How to write a good research paper

PPT presentation by prof. dr. J. Feyen
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Content

• Why writing a research paper?
• Where to publish?
• Steps in the process of scientific writing
• The creation of a research paper
• Procrastination and writer’s block
• The review process
• How to maintain the publication flow?
• Authors instructions
• Text editing
• Quick checklist before submission
• Manuscript submission
• Fine-tuning your writing
Content

• Why writing a research paper?
Why writing a research paper?

• Dissemination of results is a general requirement by the research funder.
• Exchange of knowledge and expertise with colleague scientists, locally and internationally.
• Used as instrument for evaluation of personnel.
• Career making (impact factors of journals!).
• Personal satisfaction.
• Etc.
Content

• Why writing a research paper?
• Where to publish?
Where to publish?

- Might seems a stupid question!
- Of course in journals in your field for which the manuscript is appropriate.
- Authors get the best feedback from more prestigious journals.
- It is perfectly acceptable (especially for new writers) to consider submitting work to publications that – while still of high quality – are not the most prestigious.
Where to publish?

- The chance that your material get published is higher, but published in lower ranked journals.
- Doing so will build confidence and credibility.

- The most important thing is to match your manuscript with the most appropriate journal, given the substantive fit and the writer’s circumstances (new writer, experienced writer ...).
Where to publish?

- Different types of publications
  - Books:
    - Monographs
    - Collection of papers (e.g. *Proceedings*)
    - Series (e.g. Springer Tracts in...)
  - Journals:
    - Letter journals, review journals, *research journals*,
      commercial journals, *society journals*
  - Databases:
    - Bibliographic data (e.g. astronomical observations,
      genetic codes,...)
Where to publish?

• Different types of publications
  – And now: everything also possible in electronic format!
    • Commercial journals
    • Society journals
    • Letter journals
    • Review journals
    • Research journals

(How to handle? What will be the impact on the quality status of journals? How to define the impact factor? How to monitor? Etc. A lot of unknown elements but most likely the future!)
Content

• Why writing a research paper?
• Where to publish?
• Steps in the process of scientific writing
Steps in the process of scientific writing

• Research is (hypotheses, objectives, methods, results, analyses of data, interpretation of data, preliminary conclusions) completed.

• Writing the manuscript.

• Author sends article to journal/editor.

• Editor sends article to referees (validation by refereeing is an important tool for quality control).

• If not rejected: some corrections may be required, but finally paper is accepted and printed in journal (many months after writing of the paper !).
Steps in the process of scientific writing

• Title and abstract are included in databases, readers start referring to it, which is registered in citation database.

• Journal prestige (from impact parameter) leads to higher status of author, giving rise to uncontrollable subscription prices.

• New mechanisms become available, such as self-publishing in e-archives.
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The creation of a research paper

• **Title + authors names**
• **Abstract**: summary of the ‘why’, ‘how’ and ‘results’!
• **Introduction**: status of knowledge (with references to key literature), hypotheses and objectives
• **Methods**: detailed description of methods and performed research
• **Materials**: detailed description of the materials, data monitoring, conducted laboratory experiments, etc.
• **Results (and discussions)**: description of the research results followed by interpretation of findings
• **Conclusions (or Final comments and conclusions)**: summary of paper
• **Acknowledgments**
• **References**
The creation of a research paper

- Before jumping into the pool of writing make sure that the analyses of the results is finished.
- Before writing make first an outline of the manuscript, which could consist of a simple diagram of your thoughts.
- The outline should tell you were to begin and how the assignment can be split up into manageable parts.
The creation of a research paper

- Take pen to paper or fingers to keyboard and «write»! All of us in the business know that it is easier said than done. You might be sitting hours before the screen before a descent sentence appear, which later might end up in the recycle bin of your computer. In particular the first paper you write is tough, but publishers do not expect you to come up with polished prose!

- Science is technical writing … and this can be learned!
The creation of a research paper

- The first draft of your paper is the arena into which your ideas, observations, criticisms and hypotheses are thrown to battle one another to prove themselves.
- The composition of a manuscript is a journey through the tangled underbush of your unformed ideas.
- The first draft is the place where you can write anything and everything down and determine whether or not it works.
The creation of a research paper

– Although an outline was prepared, it is likely that the process of composing an initial draft will alter the original outline.

– The purpose of the initial draft is not more than to produce raw material. Having something on paper gives something to work with.

– It might be appropriate to pass already at this stage the draft to a senior colleague, but don’t be surprised that the draft might look more red than black when you get it back!
The creation of a research paper – but don't be surprised that the draft might look more red than black when you get it back!

Regional water balance: a new impact category for LCA applied to agriculture

Proposal for a new impact category: 'regional water balance'

The life cycle impact assessment methodology, originating from industry, when applied to agriculture needed to be adapted to the specific requirements of this sector. Important factors were recently introduced in LCA's applied to the agricultural sector, such as soil fertility, land use and biodiversity. The paper introduces a new output related impact category: 'regional water balance'. It is proposed to characterize the three themes with the 95th, 5th and 50th percentile of stream flow time series, generated by the production system under study. These stream flow time series can be estimated from more easily available data about land use and management, soil, topography and hydrology with a catchment scale hydrological model. The SWaT (soil and water assessment tool) model is proposed as an useful tool for this task, mainly for its capacity of data generation because of its flexibility and its generating facilities (e.g. a database with crop characterization, possibility to simulate missing weather data) and modeling the hydrology of the land phase as a function of current and future land uses. In order to demonstrate the proposed methodology, the discharge percentiles are calculated for a variety of land use scenarios for vegetables and grains, cultivated in Belgium, with application to a study catchment in Belgium. The simulated model results, stream flow time series are used to calculate the frequency of occurrence of extreme and average flows for a given land use/soil combination, enabling the calculation of the percentiles. These percentiles can then be expressed for a given functional unit, if the amount of functional units produced per area is known. Using yield, energy and protein content data and data about energy and protein content of vegetable and grains, the indicators for flood risk of the cultivated crops can be expressed in function of the nutritional value of the crops under consideration.

Keywords: water balance, catchment, hydrological model, SWAT, impact category, LCA, hydrological model, SWAT, catchment
The creation of a research paper

– The drafting of a paper can go slow – although it still will be the least time-consuming step in the research paper process.

– For new writers it is extremely important to go through this exercise under close supervision of a senior scientist.

– Although slow and difficult in the beginning, with practice, it does get easier and faster.
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Procrastination and writer’s block

• Procrastination (= putting things off) → occurs often with scientists who need a pressure build up as motivator. The risk however is that they lose in the course of the writing process again motivation, until they are put again under pressure, and after a while they might slowdown again, and it is very likely that the manuscript never or late finished!

• Writer’s block (= can’t get anything written) → coping with writing anxiety.
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The review process

• The reviewers normally check the manuscript against the following points:
  – Is the subject matter appropriate for publication in the journal to which it is submitted?
  – Is the work scientifically and technically sound?
  – Is the work sufficiently unique?
  – Is the paper well written and organized?
  – Is the title appropriately chosen?
  – Is the abstract a good summary of the paper?
The review process

- Has adequate reference and synthesis been given for previous contributions in this area?
- Are the Figures and Tables effective supplemental to the text?
- Can the paper be understood by a wide scientific and technical audience?
- Are the materials and results supporting the discussion and conclusions?
- If applicable, do the authors explain and demonstrate satisfactorily why the presented methodology is needed, and its advantages and disadvantages over other methods.
The review process

• Overall evaluation and recommendation
  – How do you rate the manuscript? Excellent ___ Very Good ___ Good ___ Fair ___ Poor ___
  – What course of action do you recommend?
    ✓ Publish as it is …
    ✓ Publish after author(s) have the opportunity to make recommended improvements …
    ✓ Return to authors for major revisions and additional review …
    ✓ Decline the manuscript …
The review process

• The review process normally takes anywhere between 5-6 weeks to 5-6 months, and for some prestigious journals it might even take longer. It depends on the journal and the speed with which reviewers review the manuscript.

• The reviewers are not paid for the review, with the consequence that they plan this between other ongoing activities, and as such the manuscript might get covered by other material, and out of view.
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How to maintain the publication flow?

- Work in a stimulating environment;
- Be part of a research team;
- Research team should have a clear and well defined strategy, organized and disciplined;
- Have within the research group PhD-students, and undergraduate students to assist the PhD-staff;
- What about project staff (report writing)?
- Have seniority within the team for pre-review of documents (internal quality control); and
- Don’t loose momentum.
How to maintain the publication flow!

Publication record of the Laboratory for soil and water

An average of 28 publ. (14 publ. in peer reviewed journals) per year

An average of 3 PhD-dissertations per year
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Authors instructions

• Instructions vary from journal to journal.
• In the following, as an example, some ideas which one might find back in most “instructions for authors”, often phrased and structured in a different way, are presented.
• Best is to consult the website of the journal / publishers.
Authors instructions

• General instructions
  – The journal’s language is traditionally British English or American English spelling. Either one should be followed consistently throughout the article.
  – Manuscripts should be printed or typewritten on A4 or US Letter bond paper, one side only, leaving adequate margins on all sides to allow reviewers‘ remarks. Traditionally editors request double-spacing of all material, including notes and references.
  – Quotations of more than 40 words should be set off clearly, either by indenting the left-hand margin or by using a smaller typeface.
Authors instructions

– Pages ought to be numbered consecutively with the first page containing:
  > running head (shortened title);
  > article type (if relevant);
  > title;
  > author(s);
  > affiliation(s); and
  > full address for correspondence, including telephone and fax number and e-mail address.

• Abstract

  – The abstract should be short, concise and precise, usually not more than 100 to 250 words. The abstract should not contain any undefined abbreviations or unspecified references.
Authors instructions

• Key words
  – Traditionally journals request to provide 5 to 10 key words or short phrases in alphabetical order.

• SI Units
  – The use of System International (SI) units as primary units of measure is mandatory. Other units may be given in parenthesis after the SI unit if the author desires.

• Definitions and Symbols
  – The use of standard definitions and symbols as specified by the editor is requested.
Authors instructions

• Equations
  – In text, write single-level expressions, e.g., \( \frac{1}{a + b} \), not stacked equations. In numbered (displayed) equations, stack numerators over denominators. All displayed equations should be numbered sequentially throughout the entire manuscript, including appendixes. Equations should be in the body of a manuscript.

• Tables and Figures
  – Each figure and table should be numbered and mentioned in the text.
  – Figures and tables should be placed at the end of the manuscript following the Reference section.
• Tables and Figures (continued)
  – The approximate position of figures and tables should be indicated in the margin of the manuscript. On the reverse side of each figure, the name of the (first) author and the figure number should be written in pencil; the top of the figure should be clearly indicated.
  – Each figure and table should be accompanied by an explanatory legend.
  – The figure legends should be grouped and placed on a separate page.
  – Explanatory footnotes, identified by superscript letters, should be placed immediately below the table.
• Tables and Figures (continued)
  – In addition to hard-copy printouts of figures, authors are mostly requested to supply the electronic versions of figures in either Encapsulated PostScript (EPS) or TIFF format. Previous might change from journal to journal.

• Section headings
  – First-, second-, third-, and fourth-order headings should be clearly distinguishable and should be numbered (1, 1.1, 1.1.1, 2, 2.1, etc.).
Authors instructions

• Appendices
  – Supplementary material should be collected in an Appendix and placed before the Notes and Reference sections (not true for all journals).

• Notes
  – Please avoid notes, but if any, use footnotes rather than endnotes. Notes should be indicated by consecutive superscript numbers in the text. A source reference note should be indicated by means of an asterisk after the title. This note should be placed at the bottom of the first page.
Cross-referencing

In the text, a reference identified by means of an author’s name should be followed by the date of the reference in parentheses. When there are more than two authors, only the first author’s name should be mentioned, followed by “et al.”. In the event that an author cited has had two or more works published during the same year, the reference, both in the text and in the reference list, should be identified by a lower case letter like ‘a’ and ‘b’ after the date to distinguish the works.

Examples:

Winograd (1986, p. 204); (Winograd, 1986a, b); (Winograd, 1986; Flores et al., 1988); (Bullen and Bennett, 1990).
Authors instructions

• Acknowledgements
  – Acknowledgements of people, grants, funds, etc. should be placed in a separate section before the References.

• References
  – References to books, journal articles, articles in collections and conference or workshop proceedings, and technical reports should be listed at the end of the article in alphabetical order. Articles in preparation or articles submitted for publication, unpublished observations, personal communications, etc. should not be included in the reference list but should only be mentioned in the article text (e.g., T. Moore, personal communication).
• References (continued)
  – References to books should include the author‘s name; year of publication; title; page numbers where appropriate; publisher; place of publication, in the order given in the example below.
  – References to articles in an edited collection should include the author‘s name; year of publication; article title; editor‘s name; title of collection; first and last page numbers; publisher; place of publication., in the order given in the example below.
References (continued)

- References to articles in conference proceedings should include the author‘s name; year of publication; article title; editor‘s name (if any); title of proceedings; first and last page numbers; place and date of conference; publisher and/or organization from which the proceedings can be obtained; place of publication, in the order given in the example below.

• References (continued)
  – References to articles in periodicals should include the author’s name; year of publication; article title; abbreviated title of periodical; volume number (issue number where appropriate); first and last page numbers, in the order given in the example below.

Authors instructions

• References (continued)
  – References to technical reports or doctoral dissertations should include the author’s name; year of publication; title of report or dissertation; institution; location of institution, in the order given in the example below.

**Authors instructions**

- **Proofs**
  - Proofs will be sent to the corresponding author. One corrected proof, together with the original, edited manuscript, should be returned to the Publisher within three days of receipt by mail (airmail overseas).

- **Offprints**
  - 50 offprints of each article will be provided free of charge. Additional offprints can be ordered by means of an offprint order form supplied with the proofs. Varies from journal to journal.
Authors instructions

• Page Charges and Color Figures
  – No page charges are levied on authors or their institutions. Color figures are published at the author's expense only. Journal dependent.

• Copyright
  – Authors will be asked, upon acceptance of an article, to transfer copyright of the article to the Publisher. This will ensure the widest possible dissemination of information under copyright laws.
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Text editing

• You should know what are the requirements!
  – Publisher may reformat your text to fit his standards (→ don’t care too much about editing!)
  – Publisher may suggest to use specific software and template (e.g. *Kluwer Academic Publishers* prefer articles submitted in word processing packages such as MS Word, WordPerfect, etc. running under operating systems MS DOS, Windows and Apple Macintosh, or in the file format LaTeX).
Text editing

– For submission in LaTeX, *Kluwer Academic Publishers* have developed a Kluwer LaTeX class file, which can be downloaded from: http://www.wkap.nl/authors/irnlstylefiles/

– Use of this class file is highly recommended. Do not use versions downloaded from other sites. Technical support is available at: texhelp@wkap.nl. If you are not familiar with TeX/LaTeX, the class file will be of no use to you. In that case, submit your article in a common word processor format.
Text editing

• TeX and LaTeX are open and public domain software developed by AMS.

• Input through simple ASCII files, not WYSIWYG!

• Requires three steps: writing, processing, viewing or printing.

• Text structure based on declarations, similar to XML.

• Examples:
  – you are {\bd very} special $\Rightarrow$ you are very special

  – $\frac{\sqrt{\omega}}{b} \Rightarrow \frac{\sqrt{\omega}}{b}$
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Quick checklist before submission

- Is your manuscript typed DOUBLE-SPACED with generous margins?
- Is the correct number of copies supplied?
- To which division or journal should the manuscript be submitted?
- Are your illustrations ready for publication?
- Is your math clear?
- Is each table typed on a separate sheet of paper?
- Does your paper meet the length (number of word) limitation?
Quick checklist before submission

- Are your references complete?
- Have you used the mandatory International System of Units (SI)?
- Have you obtained permission for figures previously published?
- Have you double-checked the spellings of authors' names in your references?
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Manuscript submission

• **After acceptance**, the editor will requested to submit the latest (i.e., revised) version of your manuscript.

• **Most Publishers** request the submission of manuscripts and figures in electronic form in addition to a variable number of hard-copy printouts (4 to 6-fold printout).
  
  – The preferred storage medium for electronic manuscript is a 3 1/2 inch diskette; and
  
  – The diskette should be properly labeled, giving exact details on the name(s) of the file(s), the operating system and software used.
Manuscript submission

• From the publisher’s office the manuscript goes to the printing division of the journal.
• A proof print is send to the senior author for proofreading which has to be returned within a fixed period in order not to delay the publication of the journal’s volume.
• After having returned the proof print with comments the manuscript goes in final printing and publication.
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Fine-tuning your writing

If writing is a requirement of your work you are a professional writer …!

But are you writing at a professional level?
Fine-tuning your writing

- Book published by William R. Luetten, Madison, Wisconsin, USA (= an introduction to advanced writing techniques for scientists, engineers, physicians, and other professionals).

- **Content:**
  - Consider the reader
  - Beginning to write
  - Professional writing
  - Truly great writing
  - A few specifics
  - Grammar
  - Words
  - Titles
Fine-tuning your writing

• Content (continued):
  – Abstracts
  – Tables and Figures
  – References
  – Statistical presentation
  – Passive voice
  – Plagiarism
  – Reviewing and Reviewers
  – Electronics and Electronic Publishing
  – Poster presentations
  – Detailed index
Fine-tuning your writing

• **Order on-line from:**
  http://Fine-TuningYourWriting.com
  – One book for $45 + $6 shipping outside the US
  – Six books for $170 + $36 shipping outside the US

• Visiting lecturer for the graduate students of the Department of Environmental Sciences of ETHZ, Zurich, Switzerland (June 9-13, 2003).