



TROPICAL BIOLOGY ASSOCIATION

Skills Series

Scientific writing & publishing results



Scientific writing and publishing results is designed to accompany a practical training workshop that builds expertise in writing for publication and provides advice on how to publish in national and international journals.

This document is inspired by many and was developed over a series of specialist training workshops. It was drawn together by Rosie Trevelyan (Tropical Biology Association) with contributions by James Cook (Imperial College, London, UK) and Martin Fisher (Fauna and Flora International). It was funded by the European Commission (B7-6200/01/0370/ENV).

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GETTING YOUR WORK PUBLISHED

WHY, WHERE AND HOW?

Research work is incomplete unless the results are disseminated to the wider community. Publishing is important for yourself, your organization, your scientific colleagues and your funders. It improves your career, since your work will be seen as good quality and reliable. Publication will increase your chances of attracting funding and collaborators. This document provides guidelines on how to write papers for publication.

Why should you publish?

It is a good principle – almost a duty – to make results accessible.

- ❑ It gives the scientific community a chance to find out about your work. That way, people are more likely to be able to build on it rather than reinvent the wheel and duplicate the research.
- ❑ It is a way of “paying back” those who fund you.

It improves your writing and analytical skills.

- ❑ You will attract useful comments and input that you may not have thought of. This will help your ideas progress and improve your future work.

It gets you and your work known in the wider scientific and conservation community.

- ❑ Good for your career.
- ❑ Good for your organization.

Having a good track record of publications makes it easier to attract funds or collaborators who may have

more funding backing them up. Publication may also lead you to be invited to peer-review the work of others or even to join boards.

Where should you publish?

Peer-reviewed journals are arguably the most widely respected avenue for presenting research findings. Publishing in journals is also challenging – articles must follow strict guidelines and the rejection rate can be high. Besides writing for peer-reviewed journals, you can write book chapters, newsletters, magazine articles or even web pages. Occasionally you can persuade the media to include your work as newspaper supplements and articles, although this route needs to be used wisely – the media can misrepresent you.

Choosing a journal

Different journals cover different subject areas and regions. We suggest you try and broaden your horizons. If, so far, you have just published in a national journal, aim for a regional or international

Examples of journals (additional rated journal titles are included at the end of this document)

AFRICAN JOURNALS

African Journal of Ecology
African Journal of Hydrobiology and Fisheries
African Wildlife
Ostrich: Journal of African Ornithology
South African Journal of Botany
East African Agricultural and Forestry Journal
African Journal of Science and Technology
African Invertebrates
Journal of East African Natural History

INTERNATIONAL JOURNALS

Conservation Biology
Biological Conservation
Biological Journal of the Linnean Society
Oryx: The International Journal of Conservation
Animal Conservation
Biodiversity and Conservation
Functional Ecology
Bird Conservation International
Biodiversity Letters
Journal of Ecology
Journal of Zoology
Insect Science (ICIPE)



journal. If you have published in taxon-specific journals (such as *Kenya Birds*), think about aiming for a broader ecological or conservation journal.

READ journals – keep up to date and keep an eye open for where you think your work might fit in.

How to publish

Publishing one's work is a challenge faced by every

author, but it becomes easier with each new publication. Most journals will provide “**instructions for contributors**” on how to publish in that journal. **These must be followed to the last detail, or the editor will reject your article straightaway.** This includes the layout and format of both the body and references of your article. The instructions for contributors can often be found on the journal's website.

Tip

Editors' advice on how to get work published:

- **Study the journal.** The first step is to know who the journal is for and the kinds of articles it publishes.
- **Use good English.** Reviewers often reject papers because the grammar is bad, rather than on the basis of the content.
- **Be realistic.** Be aware of the value of your results but don't over-interpret them.
- **Tell a coherent story,** and don't make sweeping conclusions if you don't have the results to support them; i.e. don't be over-speculative.
- **Don't try too hard to sound important;** don't use a pompous voice.
- **Make sure the title matches the content,** e.g. don't use the title “Impact of climate change on bird ecology” when there isn't a single climate parameter in your paper.
- **Read lots of papers** and learn from them.

WRITING

A SCIENTIFIC PAPER

GETTING STARTED

This section will consider how to write a scientific paper. There are no magical ingredients to this, and it does not necessarily come naturally. However, there are general guidelines, which means that anybody can improve their scientific writing skills by learning them. Some of the guidelines apply to all writing, not just scientific writing, and these are mostly aimed at improving clarity. Other guidelines are specific to writing articles for scientific journals and are often concerned with the structure of the article.

Why are you writing?

Be realistic about trying to get your work published. Your article must be suitable for the journal, and you should be prepared to make revisions. In short, the writing can be just as challenging as the research! You must work out why you are writing an article:

- You have made a minor, but very interesting, observation.
- You have made a useful advance.
- You are putting published information into a new context.
- You are synthesizing information in a novel way that will be of interest to others.

Your reasons must guide how you write and your choice of journal.

The structure of scientific papers

Structure is absolutely crucial to scientific papers. It is also fairly standardized, which makes life easier! Most scientific papers are split into four main sections: introduction, methods, results and discussion. The introduction is usually a continuous piece of text, but the other sections often have subsections. For example,

methods might be split into field methods and statistical methods. In some journals, especially those that encourage very short articles, some sections may be joined together (e.g. methods and results, or results and discussion). However, even in these cases, the continuous text usually deals with things in the same order.

Title

The title should embody either the aim or the conclusion. Catchy titles are good, but it can be difficult to make them work, and they still need to indicate their subject and the conclusion or aim.

Tip

Ninety-nine per cent of readers will read only the *title* and *abstract* of your paper (and most people will only read the title). These are therefore the most important parts to get right.

Abstract

The abstract should summarize your entire paper – including your main findings and the importance of

Examples of titles of research papers

Catchy titles

Holes in the doughnut theory: the dispersion of antlions
The self-thinning rule: dead or alive?
How the forest lost its trees: just so stories about juniper in Arabia

Titles that incorporate aims or conclusions

Forest buffalo prefer clearings to closed-canopy forest in the primary forest of northern Congo
Distribution and status of the Apennine hare *Lepus corsicanus* in continental Italy and Sicily
Meat prices influence the consumption of wildlife by the Tsimane' Amerindians of Bolivia
Status of the Ganges river dolphin or shushuk *Platanista gangetica* in Kaptai Lake and the southern rivers of Bangladesh
The bushmeat boom and bust in West and Central Africa
Preliminary observations on the distribution and status of dwarf blue sheep *Pseudois schaeferi*

Which do you prefer? What else do you like about these titles?



Remember the introduction should entice the reader to read further

Which first sentence is better?

Elephants depend greatly on their habitat for survival does not tell the reader anything new or exciting – most organisms require habitat to survive!

OR

In Ghana, 40 per cent of the habitat on which elephants depend has been destroyed.

The introduction also puts your work into a broader context.

Sunbirds pollinate many plants in Kenya may sound too specific to a general reader who is not a bird expert.

OR

Pollination is an important ecosystem service, and sunbirds play a role pollinating many plant species introduces the concept of pollination and ecosystem services and then focuses on your study group.

your results. All this should be done using no more than 200 to 250 words.

The abstract:

- ❑ puts your work into context and presents your conclusions;
- ❑ tells us what you did;
- ❑ tells us what you found out (but doesn't provide statistics);
- ❑ clearly states the implications of your findings;
- ❑ must not go beyond the maximum number of words asked for by the journal;
- ❑ doesn't include references.

Keywords

These are what people use when searching for articles in literature indexes. Some will be quite specific to your topic (such as the animals or plants you worked on or the particular conservation approach you took). They should not be as broad as “ecology” or “conservation”.

Introduction

This is the first thing that anybody will read. You need to grab the reader's attention and convince him or her that it is worth reading the rest of the paper. The introduction should not be too long, or it will be swamped with unnecessary information and mislead the reader. The introduction itself should have a logical structure to it and should flow from paragraph to paragraph.

It is very important to remember that the introduction (and indeed the whole paper) should be prepared with the reader in mind. This means that you should not just download your view and information, but actually construct the introduction so that it follows a logical story and explains necessary things to the reader. If you are writing for a journal with a wide audience – the *African Journal of Ecology* rather than a specific one focused on birds, for example – you must first convince your reader why they should be interested in your study (they may hate birds).

The first paragraph should introduce some general aspect of biology or conservation. The second paragraph can go on to more specific issues, perhaps those particularly relevant to your study. Subsequent paragraphs may add more detail or outline particular problems. The final paragraph should focus in on the objectives of your study. At this point it is good to be very specific – for example by listing a few questions that you will address.

Methods

This section should contain enough detail to enable someone to repeat your work. The study area can be a separate section before methods, or can be part of the introduction. Maps should be simple, clear and informative. If it is available, mention the statistics/graphics package you used to analyse your data.

Results

This section presents your results but excludes any discussion. Figures and tables are usually the clearest way of showing results compared with text. As a rule of thumb, figures are preferable to tables. You should avoid repeating data in both tables and figures, or in tables and text. Avoid three-dimensional graphics! Note that some journals will accept “data-rich” papers and others won't, while others have web archives for large data sets.

Discussion

This section tells us what your results mean, why they are important and how they fit in with existing knowledge. Be clear and specific about the interpretation of your results and the implications of your work. The discussion is also where you point out alternative explanations for your findings and argue why you think your interpretation is the best (or tell us what further test is needed to show which hypothesis is correct). You should also acknowledge errors (and convince us why they do not alter your conclusion).

The final paragraph should tell us your conclusion – what your take-home message is. Avoid statements

like “further work is still needed” in your conclusion as this could contribute to your paper being rejected. If you do wish to recommend future work, then state what needs to be done and who should do it.

References

You need to list the references you have cited in your text. Things that should be cited are other authors’ ideas or facts shown by previous work. You should always cite the original authors – but don’t pad out the references to impress the reviewers. There are fairly strict rules concerning how you write references, and you need to follow the exact format requested by the journal. Spell the authors’ names and journal titles correctly – they may be asked to referee your paper! Use bibliographic software (such as Endnote, Reference Manager, ProCite, Papyrus) if possible.

The submission and next steps

Before you submit your manuscript you should give it to several friends/bosses/colleagues to read and give constructive criticism – an excellent way to improve your writing skills. It is also crucial that all mistakes and confusing bits of text are corrected before it goes to the editor.

- ❑ Ensure that you have followed the journal’s instructions for contributors to the letter, including instructions for page layout, tables, figures and plates.
- ❑ Don’t be a “chancer”: make your submission polished.
- ❑ Submit electronically if possible.
- ❑ Your first aim is to sell it to the editor. Write a polite covering letter in which you summarize why the work described in the manuscript is important and why you are submitting it to the journal – particularly important because the editor is not necessarily an expert in your field.
- ❑ Possibly recommend peer reviewers.

The editor of the journal will decide whether your paper is suitable for the journal and well-developed enough for publication. The editor will then send the manuscript to two or three external reviewers who generally have the following responses: reject, accept with major revisions or accept with minor revisions.

Tip

What are the most common problems with scientific papers?

- The paper is too long.
- The writing and figures are not clear.
- Its subject matter is not suitable for the journal.
- It is not well structured.
- The author has not explained the general interest of the specific issues.
- The author assumes too much specific knowledge from the reader.

Suggest potential peer reviewers and say why you are suggesting them and what, if any, your personal or professional relationship is with them. Don’t be afraid to suggest people who you feel will be critical of your work. Such people are often the most useful, both to author and editor, in ensuring that the manuscript that finally goes to press is as polished and authoritative as possible.

Most editors say that only 10 per cent of manuscripts submitted are accepted with minor revisions.

Revision

If you are asked to resubmit your paper after revision, you are doing well! Take care to deal with every comment and correct everything you agree with. Once you have done this, return your manuscript with a covering letter that comprehensively details all the changes you have made.

If you disagree with any comments, state why, and indicate if you haven’t made the requested changes. If there is a time limit set for the revision, don’t delay! Place comments and responses in a table.

What to do if your manuscript is rejected

Rejection is a fact of life – so don’t take it personally! In many journals approximately 30 per cent of manuscripts are rejected without review and a further 20-30 per cent are rejected following review. Analyse where you went wrong, improve your work and submit it elsewhere.



Schulz

WRITING SKILLS

There is no correct way of writing, and each individual has his or her own style. However, here are some guidelines that can be followed.

Writing aims

- ❑ Writing is all about communication: you are telling people about your ideas and results.
- ❑ Grab the reader's attention – science writing does not have to be boring!
- ❑ There are often several good ways to say the same thing, not one “correct” way, so use the style that is easiest for you.

The ABC of writing style

- ❑ **Be Accurate**
Science is a precise discipline. Your descriptions or results may be used by others who need to know they are reliable.
- ❑ **Be Brief**
Use only as many words as you need – remove or replace words that are repeated or do not add anything useful.
- ❑ **Be Clear**
You will not be there to explain to the reader what you mean. If you have to read a sentence again in order to understand it, rewrite it. Better still, give your work to others to read to see if it makes sense to them.

Planning your paragraphs

This is the key to writing logical, structured reports:

- ❑ Start with generalities and then move towards more specific ideas.
- ❑ There should be an obvious logical connection between paragraphs.
- ❑ There should be one main or theme point per paragraph; if the paragraph contains too many themes, create a new paragraph or paragraphs.

Language and grammar

Use plain words

- ❑ Impress the reader with your project, not your knowledge of the dictionary.
- ❑ Avoid jargon and abbreviations as they may not be widely known.

Avoid long sentences

- ❑ Long sentences are hard to follow. Shorter sentences help you write concisely.

Be concise

- ❑ This keeps your writing from being swamped with unnecessary words.
- ❑ Make your writing clear and therefore easy to follow.
- ❑ All journals have strict word limits!

An example of writing that is not concise

The data that were collected in this study were obtained by walking 6 x 500 m transects that traversed, from one side to the other, study plots in each of the four forest compartments (K14, K12, K10) listed in the previous section.

All the words that are underlined are unnecessary and can be removed without any loss of important information, leaving:

The data were obtained by walking 6 x 500 m transects in each of the four forest compartments.

Grammar

You can be a very good writer without knowing much about grammatical terms. Simple writing is often easier to follow than writing that uses complex structures.

- ❑ Remember to use the same tense throughout your paper.
- ❑ Most problems occur in long, complex sentences – a good reason to keep them short.

Full information transfer

- ❑ Each sentence should give you all the information you need.

Example where not enough information is given

A number of pitfall traps were set up at several transects and sampled at frequent intervals during the project period.

This is too vague. You still need to explain how many pitfall traps, how many transects, what the intervals were and so on.

Rewrite as:

Fifty pitfall traps were set up on each of 10 transects and sampled at weekly intervals between April and June.

Make it look good

- ❑ Get rid of ALL typing and spelling errors; if your writing looks careless, people may not trust the accuracy of your work.

Be consistent

- ❑ Use the same definitions throughout – if you introduce a definition in the methods, use the same term in the results and discussion.

In summary

- Concentrate on communicating your work and your ideas.
- Structure your writing by planning your paragraphs.
- Be concise – use only as many words as you need and no more.
- Even experienced scientists give drafts of their papers to colleagues to comment on and point out bits that are unclear. Your final report will be much better if you do this as well.

This could be your published work!



LIST OF COMMON JOURNALS

Where might you consider publishing? Here is a list of common journals using the SCI Journal Citation Report Impact Factors 1998-2004.

| Common African Journals | | |
|---|-------------------|-------|
| Journal Title | Short Name | 2004 |
| African Entomology | Afr Entomol | 0.225 |
| African Invertebrates: a journal of biodiversity research | | |
| African Journal of Ecology | Afr J Ecol | 0.416 |
| African Journal of Hydrobiology and Fisheries | | |
| African Zoology (was S A J of Zoology) | Afr Zool | 0.000 |
| East African Agricultural and Forestry Journal | | |
| Journal of East African Natural History | JEANH | |
| Ostrich: Journal of African Ornithology | Ostrich | 0.548 |
| Pachyderm | | |
| Scopus | | |
| South African Journal of Animal Science | S Afr J Anim Sci | 0.302 |
| South African Journal of Botany | S Afr J Bot | 0.464 |
| South African Journal of Science | S Afr J Sci | 0.414 |
| South African Journal of Wildlife Research | S Afr J Wildl Res | 0.293 |
| South African Journal of Zoology | S Afr J Zool | 0.525 |

| Common International Journals | | |
|--|----------------------|-------|
| Journal Title | Short Name | 2004 |
| Agriculture Ecosystems & Environment | Agr Ecosyst Environ | 1.207 |
| Ambio | Ambio | 1.403 |
| American Naturalist | Am Nat | 3.944 |
| American Zoologist (integrative & comparative biology) | Am Zoo | 3.667 |
| Animal Behaviour | Anim Behav | 2.092 |
| Animal Conservation | Anim Cons | 1.309 |
| Annual Review of Ecology and Systematics | Annu Rev Ecol Syst | 9.429 |
| Applied and Environmental Microbiology | Appl Environ Microb | 3.389 |
| Aquatic Conservation | Aquatic Conserv | 0.990 |
| Auk | Auk | 1.690 |
| Behavioral Ecology | Behav Ecol | 2.189 |
| Behavioral Ecology and Sociobiology | Behav Ecol Sociobiol | 2.180 |
| Behaviour | Behaviour | 0.942 |
| Biodiversity and Conservation | Biodivers Conserv | 1.197 |
| Biological Conservation | Biol Conserv | 2.166 |
| Biological Journal of the Linnean Society | Biol J Linn Soc | 2.261 |
| BioScience | BioScience | 3.041 |
| Bird Study | Bird Study | 0.729 |
| Botanical Journal of the Linnean Society | Bot J Linn Soc | 1.510 |
| Coastal Management | Coast Manage | 0.308 |
| Condor | Condor | 1.207 |
| Conservation Biology | Conserv Biol | 3.672 |
| Ecography | Ecography | 2.841 |
| Ecological Applications | Ecol Appl | 3.287 |

Common International Journals

| Journal Title | Short Name | 2004 |
|--|----------------------|-------------|
| Ecological Economics | Ecol Econ | 1.266 |
| Ecological Monographs | Ecol Monogr | 5.016 |
| Ecology | Ecology | 3.650 |
| Environmental Conservation | Environ Conserv | 1.841 |
| Environmental Monitoring and Assessment | Environ Monit Assess | 0.608 |
| Environmental Pollution | Environ Pollut | 2.205 |
| Estuaries | Estuaries | 1.354 |
| Evolution | Evolution | 3.632 |
| Evolutionary Ecology | Evol Ecol | 3.215 |
| Folia Primatologica | Folia Primatol | 0.926 |
| Freshwater Biology | Freshwater Biol | 2.205 |
| Functional Ecology | Funct Ecol | 2.718 |
| Ibis | Ibis | 1.206 |
| Insects Systematics & Evolution (was: Entomologica Scandinavica) | Insect Syst Evol | 0.941 |
| Journal of Animal Ecology | J Anim Ecol | 3.342 |
| Journal of Applied Ecology | J Appl Ecol | 3.266 |
| Journal of Arid Environments | J Arid Environ | 0.722 |
| Journal of Avian Biology | J Avian Biol | 1.658 |
| Journal of Biogeography | J Biogeogr | 2.329 |
| Journal of Chemical Ecology | J Chem Ecol | 1.607 |
| Journal of Ecology | J Ecol | 3.397 |
| Journal of Environmental Management | J Environ Manage | 0.780 |
| Journal of Experimental Marine Biology and Ecology | J Exp Mar Biol Ecol | 1.588 |
| Journal of Experimental Zoology | J Exp Zool | 1.854 |
| Journal of Field Ornithology | J Field Ornithol | 0.509 |
| Journal of Insect Physiology | J Insect Physiol | 1.468 |
| Journal of Mammalogy | J Mammal | 1.352 |
| Journal of Molecular Biology | J Mol Biol | 5.542 |
| Journal of Parasitology | J Parasitol | 1.207 |
| Journal of Plankton Research | J Plankton Res | 1.189 |
| Journal of Raptor Research | J Raptor Res | 0.269 |
| Journal of Tropical Ecology | J Trop Ecol | 1.196 |
| Journal of Vegetation Science | J Veg Sci | 1.589 |
| Journal of Wildlife Management | J Wildlife Manage | 1.436 |
| Journal of Zoology | J Zool | 0.889 |
| Landscape Ecology | Landscape Ecol | 2.092 |
| Mammalian Biology (was: Zeitschrift fur Saugertierkunde) | Mamm Biol | 0.605 |
| Marine Biology | Mar Biol | 1.772 |
| Marine Ecology – Progress Series | Mar Ecol – Prog Ser | 2.052 |
| Marine Pollution Bulletin | Mar Pollut Bull | 1.101 |
| Microbial Ecology | Microbial Ecol | 2.703 |
| Molecular Biology and Evolution | Mol Biol Evol | 5.298 |
| Molecular Ecology | Mol Ecol | 4.375 |
| Natural History | Nat Hist | 0.081 |
| Nature | Nature | 32.182 |
| New Scientist | New Sci | 0.464 |
| Oecologia | Oecologia | 2.899 |
| Oikos | Oikos | 2.901 |
| Oryx | | 1.090 |
| Philosophical Transactions of the Royal Society of London Series B-Biological | Philos T Roy Soc B | 3.516 |
| Plant Ecology (was: Vegetatio) | Plant Ecol | 1.275 |
| Proceedings of the National Academy of Sciences of the USA | P Natl Acad Sci USA | 10.452 |



Common International Journals

| Journal Title | Short Name | 2004 |
|---|------------------------|-------------|
| Proceedings of the Royal Society of London B-Biological Sciences | P Roy Soc Lond B Bio | 3.653 |
| Public Library of Science (www.plos.org) | PLoS | 14.700 |
| Quarterly Review of Biology | Q Rev Biol | 3.062 |
| Revue d'Ecologie – Terre et la Vie | Rev Ecol-Terre Vie | 0.396 |
| Science | Science | 31.853 |
| Scientific American | Sci Am | 2.216 |
| Systematic Biology | Syst Biol | 10.257 |
| Transactions of the Royal Society of South Africa | T Roy Soc S Afr | 0.049 |
| Trends in Ecology and Evolution | Trends Ecol Evol | 12.938 |
| Water SA | | 0.263 |
| Wildlife Monographs | Wildlife Monogr | 1.667 |
| Wildlife Research | Wildlife Res | 0.855 |
| Zoological Journal of the Linnean Society | Zool J Linn Soc – Lond | 1.624 |



TROPICAL BIOLOGY ASSOCIATION

Skills Series

The **Skills Series** was developed in conjunction with the Tropical Biology Association's specialist training workshops. The workshops are collaboratively designed to fill specific skills gaps identified by the hosting African institutions. They develop capacity in the skills necessary for preparing funding proposals, publishing conservation research papers and communicating to decision makers and the public. The target group is conservation scientists and park ecologists working for government agencies, non-governmental organizations and research institutions.

The **Skills Series** provides resources for trainers on scientific writing and publishing, and fundraising. New titles will include research design and monitoring as well as communication skills.

Tropical Biology Association

The Tropical Biology Association is a non-profit organization dedicated to providing professional training to individuals and institutions involved in the conservation and management of tropical environments. The TBA works in collaboration with African institutions to develop their capacity in natural resource management through field courses, training workshops and follow-up support.

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