How to write a paper for successful publication in an international peer-reviewed journal

In this paper, we present a step-by-step guide on how to write a paper for successful publication in a peer-reviewed journal. We propose a ten-step approach to the entire process of paper writing from preparation, manuscript writing, and submission to the stages of peer-review and revision. The steps include defining paper objectives, authorship, journal selection, writing routines, requirements of manuscript sections, editing and proof-reading as well as how to communicate successfully in submission and review.

Key words: peer-review, journal paper, publishing rules, writing guidelines, referee system, IMRAD, research paper, science communication, science education, research training

INTRODUCTION

Publishing is an inherent part of research; if research has not been published, it has not been completed. Allocation of research funds, academic appointments and promotion exercises depend on the quantity and quality of publications of the individual researcher. Thus, an expected outcome of research is to publish papers in a peer-reviewed journal (Kyvik 2003; Jubb 2012).

Despite the high esteem of journal papers, it is surprising how poorly the process of writing a paper and getting it published is treated during research education. As a PhD student, early-career researcher or as other potentially experienced author, one learns to write either from good mentors or from the bruising process of trial and error. Initial publishing success is more often the result of good fortune than the outcome of a process that has been taught as a student at university or research establishment.

During our service as associate editors of a peer-reviewed journal in landscape ecology and planning (GT, BT and DAS) and several conservation journals (DAS), we handled many submissions that were not suitable for publication. Many were based on sound science and could have made it to publication, if the authors had been taught how to write good papers and about the publication process. The submission of a manuscript is the wrong time to learn this process. It is not the task of reviewers and editors to instruct

authors how to write papers, but to judge the quality and relevance of the manuscript submitted. We agree with Keen (2007) and Recher *et al.* (2009) who stress the benefit of teaching young scientists and less-experienced authors the art of writing scientific papers and the publication process.

Since 2007, we (GT and BT) have trained about 1,800 researchers to write journal papers and have them published. These researchers expressed similar difficulties with writing and publishing as those reported by Driscoll and Driscoll (2002) and Vintzileos and Ananth (2010). These difficulties include; lack of confidence, fear of writing a peerreviewed paper, perceived lack of time, and lack of training in writing. The peer-review system is considered by many to be a black box, in which decisions are taken on the basis of criteria unknown to the authors.

The established guidelines for paper writing, for example the handbooks by Cargill and O'Connor (2009), Day and Gastel (2011), Hall (2012) or style guides, such as American Psychological Association (2009), Coghill and Garson (2006) and Council of Scientific Editors (2006), provide helpful advice, particularly on the technical aspects of writing papers. However, these guidelines can be difficult to put into practice. While they give specific advice on the writing of sections of a paper or technical details of submissions, they provide too little information on the overall

process of starting to write a paper, writing strategies, and peer-review procedures. Less-experienced authors benefit from understanding the publication process from the perspective of all of those involved; authors, editors, reviewers, and readers.

Our aim with this paper is to provide less-experienced authors with a ten-step guide on how to write a paper that gets published in a peer-reviewed journal.

Step 1. Define the objective, type and title of the paper

A primary goal of any research paper is to communicate the outcome of that research. While the research project might address several research questions, a paper, ideally, focuses on only one research question; this is the objective of the paper and must be expressed explicitly. The question should have a narrow focus rather than one covering too many aspects. The objective is a helpful guide to writing as it is the line through the paper, connecting all of its parts. Everything in the paper should contribute to the objective; if it does not, it should be left out.

The definition of the objective should determine the *type of paper*. The most common paper types are research papers, methods papers, review papers, and discussion papers. In a research paper, the main focus is on addressing a research question by presenting novel findings. In a methods paper, new methods, tools or techniques

are presented. Review papers present an overview of the current literature on a specific question to set out what is known on the topic and what needs to be known. Discussion papers focus on a particular topic to stimulate or contribute to a discussion in that field. A paper should have only one primary goal. Readers look for very specific information, so one should avoid mixing paper types.

The objective of a paper can also be used to create a good *title*. The title is critical as it informs the readers what is the question being examined and what benefit they will get from the paper. The main keywords should be included in the title so that the paper comes high on the list of any keyword search that potential readers conduct in databases. The title must be understandable when read in isolation as most (potential) readers look at the title before they see, download or read the paper.

Step 2. Decide on co-authors

It is important early in the writing process to decide who should be an author or co-author. This helps to avoid disputes, conflicts of interest, and disappointment among potential authors and increases clarity and motivation in the writing process. Although there seems to be no universally agreed definition of what constitutes authorship of an academic paper, several international bodies of publishing ethics in academia (Committee on Publication Ethics 2000; National Health and Medical Research Council 2007; International Committee of Medical Journal Editors 2010; Scott-Lichter et al. 2012) suggest to consider as an author someone who has made a substantial intellectual contribution to the conception, design, analysis, and writing of a study. It should always be possible to attribute at least one of the mentioned aspects to an author. Each author must critically review and approve the paper and agree with its submission to a journal. Anyone involved in only a technical or routine-based contribution, acquisition of funding, collecting data, or general supervision of the research team would not qualify as an author, but their support should be acknowledged.

Writing as a team of authors requires clear agreements on roles and responsibilities. The first author is the one who has contributed most to the research or the paper. They receive most credit for writing the paper. In addition, the first author has the role of managing the writing and submission. All authors should contribute to the writing and not just comment on the work of the first author. An effective collaboration may involve discussing the writing, dividing the work among authors, and agreeing on a timetable, with the first author overseeing the process.

Step 3. Define audience and select correct journal

Defining a clear target *audience* is the key to selecting the correct journal. For whom is the topic relevant? Who are the international researchers, laboratories, research teams or departments that would benefit from reading the work (Brown *et al.* 1993)? They are the ones who will read the paper, cite it, build it into their research or apply it in practical ways such as management for conservation.

Which is the correct journal for the target audience? In most subject areas, a great variety of international peer-reviewed journals are available. The quality of journals is assessed with the help of bibliometric indicators of which the impact factor is the most prominent. It measures the average number of times papers in a journal published in the past two years have been cited in a particular year. Many authors prefer to submit to journals with high impact factors. These journals have high rejection rates as a result. Journals with lower impact factors tend to have lower submission rates and lower rejection rates. Bibliometric indicators should be only one

of several criteria used to select an appropriate journal (Calver 2013).

When to select and how? It is essential to select the right journal at the start of writing, not at the end. At the start, a list of potential journals in the field should be prepared in order of preference for submission. This step can be informed by asking colleagues, systematically searching current literature, browsing the Internet and specific journal/paper databases such as Web of Science, Scopus, Pubmed, etc. The order of preference should be based on the subject of the proposed paper, the aims and scope of each journal, the range of papers published in the journals, the intended readers, and relevant bibliometric data. Having selected the most appropriate journal, at least one other journal should be listed as a back-up in the event that the initial submission fails.

Every journal provides detailed guidelines (or instructions) to authors for preparing and submitting manuscripts. These guidelines are available on their websites and provide detailed instructions about the types of papers published in the journal, paper structure, length, format of references, tables and figures, and other submission requirements. These instructions must be followed precisely as many journals will reject submissions that do not conform to their format.

Step 4. Write for readers

The aim of publishing a paper is to inform readers about the research. Therefore it is essential to consider the reader's perspective when writing the paper. Sufficient information needs to be provided to present a logical argument for the objective of the paper. It is important to avoid repetition. Bearing the reader in mind, the paper should be interesting to read, easy to understand, and not bogged down in detail. The paper should have a clear message and be expressed in simple language rather than complicated scientific jargon.

Step 5. Write in short, but regular sessions

Avoid waiting for big blocks of free time to write a paper, they seldom come. Instead, write daily in short sessions. Make writing a routine task, like brushing teeth or going for lunch. Boice (1990), Martin (2009) and Gray (2010) stress that regular writing substantially increases publication output and quality. If writing feels like a burden, short writing sessions can help to change this feeling; 30-60 minutes of writing a day can be very productive. It reduces fear of failure and provides a daily feeling of success. Six to eight weeks of regular short writing sessions can result in the draft of a paper, while fulfilling many other tasks within the same time frame.

Step 6. Write a well-focused and clearly structured manuscript

A good structure is the backbone of a paper which supports readers in understanding it better. Most researchers read selectively by picking out the sections they are most interested in. A helpful paper structure for these purposes is the IMRAD format. It dates back to the 19th century, but it is still useful today (Day 1989; Day and Gastel 2011; Wú 2011). The IMRAD format features separate sections for Introduction, Methods, Results and Discussion, which are most commonly accompanied by an Abstract (or Summary) at the beginning and a separate Conclusion at the end. The Conclusion may also be incorporated into the Discussion, typically as the last paragraph. Section headings assist the reader to navigate through the paper.

The *Introduction* is the first section written. It exposes the reader to the topic, the motivation and the context of the study, and the scope and relevance of the objective of the paper. The Introduction should include five aspects: (a) the problem being dealt with, (b) the motivation for the paper (i.e., why is the topic relevant?), (c) an overview of the current state-of-the-art in the field

of research (i.e., what has been done by other researchers in this field before with reference to the most recent and relevant journal papers in the field?), (d) an account of what has not been appropriately addressed by previous researchers in this context (i.e., what is still missing in this field of research?), and then (e) the objective of the paper and how it will help to fill gaps in understanding of the field. Brevity is important in the introduction.

The *Methods* section demonstrate the replicability of the study and provide evidence of the validity of the results. If the research is experimental, the experimental protocols should be explained in detail; the section should provide sufficient detail that any reader could replicate the study. Reviewers tend to pay close attention to the methods section. Any lack of clarity may lead to a request for revision or rejection. This section should be presented in chronological order of the different steps undertaken during the study. Sub-headings are useful to assist the reader to screen the content of the Methods section quickly. New methods need to be explained in full. Established methods may be presented briefly and by citing appropriate literature.

The *Results* section presents the paper's contribution of new knowledge. It briefly provides the answer to the research question forming the objective of the paper. Only those results which correspond with the objectives should be presented. Figures and tables are used to communicate the results, but material in figures and tables should not be duplicated in the text. It is important in this section to present only the facts that support the objective without any discussion of the results.

The *Discussion* section provides the interpretation of the results in the context of the existing knowledge (i.e., how do the results contribute to what is already known? How far do they break with existing knowledge and prepare new ground?). The results may be discussed by

presenting generalizations that arise from them, by explaining extreme or unexpected observations, or by informing the reader about limitations of the methods. Under no circumstances should the discussion include any speculation that may not be supported by the results reported. The discussion typically ends with implications for theory, future research or possible practical applications of the results.

The *Conclusions* section briefly presents the take-home message from the paper. The Conclusions section is often read in isolation before the other sections. The conclusions should not repeat what is in the paper or continue the discussion or present new facts.

The Abstract section provides a short summary of the paper. Most readers will read the abstract and decide from the abstract whether to read the entire paper or not. A carefully prepared abstract raises the interest of the reader. The abstract should be written after the manuscript has been finalized and should follow the IMRAD format. Each of the manuscript's sections should be summarized with one to two sentences. Journal guidelines specify the length of the abstract; usually no more than 300 words and it should not contain any references.

The final sections of a paper consist of the Acknowledgements and the References. In the former, the names of all those who assisted in the research or the preparation of the manuscript, other than the authors, should be listed. All sources of funding and organizations that contributed to the research should be acknowledged, as should all ethics and other appropriate approvals. When preparing the acknowledgements in the final revision, it is worth considering whether mention should be made of the editor and reviewers as they will have made a considerable investment on behalf of the authors.

The *References* section should be compiled in accordance with the journal's guidelines which will

specify precisely how each reference is to be set out. These guidelines will provide information on correct listings for journal articles, online journal articles, books, book chapters, reports and websites. Failure to follow journal format precisely may result in rejection. It is important to ensure that all references cited in the text are in the reference list and vice versa. Bibliographic software such as Endnote is fallible and authors should physically check all references and format before submission.

Step 7. Edit the text for clarity, logic, language and length

Editing makes the text more understandable, focused, and shorter. Best practice involves keeping writing and editing of the manuscript separate. Only after a full draft of the manuscript has been written should editing be undertaken to improve the presentation.

What to edit? Several rounds of editing should be undertaken and in each round only one aspect should be looked at. Combining several aspects in one round may result in missing some aspects. First, the manuscript should be examined for repetition, redundant words or phrases, and sentences or paragraphs that could be omitted. Second, the paper should be read for clarity of content (i.e., does the paper present what is promised in the introduction? Can the reader understand the intellectual steps reported?). Third, the structure and use of headings in the paper should be reviewed (i.e., do they support the reader in navigating through the paper?). Fourth, all references cited in the text should be checked to see that they are provided correctly in the reference list and that all references in the reference list are cited in the text. References cited in the text and in the list should follow journal format precisely. Fifth, journal guidelines should be consulted again to ensure they have been followed precisely. Sixth, the quality of the expression should be checked (Heatwole 2008). Spelling-checkers to highlight typographical errors and check grammar and punctuation are useful aids, but should not be relied on alone. Proofreading is essential. It is useful to ask someone not familiar with the subject, but fluent in the language of submission, to read the manuscript critically to assist in deleting any errors in expression, including repetition and verbosity. Helpful resources for this step are provided by Glasman-Deal (2010) and Day and Sakaduski (2011).

How to edit? It is useful to leave the paper for a few days or a week before editing to provide the necessary distance to read through the text and identify mistakes. It is a good idea to print the paper and annotate it with a pen, but do not start to correct each mistake found immediately. Correction is a separate task to be done later.

Step 8. Ask colleagues to read the manuscript critically

Having the manuscript critically reviewed by at least two other colleagues (not co-authors) is an successful essential for step publication. This helps to improve the quality of the manuscript and increase the chances of passing the peer-review process. This step, if it involves experts in the field as well as someone not familiar with the subject, can identify flaws in the research design or the logic, as well as problems of expression that can be corrected before submission.

Pre-submission review does not have to take a lot of time. Any comments offered must be taken seriously. The purpose of this step is to "polish" the manuscript and put the work in the best possible light. Any advice offered should be considered carefully and any changes suggested implemented unless there are good reasons not to do so.

Step 9. Communicate clearly in submission, review and revision

The aim of the peer-review process is to judge the quality of a

submitted paper and its potential for publication in a journal. This process is managed by a journal editor, who is often a scientist in the field, employed at a university or research institute, or a professional editor employed by the publisher. It is the editor who decides whether paper the is accepted publication or not. In order to get published, Davidson and Carlin (2008) suggest a paper must be relevant, original, scientifically valid, as well as clear and well-written. Peer-review is therefore a qualitycontrol process, which may end with publication as the final quality label. Clear communication with editors and reviewers in this process may influence the chances of being published.

How to submit? A short covering letter should be written that provides the names and addresses of the corresponding author and coauthors as well as a short statement about the key message and relevance of the paper. Some journals specify what the covering letter should contain and this information must be included. This may relate to approvals, declarations regarding funding, and potential conflicts of interest. The letter should be addressed personally to the journal's Editor or Editor-in-Chief. Most journals have an electronic paper submission process that guides authors easily through the required steps and documents. Some journals ask for suggestions for suitable reviewers. If so, people with a sound knowledge of the field should be suggested. This list should not include anyone with whom the author has published or anyone from the same research team or close associates. Authors may also request that particular people are not asked to review the manuscript. If seeking to exclude anyone, valid reasons for the exclusion must be given. If the editor uses one of the suggested reviewers, they will first check the academic credibility of that person. Under no circumstances should a manuscript be submitted to more than one journal at the same time.

The first stage in the peer-review process (see figure 1) is the editorial assessment process, during which the editor makes a decision whether the paper has potential for publication and should be sent to reviewers. Essential criteria for this decision are whether the paper is within the scope of the journal, whether it is a new and relevant contribution, whether it is based on sound science, and whether it has been presented precisely in the journal's required format (Meffe 2006; Primack 2009). Experienced editors may make a decision to reject a manuscript at this stage in a matter of minutes. This reinforces the point that the title, abstract, and presentation of the manuscript should be such that they "catch and retain the readers' eyes." If the manuscript is rejected at this stage, the editor should give reasons for the rejection, but this is not always the case. The editor may suggest another journal better suited to the publication of the manuscript.

When the manuscript enters stage two, peer-review, the editor usually invites two to three independent experts in the field to read and review the manuscript critically. Those reviewers who accept the invitation to review the manuscript are provided a copy of the manuscript and usually receive a set of review criteria according to which they should evaluate the quality of the manuscript. These criteria include aspects such as originality of the work, quality of the overview presented in the paper, international relevance, clarity of methods, soundness of the discussion, justification of conclusions, structure, organization and length of the manuscript, quality of expression, clarity of illustrations, and correct referencing. Some journals have a double-blind system of review where the authors do not know the name of the reviewers and vice versa. Others let the reviewers know the name of the author(s), but do not provide the name of reviewers to the author(s). Reviewers normally have the option of requesting that a signed copy of their review be made available to author(s) and may invite questions from the author(s) on their review.

Every reviewer returns a report with comments to the editor. The editor will then make a decision on the manuscript which could be either "accept", "minor revision", "major revision" or "reject". This decision is communicated to the authors, but manuscripts are seldom accepted at this stage without revision. Some editors may compile a synopsis of the different reviewers' comments to guide authors in revising the manuscript. Other editors simply provide authors with unedited copies of the reviewers' reports, but may supplement these with a separate set of editorial comments. Authors need to be aware of these differences between journals and may be confused by what may appear to be inconsistent approaches to the review process. When rejecting manuscripts editors may offer suggestions for improvement and for subsequent submission to another journal.

Whether the editor's decision is "minor" or "major revision", the manuscript enters stage three, the revision. The editor requires that all issues raised in the reviewers' and editor's reports are considered and that a revised manuscript that takes account of the issues raised is submitted within a given time frame, usually between one to three months. It is wise to follow the suggestions as closely as possible. However, reviewers and editors are fallible and authors are entitled to reject suggestions for change. However, if suggestions are not followed, an explanation why not is necessary. Editors and reviewers are not acting to prevent publication; they are acting to see that submissions are presented in the best possible light. They conduct their work with the best intentions and this attitude deserves respect, so criticism and complaint in any responses to their suggestions should be avoided. The revised paper should be returned to the journal together with a letter explicitly reporting the revisions made. It is good practice to use the reports from reviewers and editor to itemize each issue and the response to the issue. The more detailed this letter of response, the easier the editor (and reviewers if their assistance is sought again) can assess the revision. After resubmission, the editor may decide to send the revised manuscript to the original or different reviewers for a further round of reviews.

Once the manuscript has been through peer review and revision, it will enter stage four, the *editorial final decision*. The editor will decide to accept or reject the manuscript on the basis of the comments from the reviewers and the quality of the revision. Acceptance is a good reason for celebration, although there are several further steps before publication.

The next stage is receiving page *proofs.* These are a typeset version of the manuscript as it should appear in the journal. These should be received one to two months after the editor has accepted the manuscript, although the delay between acceptance and proofs can be considerably longer. The author is required to check the proofs for technical or spelling mistakes. Substantial changes to the content of the paper are not permitted. At this stage the paper is "in press", and may be cited as such. With many journals the paper may quickly be online and available for readers in the "Papers in press" section of the journal website.

The paper is deemed published once it appears with its full referencing information (year, volume number, issue number and page numbers) in the online or hard copy version of the journal. Depending on the size of the journal, on the quality of the paper, on the responsiveness of the reviewers, the speed with which the revision is undertaken and on the production backlog of the publisher, the time from submission to publication may take several months or even longer. Clear communication from the author(s) and timely

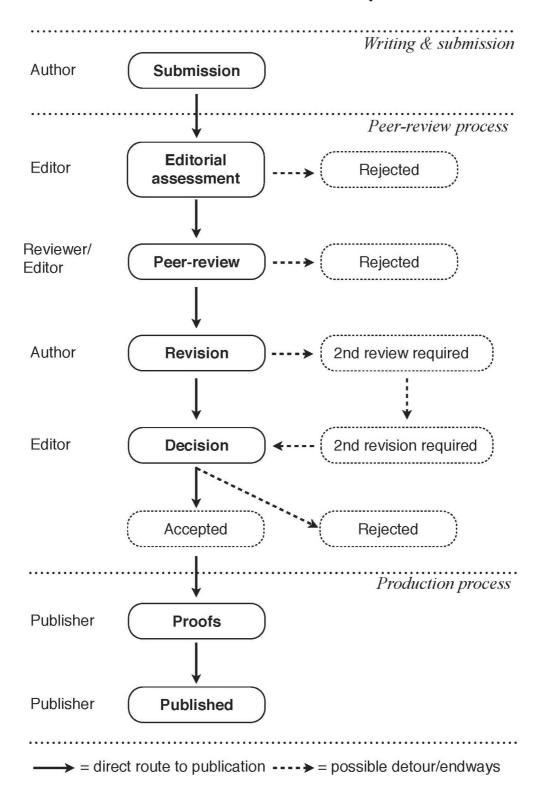


Fig. 1. Stages of the peer-review and publishing process

response to all requests from the journal can speed up the process.

Step 10. If a manuscript is rejected, do not give up

Why are papers rejected? Sullivan (2002) Pierson (2004), Meffe (2006), Primack (2009) and Winck et al. (2011) report common reasons why papers are rejected, including that the paper does not fit within the scope of the journal, does not present new or relevant findings, problems in the research or the research design, lack of clarity as to how results and conclusions were achieved, incomplete or poorly formatted presentation, failure to submit a revision, revision failing to meet the standards of the journal, or poorly written manuscripts that do not communicate their message clearly.

What to do if the manuscript is rejected? A good editor will provide an author with the reasons for the rejection. Some editors use a set of templates for rejection letters, but they usually add a few sentences to make it clear why the manuscript was rejected. If the rejection follows reviews, the editor should provide copies of the reviewers' reports. If the author does not understand the reasons for rejection, they are at liberty to request clarification from the editor. In most cases, the editor's decision is final and not open for discussion.

Is it possible to resubmit a paper that was rejected? Yes, however, the chances of success are usually poor and depend on the reasons for rejection. In the letter explaining the decision to reject, the editor will usually indicate if there is any chance of major revision and resubmission. Some journals reject manuscripts requiring major revisions, but advise the author that if they follow the suggestions of reviewers and editor, they may resubmit, but that it will be treated as a new submission and handled accordingly. In this situation, it is wise counsel to consider whether to follow that suggestion, or undertake a major revision and submit to another journal.

Not every paper that is submitted gets published in the journal to which it is originally submitted. The rejection rate differs greatly between journals. The higher the impact factor a journal has the higher will be its rejection rate. With around 1.8 million papers being published from 3.6 million submissions to around 28 000 journals per year (Björk, B.-C. et al. 2009; Morris et al. 2013; Van Noorden 2013) rejection is common and can be a bruising experience. Regardless of whether the manuscript requires any revision or has been rejected, the peer-review process should be positively regarded as an opportunity to improve the having a manuscript. Anyone manuscript rejected should not give up, but profit from the experience by using it to improve the manuscript and submitting it to another journal. A good manuscript always has a good chance of being published, even if it is not in the journal of initial choice. Rejection is not the end of a manuscript, but the beginning of a better one.

CONCLUSION

Writing a paper for an international peer-reviewed journal is a multi-step process. These steps have to be performed with great care and attention to detail. The more care and attention to detail devoted to the task, the higher the chances that an interesting and relevant manuscript will be published. While the peer-review process is not necessarily an easy or perfect one, it provides an excellent opportunity to improve a manuscript. While the writing and revision steps may take a lot of energy, the editor's letter of acceptance and the final product make all effort worthwhile. The more often one publishes a paper, the easier the process becomes and the more fun it will be.

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