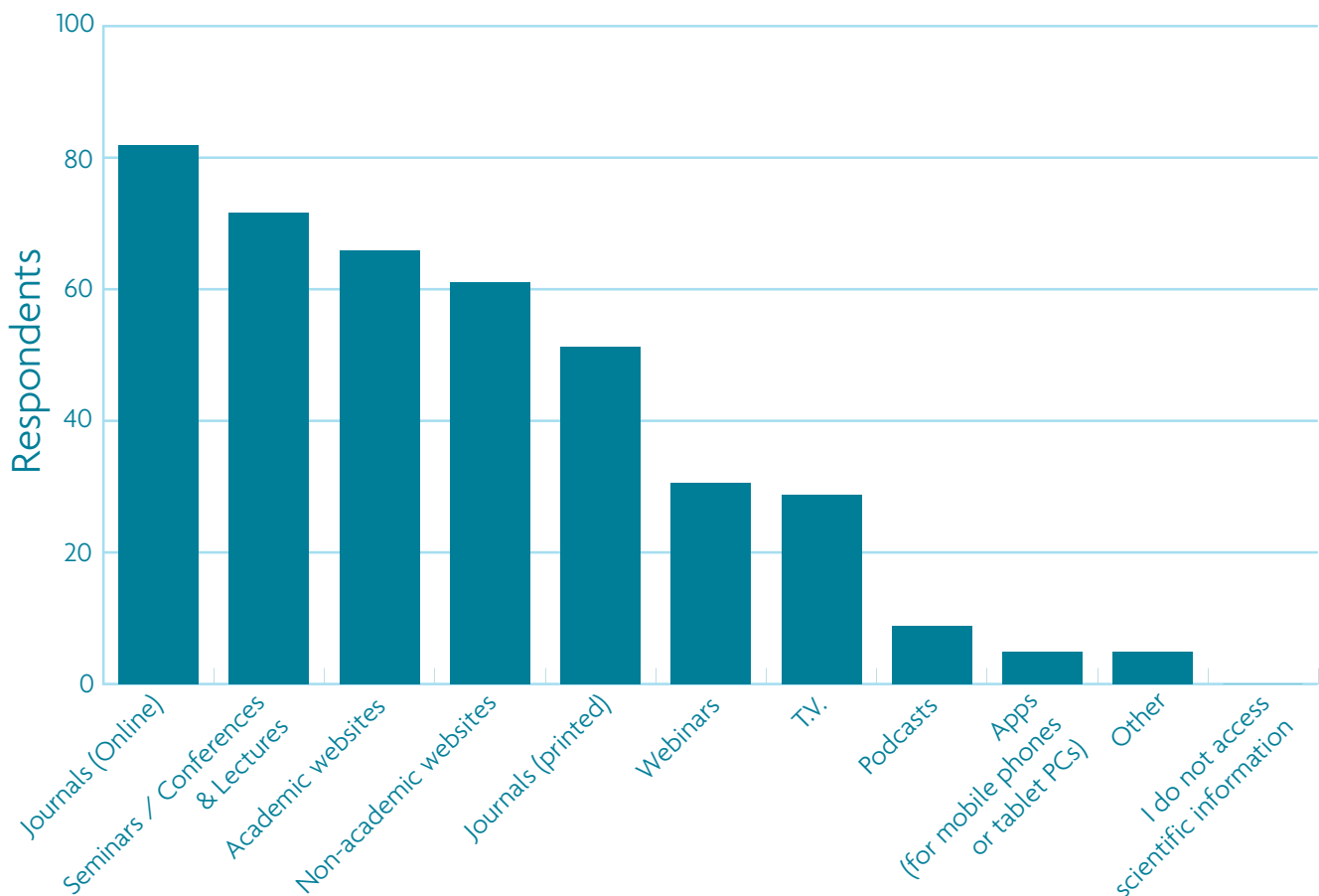


Figure 8: How respondents have been involved with journal editing and publishing (n=220).

Journal access among environmental scientists

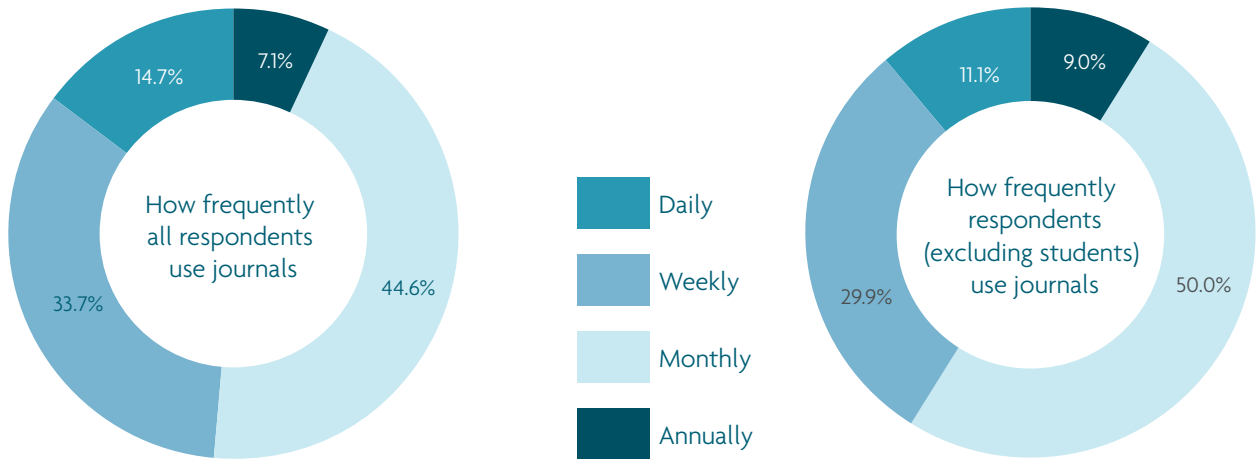


Figure 10: The frequency of journal use among respondents. The graph on the left shows results across all respondents (n=184), the graph on the right shows results excluding student responses

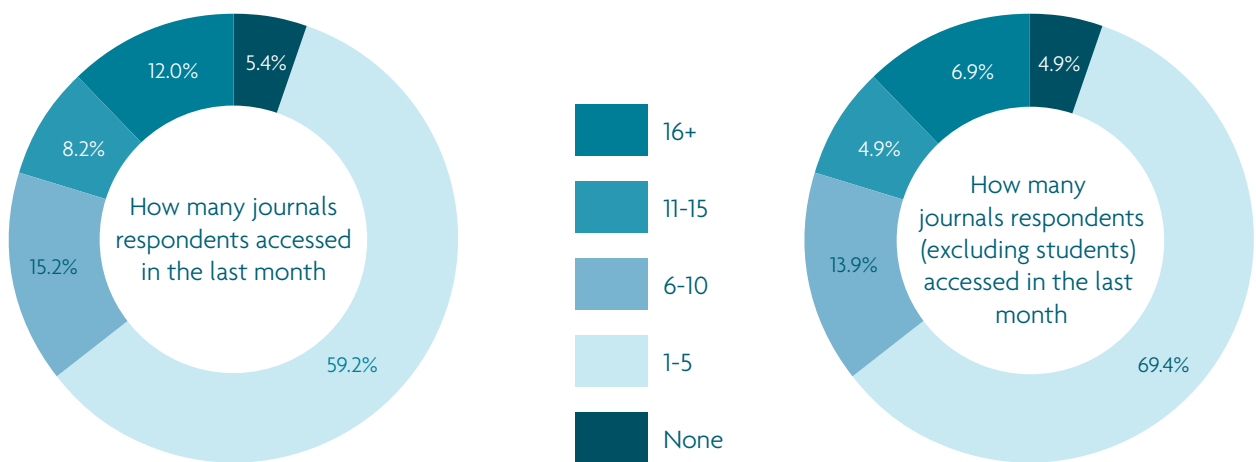


Figure 11: How many journals respondents accessed in the last month. The figure on the left shows results across all respondents (n=184), the figure on the right shows results excluding student respondents.

Figure 10 shows how frequently respondents use journals. As can be seen, the majority of respondents use journals at least monthly, if not more often. This result is exaggerated when the student members are excluded from the results as students, on average, use journals more frequently than other respondents. This is expected as students regularly carry out research.

Figure 11 shows how many journals, on average, were accessed by respondents in the month prior to completing the survey. The graph on the left shows results for all respondents, the graph shows results for respondents excluding students. As can be seen from Figure 11, the proportion of respondents that accessed 16+ journals in the past month decreased significantly when students are excluded from the demographic.



Figure 12: Who finances journal access for IES members (n=183).

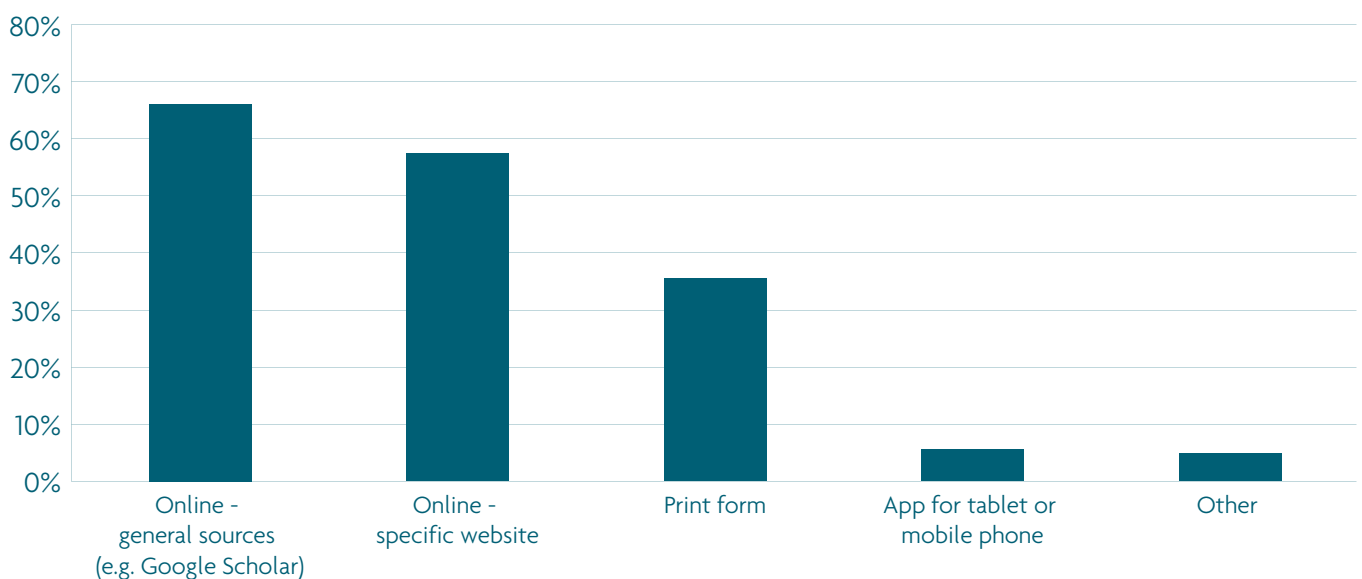


Figure 13: IES members preferred method for accessing journal content (n=183).

As can be seen from **Figure 12**, most commonly it is the employer / university of IES member who pays for journals access. Where respondents answered 'other', the most common response was that the respondent only ever used open access or freely available journal information and thus did not pay.

Figure 13 shows IES members' preferred method for accessing journal content. As can be seen from the graph, the primary method for accessing journal content was online via general sources. Where respondents selected 'other' the primary method given was 'online research databases' such as Web of Science. The number of respondents accessing journal content through an app for a tablet or mobile phone is small however this number is likely to grow as tablet technology achieves greater market penetration

Journal Subscription

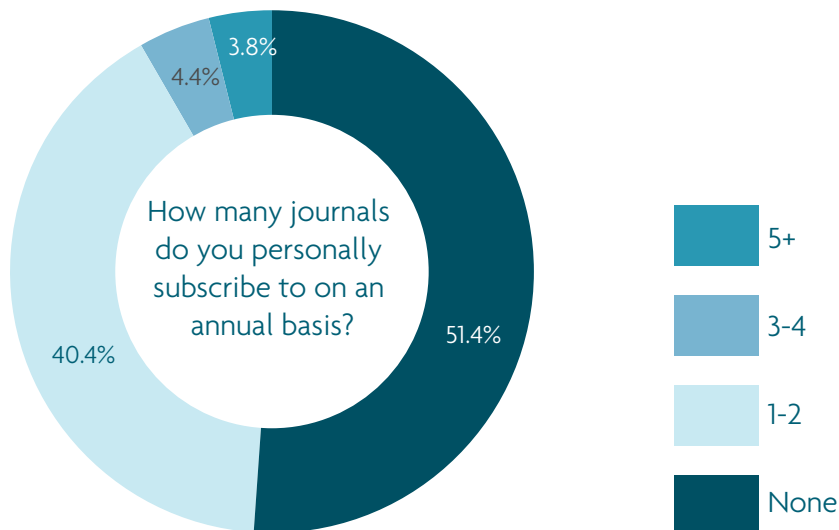


Figure 14: Levels of annual journal subscription among IES members (n=183).

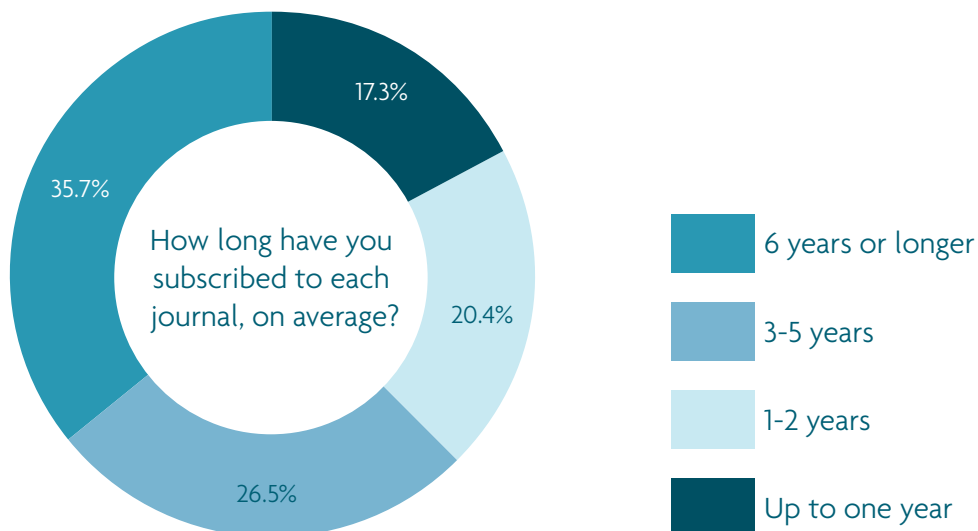


Figure 15: Length of journal subscription among IES members (n=183).

When asked how many journals that were accessed in the last month that members paid for themselves, the majority (65%) of respondents answered 'none'. A third of respondents answered 'one to three'. As can be seen in **Figure 14**, half of respondents do not personally subscribe to any journals on an annual basis and only a small minority of respondents subscribe to three or more journals on an annual basis. This time frame was selected because most journals do not offer subscriptions of less than a year.

Figure 15 shows, for those respondents that do subscribe to a journal, how long they been subscribers for. The results are evenly spaced among the categories, a greater proportion of respondents have subscribed to journals for six years or longer than those who subscribed for lesser amounts of time.

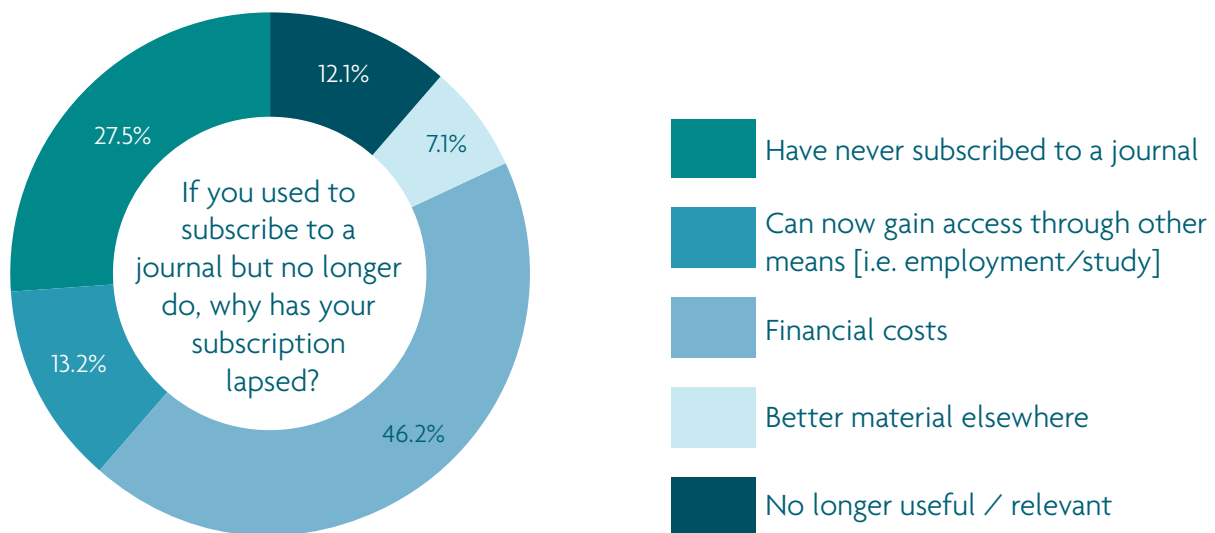


Figure 16: Reasons for journal subscription lapse (n=182).

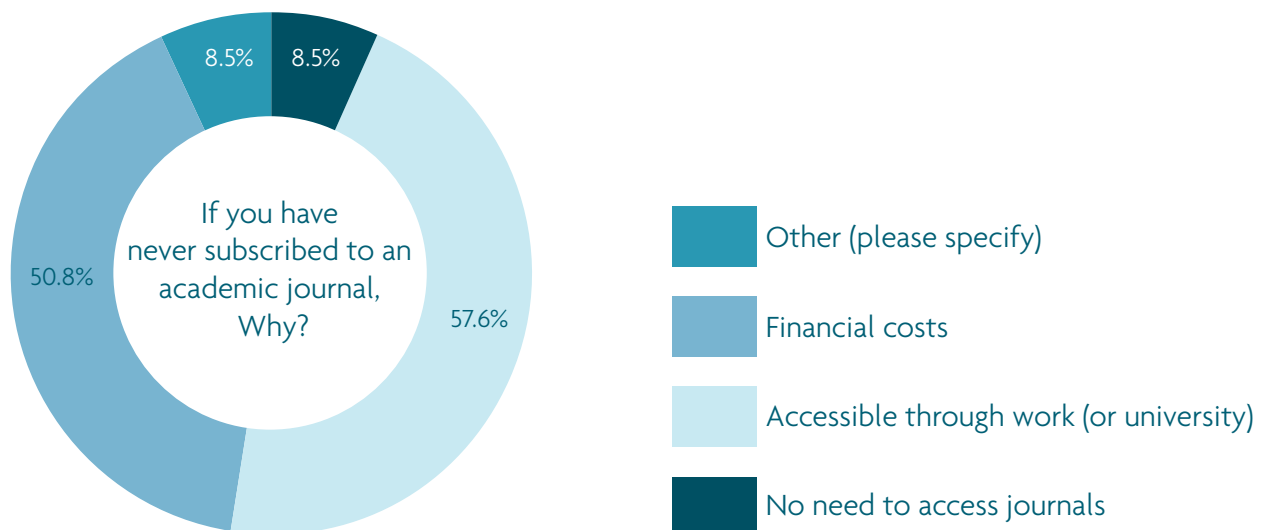


Figure 17: Reasons why members have never subscribed to academic journals (n=59).

Where members previously subscribed to a journal but their subscription has now lapsed, the primary reason for the lapse was financial costs, with 59% of respondents who had previously subscribed to a journal citing cost as the reason why they let their subscription lapse (Figure 16).

For those members who have never subscribed to journal content, the reasons are shown in Figure 17 above. As can be seen from the graph, the primary reasons for not subscribing are financial costs and the availability of access through work or university. In order to minimise the student bias these results were re-evaluated excluding the student members. When student access was excluded from the results, 'financial costs' was the majority response (56% of respondents).

Discussing articles

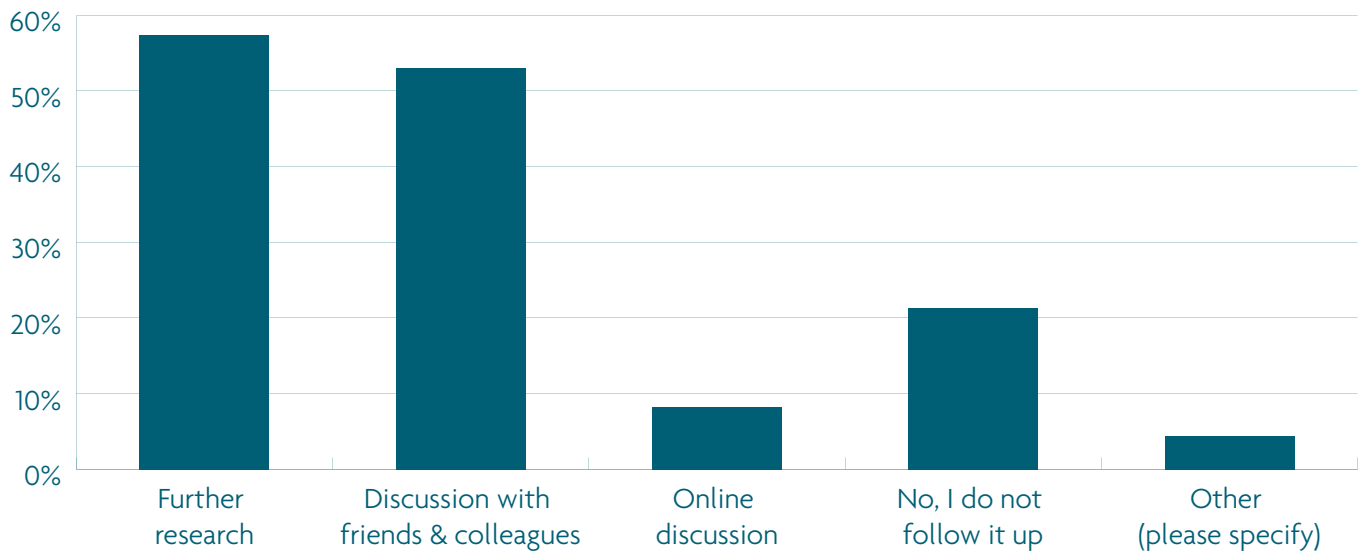


Figure 18: How IES members follow up once accessing journal content (n=183).

Figure 18 above shows how, if at all, IES members follow up after reading journal content. It shows that the majority of members do follow up reading a journal article in some way, predominantly through further research or through discussion with friends or colleagues. When asked whether or not more follow up of the journal material that they accessed would be appreciated, members were predominantly satisfied with the opportunities available to them (see Figure 19).

However, 25 – 34 per cent of members would appreciate some sort of follow up service being made available. With one member commenting “I don’t really have time to talk about journals at the moment, but would enjoy the opportunity to if the right environment was created, it could be very beneficial”.

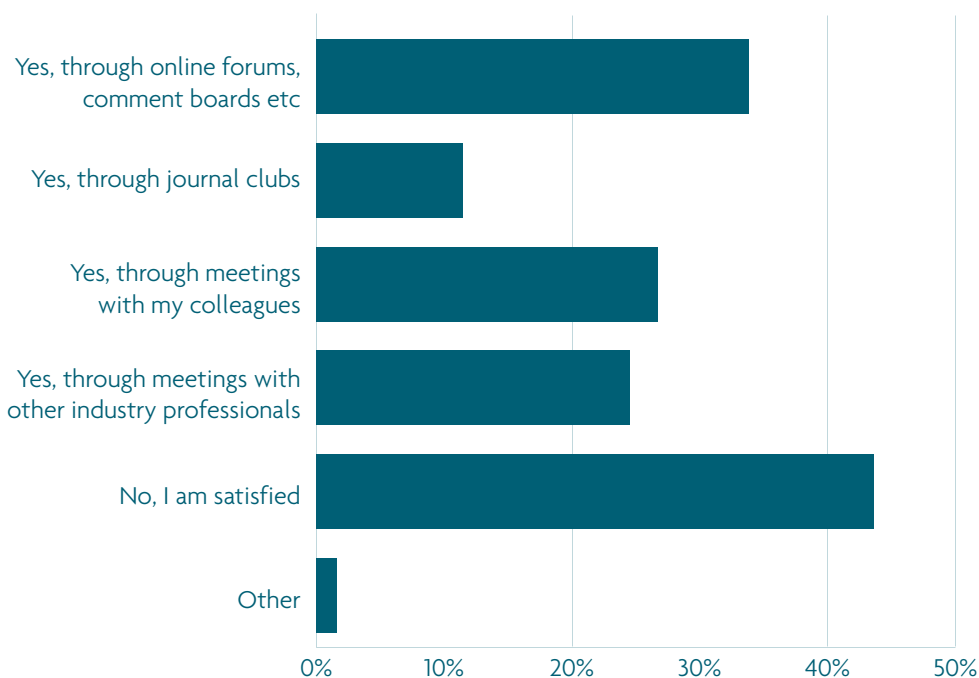


Figure 19: Opportunities for follow up after accessing journal content (n=183).

Open Access journals

The survey showed that the majority of members either had no experience of open access journals or were unsure if they had (see **Figure 20**). This suggests that, despite open access journals increasing in popularity, either they are still not as popular as traditional subscription journals, or it is not made clear that they are open access journals.

Members were asked which open access journals they were most familiar with. Of the 39 journals that were listed by name, 14 were in fact not open access and two were open access for some content only. This would suggest that either members are unclear as to what open access means, or that they are able to access journals through work / university that they were unaware required a subscription.

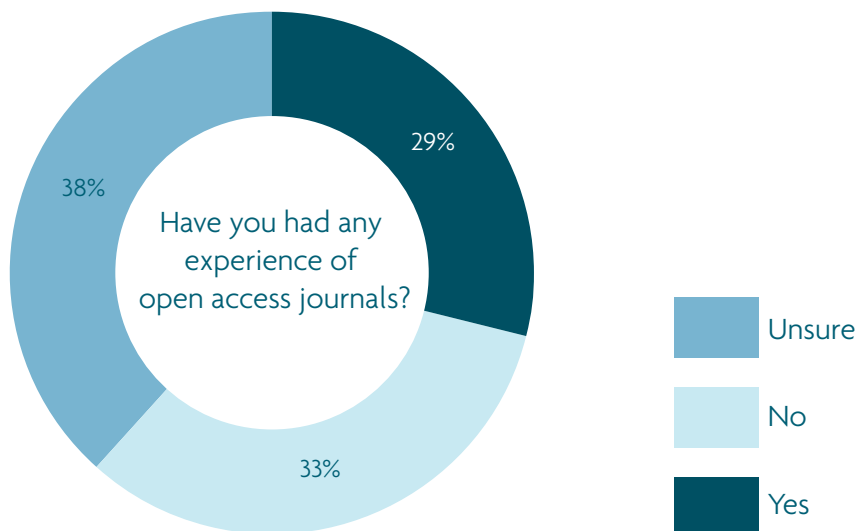
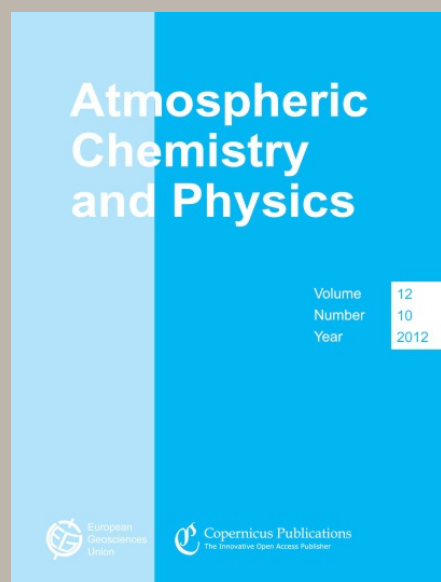


Figure 20: The proportion of members who have experience of open access journals (n=175).

Atmospheric Chemistry and Physics



For those members who did have experience of open access journals, one of the most commonly mentioned ones was **Atmospheric Chemistry and Physics**.

Atmospheric Chemistry and Physics (ACP) is an international scientific journal dedicated to the publication and public discussion of high quality studies investigating the Earth's atmosphere and the underlying chemical and physical processes. It covers the altitude range from the land and ocean surface up to the turbopause, including the troposphere, stratosphere and mesosphere.

the main subject areas comprise atmospheric modelling, field measurements, remote sensing, and laboratory studies of gases, aerosols, clouds and precipitation, isotopes, radiation, dynamics, biosphere interactions, and hydrosphere interactions (for details see Journal Subject Areas). The journal scope is focused on studies with general implications for atmospheric science rather than investigations that are primarily of local or technical interest.

More information can be found on the [ACP website](#)

Table 3: Why open access journals are different from traditional subscription access journals (n=175).

Category	Open access 'better' or 'much better'	Open access journals 'same'	Open access 'worse' or 'much worse'
Accessibility & Availability	"Free dissemination is better for science" "More information available" "Easier access usually means higher-frequency and better use for both professionals and researchers"		"Always easier to have journals in front of you, rather than scrolling through several screens. [Print journals are] not internet dependent"
Quality		Only if they are peer reviewed, then "quality is at a set standard" "I only look at open access journals if they are peer reviewed and part of other research"	"Some are not peer-reviewed" [They are not the same quality] "but they should be the same" "Often [information is] over 2 or 3 years old and research not of same value as not sampled properly" "They are still peer-reviewed, but may be work of less established researchers"
Cost / finances	"Saves university's money" "Cost, ease of access" "Free and accessible to a larger audience" "If you just want to look at one article to see if it is of relevance, you don't want to pay as often it is of no use"		"Poorly financed"
Scientific advancement	"It encourages research and knowledge updates"		
No Opinion / No difference	"Haven't noticed a difference as I don't know what has been paid for and what hasn't" "Never used one as far as I'm aware"		"Have not noticed any discernible differences" "Don't know enough about them"

Members were then asked their opinions of open access journals versus traditional subscription journals.

Where respondents did have an opinion, the majority of respondents felt that open access journals were 'the same' as subscription journals, with more respondents feeling they were 'better' or 'much better' (27 respondents) than felt they were

'worse' or 'much worse' (14 respondents). When asked why, respondents' answers can be divided into five broad categories as laid out in **Table 3** above. Characteristic responses for each of the categories are shown.

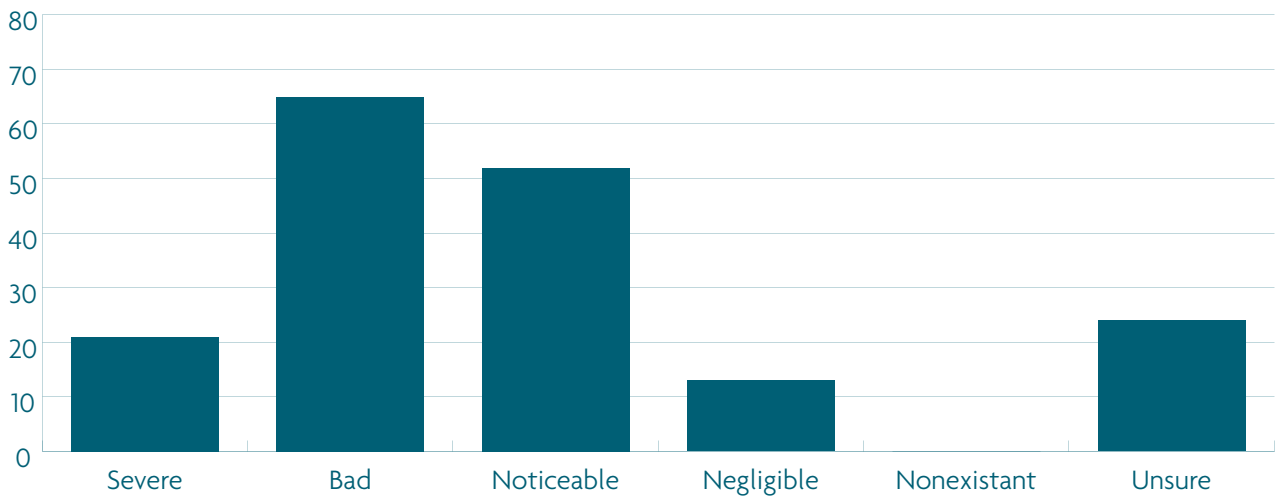


Figure 21: The effect of restricting access to journal content on scientific progress (n=175).

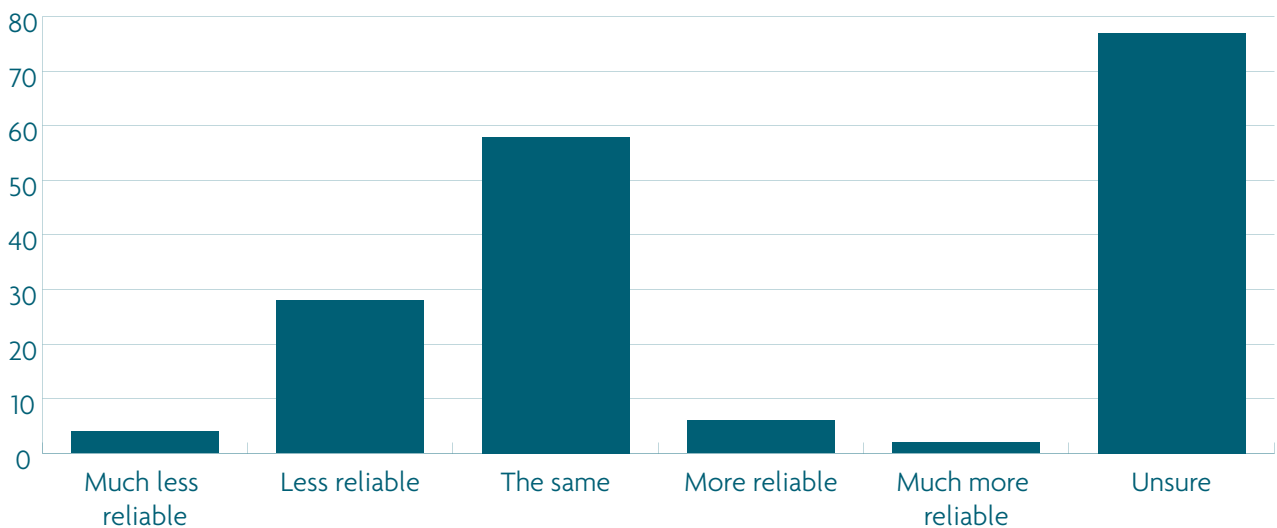


Figure 22: Members opinion of open access journals versus traditional subscription journals in terms of scientific reliability (n=175).

As can be seen from **Figure 22**, the majority of respondents were unsure as to whether open access journals were more or less reliable than traditional subscription journals. Where respondents did have a firm idea they mostly thought that open access journals were the same as traditional subscription journals, although more members think that open access journals are less reliable than think they are more reliable.

Respondents were asked what effect the restriction of content has on scientific progress. As can be seen from **Figure 21**, more respondents believe that restricting content has a negative ('severe' or 'bad') effect than believe that the effects of restricting access are 'negligible' or 'non-existent'. Interestingly, a large number of participants felt that the effects were 'noticeable' but not necessarily enough to consider them to be negative.

Given that most respondents had no opinion of whether open access journals were the same, better or worse when compared to traditional subscription journals; it was surprising that a significant majority of respondents (76 per cent) would like more journals to become open access (Figure 23).

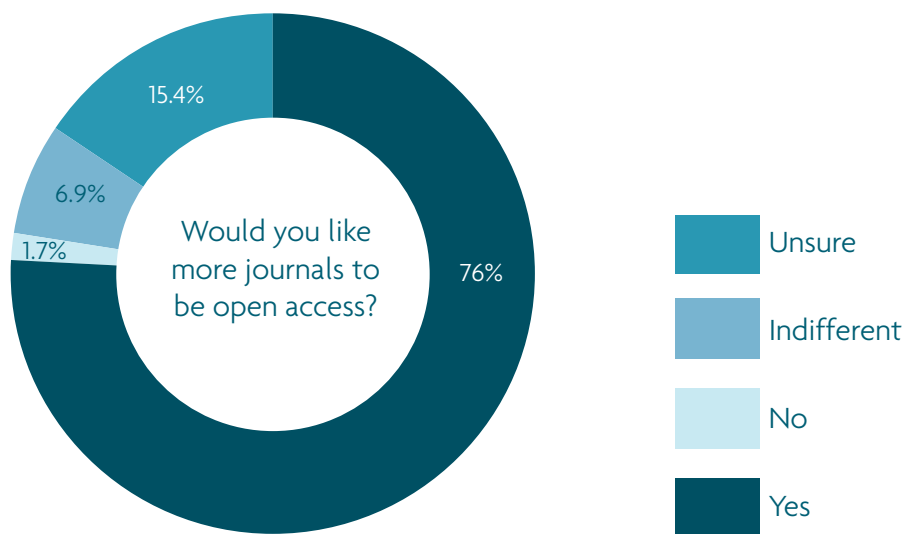


Figure 23: Would members like more journals to be available on an open access publishing scheme (n=175).

When asked why they would like more journals to be open access, most respondents mentioned either greater access to information or cost as their primary reason for wanting more open access journals, particularly where research has been sponsored by publicly-funded institutions. Opinions on quality were divided, some respondents felt that it was difficult “to be assured of the scientific rigour of the content” whereas others thought that increased levels of open access publishing would cause “competition [that] would improve/maintain quality”. One respondent did mention the opportunity cited by Beddoes et al. (2012) for non-directed general browsing stating [I would like more journals to be open access] “because then I would be more inclined to ‘dip’ in and out of all types of journals for pleasure as well as work / projects / assignments, as it would not incur any costs”, thereby opening up the possibility that authors would achieve a much wider readership if their research were made available on an open access publishing model. This finding is incongruous with the fact that more respondents considered open access ‘less reliable’ than considered them ‘the same’ or ‘more reliable’, which suggests that the theory of open access publishing is more highly regarded than how people feel about open access publications in practice.

In order to establish how respondents felt about open access publishing they were asked which words they associated with open access journals from a list and why they associated open access journals with those words. There was no strong consensus among respondents, the most often-selected option was ‘future’ but even that was only selected by 35 per cent of respondents, suggesting that opinion is still divided on open access journals (see Figure 24). Even so, the most commonly selected options tended to be those that held open access journals in a positive light such as ‘progressive’ and ‘popular’ and negative terms are clustered around the lower end of the graph suggesting that open access journals are favourably perceived.

When asked why they associated those particular words with open access journals, some respondents cited “personal experience” of open access journals, whereas other respondents felt their selections were what open access journals “should be”.

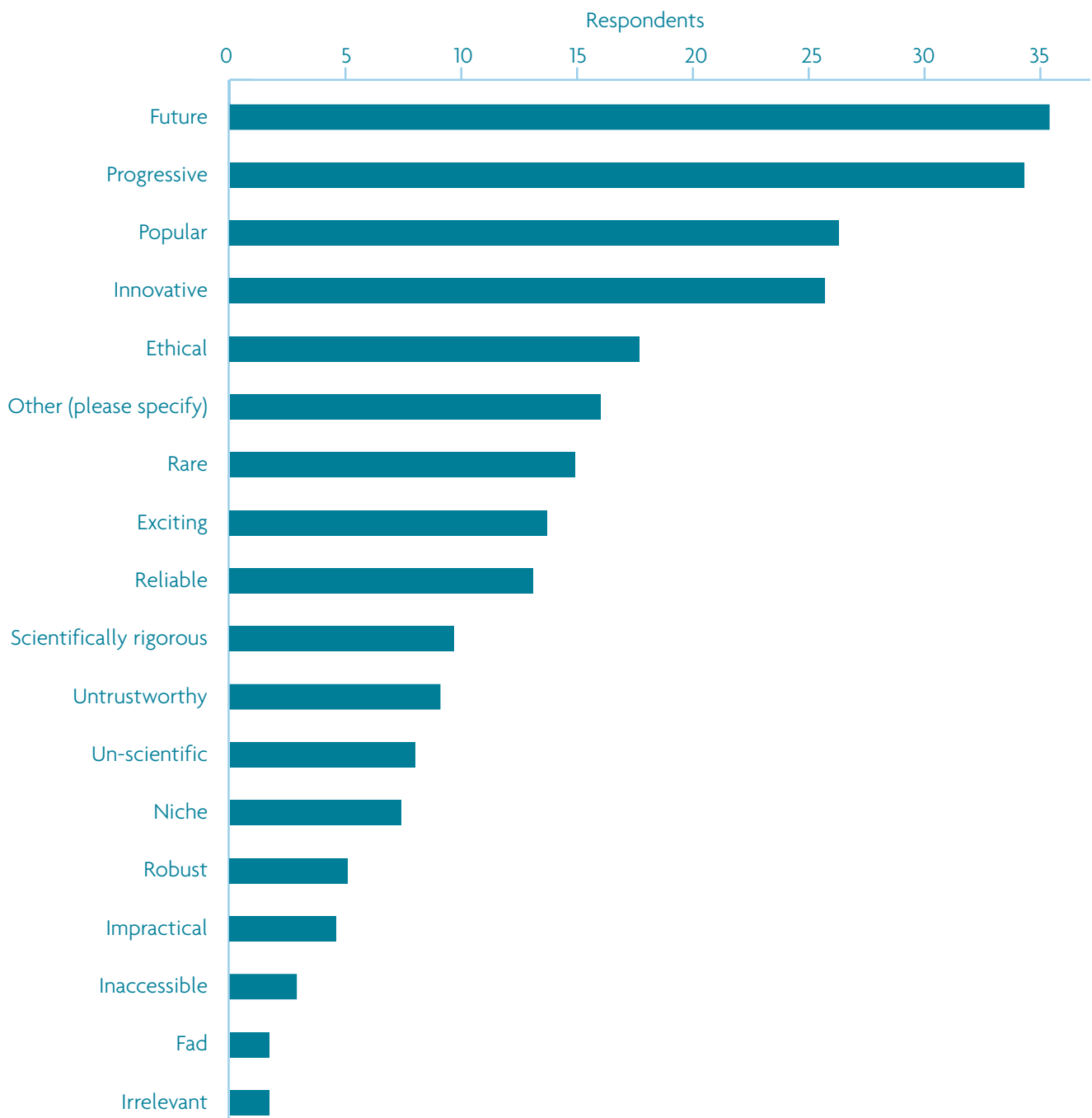


Figure 24: Which words members associate with open access journals (n=175).

For those respondents that chose ‘other’ the responses are listed in **Table 4** below.

Table 4: Which words do respondents associate with open access journals.

Respondents	Answer
8	No experience with open access journals
2	No comment
1	Ease
1	Lower quality
1	Helpful for leads
1	Like everything, you have to use judgement but generally it has huge potential to expand scientific thought and raise new opportunities
1	Lack of cost
1	Accessible
1	Variable
1	I don't. It depends on the journal's editorial policy, not on the class 'open access', any more than print journals would all have the same characteristics
1	Not always fully peer reviewed
1	Libertarian
1	Unreliable
1	They are sometimes more informative than the paid online journals
1	Suitable/helpful in correct context
1	Useful!
1	Equality

Conclusions

Overall, IES members regard the open access publishing model as a positive process and would welcome a shift from traditional subscription publishing to an open access model.

Throughout the survey responses, several repeating themes emerged with regards to members' opinions on open access publishing:

No coherent policy

Despite open access being widely accepted in the academic community, there is little consensus among organisations with regards to requirements for research being made open access. The European Commission (2012) found that several respondents would prefer that “the open access requirement be made mandatory and for its implementation to be monitored through reviews or progress reports”.

While open access is left to authors to implement, it is unlikely to ‘take off’ as the statistics regarding increased citation rates and increased impact are not widely quoted therefore the authors are unaware of the potential benefits of making their work available freely online.

Lack of understanding of open access publishing

Members repeatedly expressed an interest in more information on open access publishing as the information that they did have was not wholly comprehensive. Even though some members claimed to have experience of open access publishing and journals, half of the examples that were given were not open access publications suggesting that understanding of open access publishing is still not complete.

“Navigation is key to making articles not just accessible but useable”

Michael Jubb—Director, Research Information Network

Money matters

Financial cost consistently ranked as a key barrier to accessing scientific information for members it was cited as the reason why some journal subscriptions have lapsed suggesting that if more research were made freely available in an open access model, more members would access more scientific information.

This extends purely beyond just work / research motivations as one respondent commented that they would like more scientific information to be made available in an open access model “because then I would be more inclined to ‘dip’ in and out of all types of journals for pleasure as well as work/projects/ assignments, as it would not incur any costs”.

“Figures from JSTOR suggest that there are 150 million attempts to access material that get turned away by the paywall each year ”

Chris Bird, Senior Lawyer—Wellcome Trust

Principles versus practice

The majority of respondents acknowledge that restriction of access to scientific information has a negative effect on scientific progress and also feel positively about open access publishing in general, but this does not translate to eagerness to be involved with open access publishing or trust in the scientific credentials of open access journals.

Promoting discussion

Some respondents expressed interest in discussing the journal content that they had accessed through an online forum system or something similar but respondents did not have the time to create or search extensively for such a service with one respondent commenting “I don’t really have time to talk about journals at the moment, but would enjoy the opportunity to if the right environment was created, it could be very beneficial”.

The internet is king

Increasingly, members are using a wider range of media-based sources to access scientific information including smartphone apps and social media. This suggests that a move to more open access publishing would not affect how members access journal content as they already predominantly utilise web-based access methods.

Adding Value

“Publishers need to demonstrate that they add value to the research process. This sits alongside their need to deliver a reasonable profit—whether to fund learned society activities or to reduce their publishing charges or, like many suppliers of services and equipment to researchers, to deliver a return to their investors. The perception of publishers as profiteers is strong, and understanding of the value they add is weak. Not noted for their transparency, publishers will have to work hard to develop trust amid a fundamental shift in their customer base.”

Nature Editorial (2012)

Discovering Open Access

Many respondents commented that they would be interested in using open access journals but that they did not know how to go about finding such resources. Services such as the [Directory of Open Access Journals](#) should be advertised more widely so that these journals will be used more widely.

List of open access journals

A selection of Open Access journals from DOAJ, a list of all Earth and Environmental Sciences journals can be found here.

- [Acta Scientiarum: Agronomy](#)
- [Aerul si Apa](#)
- [Air, Soil and Water Research](#)
- [Ambiente e Agua: An Interdisciplinary journal of Applied Science](#)
- [Annals of Environmental Science](#)
- [Applied and Environmental Soil Science](#)
- [Atmosfera](#)
- [Atmospheric Pollution Research](#)
- [Brazilian journal of Aquatic Science and Technology](#)
- [British journal of Environment and Climate Change](#)
- [Ciencia del Suelo](#)
- [Ekoloji](#)
- [EnvironmentAsia](#)
- [Environmental research, Engineering and Management](#)
- [Hidrobiologica](#)
- [Holos Environment](#)
- [International journal of Environmental Research and Public Health](#)
- [International journal of Environmental Sciences](#)
- [International journal of Soil, Sediment and Water](#)
- [Journal of Applied Technology in Environmental Sanitation](#)
- [Journal of Environmental Biology](#)
- [Journal of Urban and Environmental Engineering](#)
- [Journal of Water and Environmental Technology](#)
- [Journal of Water Resource and Protection](#)
- [Open Atmospheric Science Journal](#)
- [Open Environmental Pollution & Toxicology journal](#)
- [Open Hydrology Journal](#)
- [Proenvironment Promediu](#)
- [Sciences Eaux & Territoires: la Revue du IRSTEA](#)
- [Sustainability](#)
- [Water](#)

Views of the IES

The IES believes that the prohibitive cost of accessing scientific information through journals has the potential to limit progress. Whilst some sectors have achieved 100% open access publishing, others still lag behind. A fully open access sector would be an ideal state of affairs for the environmental sciences as well and the IES will endeavour to promote and support this change as the face of publishing changes in the environmental sciences.

We have included a list of peer-reviewed journals and links to the Directory of Open Access journals so that members can investigate what is available in their field. We call on our members and other people in the sector to assure the quality of these journals by being involved in the peer-review or editing process wherever possible.

The IES supports a radical overhaul of the way that access to journals is provided. The inter-disciplinary nature of the environmental sciences means that single-journal subscriptions are of limited use to specialists working in related fields.

The Governments unveiling of plans to make all publicly funded research freely available is an ambitious starting point. To build on it we call on publishers to be more innovative in the way they offer journal subscriptions and access to scientific information.

We recognise that this is a time of transition as scientific opinion shifts and we applaud the moves that some publishers and now the UK Government are making to accommodate open access practices.

We call on other professional bodies to open up their archives to be fully searchable and the IES will endeavour to make our, already open access, archive more searchable and thus more accessible to a wider readership.

The environmental SCIENTIST



In the survey Members showed they were split over the whether the IES should make its journal open access and whether we should publish a tablet version.

As part of the survey, members were asked about the IES journal—the environmental SCIENTIST—and the results from these questions are the focus of this article.

We asked members three questions in relation to the environmental SCIENTIST:

- Do you value having a paper copy of the environmental SCIENTIST?
- Currently the IES restricts access to the most recent version of the journal to its members only, do you think this is the correct thing to do?

The majority of members (60%) said that they do value a paper copy of the environmental SCIENTIST, so the Project Office will continue to distribute these as the journal is published. We will, however, be adding the ability for our members to opt in to receiving an electronic version instead of a paper copy through the soon-to-be-launched membership management area of the website.

When it came to the question of restricting access to the most recent edition of the journal, members were almost equally divided with 49.7% believing that restricted access is the correct thing to do, and 50.3% believing that it is not the correct thing to do. For those that believe restricting access is not the correct thing to do, the reasons centred on the belief that information should be made freely available straight away so that scientific progress is not impeded.

Whereas, those who gave reasons why restricting access is the correct thing to do tended to fall into two brackets: 1) those who believe that restricted access is a benefit of membership; and 2) those who believe that, because the environmental SCIENTIST does not contain primary research, the effects of restricting access for a given amount of time (suggestions ranged from one month to one year) are minimal.

As there was no consensus surrounding restricted access, the Project Office will continue its current practice of making the most recent edition of the environmental SCIENTIST freely available online two months after it is initially published.

Appendix

Agriculture and Food Sciences

- [Agriculture \(General\) \(148 journals\)](#)
- [Animal Sciences \(107 journals\)](#)
- [Aquaculture and Fisheries \(19 journals\)](#)
- [Forestry \(39 journals\)](#)
- [Nutrition and Food Sciences \(42 journals\)](#)
- [Plant Sciences \(52 journals\)](#)

Arts and Architecture

- [Architecture \(42 journals\)](#)
- [Arts in general \(60 journals\)](#)
- [History of arts \(12 journals\)](#)
- [Music \(48 journals\)](#)
- [Performing Arts \(32 journals\)](#)
- [Visual Arts \(19 journals\)](#)

Biology and Life Sciences

- [Biology \(256 journals\)](#)
 - [Anatomy \(11 journals\)](#)
 - [Botany \(83 journals\)](#)
 - [Cytology \(11 journals\)](#)
 - [Genetics \(56 journals\)](#)
 - [Microbiology \(56 journals\)](#)
 - [Physiology \(36 journals\)](#)
 - [Zoology \(98 journals\)](#)
- [Life Sciences](#)
 - [Biochemistry \(49 journals\)](#)
 - [Biotechnology \(48 journals\)](#)

Chemistry

- [Analytical Chemistry \(15 journals\)](#)
- [Chemical Engineering \(16 journals\)](#)
- [Chemistry \(General\) \(107 journals\)](#)
- [Inorganic Chemistry \(5 journals\)](#)
- [Organic Chemistry \(14 journals\)](#)

Earth and Environmental Sciences

- [Earth Sciences \(99 journals\)](#)
- [Ecology \(53 journals\)](#)
- [Environmental Sciences \(118 journals\)](#)
- [Geography \(109 journals\)](#)
- [Geology \(103 journals\)](#)
- [Geophysics and Geomagnetism \(13 journals\)](#)
- [Meteorology and Climatology \(30 journals\)](#)
- [Oceanography \(32 journals\)](#)

Health Sciences

- [Dentistry \(89 journals\)](#)
- [Medicine \(General\) \(487 journals\)](#)
 - [Allergy and Immunology \(31 journals\)](#)
 - [Anaesthesiology \(14 journals\)](#)
 - [Cardiovascular \(84 journals\)](#)
 - [Dermatology \(26 journals\)](#)
 - [Gastroenterology \(46 journals\)](#)
 - [Gynaecology and Obstetrics \(43 journals\)](#)
 - [Internal medicine \(307 journals\)](#)
 - [Neurology \(120 journals\)](#)
 - [Oncology \(82 journals\)](#)
 - [Ophthalmology \(30 journals\)](#)
 - [Otorhinolaryngology \(25 journals\)](#)
 - [Pathology \(40 journals\)](#)
 - [Paediatrics \(62 journals\)](#)
 - [Pharmacy and materia medica \(94 journals\)](#)
 - [Psychiatry \(61 journals\)](#)
 - [Sports Medicine \(20 journals\)](#)
 - [Surgery \(94 journals\)](#)
 - [Therapeutics \(97 journals\)](#)
 - [Urology \(30 journals\)](#)
- [Nursing \(41 journals\)](#)
- [Public Health \(198 journals\)](#)

Business and Economics

Business and Management (251 journals)

Economics (181 journals)

General Works

Multidisciplinary (182 journals)

History and Archaeology

Archaeology (35 journals)

Diplomatics. Archives. Seals (2 journals)

History (210 journals)

Languages and Literatures

Languages and Literatures (314 journals)

Linguistics (194 journals)

Law and Political Science

Law (147 journals)

Political Science (172 journals)

Mathematics and Statistics

Mathematics (212 journals)

Statistics (47 journals)

Philosophy and Religion

Philosophy (187 journals)

Religion (84 journals)

The Bible (6 journals)

Physics and Astronomy

Astronomy (General) (19 journals)

Physics (General) (81 journals)

Acoustics (6 journals)

Electricity (9 journals)

Heat (5 journals)

Mechanics (2 journals)

Nuclear Physics (5 journals)

Optics and Lights (18 journals)

Science General

Information theory (1 journals)

Science (General) (130 journals)

Social Sciences

Anthropology (82 journals)

Education (532 journals)

Ethnology (26 journals)

Gender Studies (34 journals)

Library and Information Science (131 journals)

Bibliography (2 journals)

Media and communication (102 journals)

Psychology (163 journals)

Social Sciences (298 journals)

Migration (9 journals)

Sociology (136 journals)

Social and Public Welfare (42 journals)

Sports Science (58 journals)

Technology and Engineering

Chemical Technology (33 journals)

Computer Science (325 journals)

Construction (16 journals)

Electrical and Nuclear Engineering (62 journals)

Environmental Engineering (10 journals)

Environmental Technology (10 journals)

General and Civil Engineering (159 journals)

Hydraulic Engineering (4 journals)

Industrial Engineering (19 journals)

Manufactures (11 journals)

Materials (39 journals)

Mechanical Engineering (40 journals)

Military Science (10 journals)

Mining and Metallurgy (13 journals)

Technology (General) (91 journals)

Transportation (30 journals)

References

Asher, A. 2011. Open Access at Bucknell [online].

Available from: scholcomm.blogs.bucknell.edu/2011/02/03/bucknell-scholarly-communications-practices-survey-summary-results/ [Accessed: 3rd May 2012].

Beddoes, D., Brodie, E., Clarke, R., Sin, C.H. 2012. Benefits of Open Access to Scholarly Research for Voluntary and Charitable Sector Organizations:

A Research Report to JISC from the Office for Public Management and the National Council of Voluntary Organisations. London: JISC.

Bell, F., Schmoller, S., Sharpe, R. 2012. Going for gold: Research in Learning Technology makes the switch to a fully Open Access publishing model.

Research in Learning Technology. 20 (1).

DOAJ. 2012. Directory of Open Access Journals [online].

Available from: www.doaj.org/. [Accessed: 31st May 2012].

European Commission, 2012. Survey on open access in FP7.

Luxembourg: Publications Office of the European Union.

Eysenbach, G. 2011. Can Tweets Predict Citations? Metrics of Social Impact Based on Twitter and Correlation with Traditional Metrics of Scientific Impact.

Journal of Medical Internet Research. 13 (14): e123.

Finch Group, 2012. Accessibility, sustainability, excellence: how to expand access to research publications [online].

Available from: www.researchinfonet.org/wp-content/uploads/2012/06/Finch-Group-report-FINAL-VERSION.pdf [Accessed: 19th June 2012].

Fister, B. 2012. An Academic Spring? [online].

Available from: americanlibrariesmagazine.org/features/04042012/academic-spring [Accessed: 8th May 2012].

Friend, F. 2011. Knowledge Exchange Briefing Paper: Open Access Business Models For Research Funders and Universities [online].

Available from: www.knowledge-exchange.info/Admin/Public/DWSDownload.aspx?File=%2fFiles%2fFiler%2fdownloads%2fOpen+Access%2fKE+Briefing+paper_BUSINESS_MODELS_FOR_RESEARCH_FUNDERS_AND_UNIVERSITIES-08-09-11.pdf [Accessed: 28th June 2012].

Graf, C., 2012. What IJCP authors think about open access: exploring one possible future for publishing clinical research in a general and internal medicine journal.

International Journal of Clinical Practice. 66 (2), pp. 116-118.

Harnard, S. 2011. Open Access to Research. Journal of eDemocracy. 3 (1), pp.33-41.

Hoole, D., (d.hoole@nature.com), 12 June 2012. Institution of Environmental Sciences.

Email to E. Fenton (emma@ies-uk.org).

Houghton, J., Rasmussen, B., Sheehan, P., Oppenheim, C., Morris, A., Creaser, C., Greenwood, H., Summers, M., Gourlay, A. 2009. Economic implications of alternative scholarly publishing models: Exploring the costs and benefits.

Joint Information Systems Committee: Loughborough, UK.

Jha, A. 2012. Wellcome trust joins 'academic spring' to open up science [online].

Available from: www.guardian.co.uk/science/2012/apr/09/wellcome-trust-academic-spring [Accessed: 8th May 2012].

Nature Editorial. 2012. Openness costs [online].

Available from: www.nature.com/journal/v486/n7404/full/486439a.html [Accessed: 29th June 2012].

Neylon, T. n.d. The Cost of Knowledge [online].

Available from: thecostofknowledge.com [Accessed: 8th May 2012].

Open Access, 2011. Open Access [online].

Available from: open-access.org.uk/information-and-guidance/open-access [Accessed: 9th May 2012].

Open Oasis, 2009. Institutional Advantages from Open Access [online].

Available from: www.openoasis.org/index.php?option=com_content&view=article&id=142&Itemid=26. [Accessed: 9th May 2012].

Phelps, L., Fox, B.A., Marincola, F.M. 2012. Supporting the advancement of science: Open access publishing and the role of mandates [online]. Journal of Translational Medicine.

Available from: www.translational-medicine.com/content/10/1/13 [Accessed: 8th May 2012].

Research Information Network, 2011. Heading for the open road: costs and benefits of transitions in scholarly communications. RIN: London, UK.**Sample, I. 2012. Harvard University says it can't afford journal publishers' prices [online].**

Available from: www.guardian.co.uk/science/2012/apr/24/harvard-university-journal-publishers-prices [Accessed: 21st June 2012].

Schroter, S., Tite, L., 2006. Open access publishing and author-pays business models: a survey of authors' knowledge and perceptions.

Journal of the Royal Society of Medicine. 99, pp.141-148.

Suber, P. n.d. Open Access Overview [online].

Available from: www.earlham.edu/~peters/fos/overview.htm [Accessed: 3rd May 2012].

Wellcome Trust, 2004. New report reveals open access could reduce cost of scientific publishing by up to 30 per cent [online].

Available from: www.wellcome.ac.uk/News/Media-office/Press-releases/2004/WTD002874.htm [Accessed: 9th May 2012].

Willinsky, J., 2003. The Nine Flavours of Open Access Scholarly Publishing.

Journal of Postgraduate Medicine. 49, pp.263-267.

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