MOR2 DATA ANALYSIS & SCIENTIFIC WRITING WORKSHOP

November 18-21, 2014, Ulaanbaatar, Mongolia

Agenda

- Welcome, Introductions, Objectives
- Day 1: Research questions, literature review, hypotheses, statistical assumptions, data transformation
- Day 2: Data analysis, creating graphs and tables
- Day 3: Organizing and writing a scientific paper
- Day 4: Peer review process, complete conference abstracts, workshop evaluation

Topics

- Why publish?
- Peer review and publication process
- Where to publish?
- Writing a scientific paper
  - Before you start—Read, read, read
  - Organizing a paper—what goes where
  - Formatting—details matter!
- Tips for effective scientific writing

Parts of this presentation are adapted from “Writing Scientific Manuscripts, a guide for undergraduates”, Journal of Young Investigators, 2005, and D. McGowan, 2012, How to Write for and Get Published in Scientific Journals.”
Why publish?

- To exchange ideas, advance science!
- Our work as scientists is not complete until the results are communicated!!
- Ensures a permanent record of your contribution
- Required to
  - Graduate (some graduate programs)
  - Secure employment in research field
  - Obtain research funding
  - Advance career

Why publish in English?

- English is the international language of science
- Others want to know about Mongolian researchers’ results!
- Increases reputation of individual scientists, teams and institutions
- Increases opportunities for international collaboration and funding
Competition to publish

- Number of submissions increasing much faster than number of journals
- Thus, publication success depends on
  - Quality of the science
  - Quality and professionalism of articles submitted

Peer-review Process

- Method for assessing quality and relevance of scientific papers—making publication decisions
- Ensures quality and completeness of paper—improves your contribution
- Peer: an established scientist in relevant field, almost always a PhD
- Review: assessment of submitted papers against an established set of criteria
- Usually 2-3 reviewers per submitted paper
- Reviewers are unpaid volunteers—part of professional service

Peer-review & Publication Process (6-18 months total)

1. Submit Manuscript
2. Editor decision—review or reject
3. Manuscript sent to 2-3 reviewers
4. Reviewers submit comments & recommendation
5. Editor decision:
   i. Reject
   ii. Major revisions
   iii. Minor revisions
   iv. Accept as is
6. Revise manuscript & respond to reviewer comments
7. Resubmit manuscript
8. Editor decision (or re-review by reviewers)
9. Final acceptance
10. Copy editing
11. Review page proofs
12. Publication

Criteria for publication (more on this later)

- Novelty
  - New knowledge
  - Advances theory
  - Methodological innovation
- Broad interest
  - Relevance to wide audience
  - Practical implications
- Quality of science
  - Appropriate methods and analysis
  - Conclusions supported by data
Peer-review process

- On average:
  - ~ 30% of submissions rejected
  - 45% major revisions
  - 20% minor revisions
  - <=5% accepted as is
- High impact journals are most selective
- Lower impact journals have higher acceptance rate

Where to publish?

- Peer-reviewed journal article
- Peer-reviewed book chapter
- Peer-reviewed conference proceedings
- Book chapter
- Book
- Conference proceedings
- Non-technical or non-peer-reviewed journal

Where to publish?

- What type of journal? Who is the target audience?
  - Field-specific?
  - Interdisciplinary?
- Types of articles typical for journal?
  - Experiments? Observational studies? Case studies? Qualitative vs. quantitative research?
- Impact factor/selectivity?
  - Likelihood of success vs Impact if accepted
- Time to publication?
  - Fast or slow review process
  - Time to print/on-line publication after acceptance

Example rangeland journals

<table>
<thead>
<tr>
<th>RANGELAND SPECIFIC</th>
<th>BROADER JOURNALS</th>
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<tr>
<td>Rangeland Ecology and Management</td>
<td>Ecological Applications</td>
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<td>The Rangeland Journal</td>
<td>Jl of Applied Ecology</td>
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<tr>
<td>Grassland and Forage Science</td>
<td>Jl of Applied Vegetation Science</td>
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<td>Pastoralism</td>
<td>Global Environmental Change</td>
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<td>Nomadic Peoples</td>
<td>Agricultural Systems</td>
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<td>Rangelands</td>
<td>Ecosphere</td>
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<td>Environmental Management</td>
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<td>Journal of Arid Environments</td>
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<td>Human Ecology</td>
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<td>Society &amp; Natural Resources</td>
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<td>Development &amp; Change</td>
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Selecting your target journal

- Read articles in potential journals
- Read Author Guidelines for each journal
- Consider the novelty and interest of your research

New Findings

Incremental Advances

Conceptual Advances

Region-specific

Broad applications

Moderate to high impact

Low to moderate impact

(Adapted from McGowan 2012)

Activity

- Select a journal from the list provided
- Go to the journal’s website
- Look at page of contents for last 3 issues
  - Are any titles relevant to your work?
  - What kinds of research do they publish (experiments, observational studies, case studies, qualitative studies?)
- What is the journal’s impact factor?
- Go to the Instructions for Authors
  - What kinds of topics does the journal cover?
  - What kinds of papers does it accept?
  - What are the page or word limits?
  - Other key guidelines?

Writing a scientific paper

Before you start…..

- Read, read, read to know how your work fits into existing theory and knowledge
- Ensure sound research design and analysis
- Have results in hand
  - Helps to have key tables and figures drafted
- Identify target journal

Writing a scientific paper

- A paper is a story about your research with a
  - Beginning (introduction)
  - Middle (body)
  - End (conclusion)
- Like a story it should have a main message
  - What should readers remember about your paper?
- MUST be clear and easy to read
Writing a scientific paper

- **Beginning (introduction)**
  - **Assertion** – tell them what you are going to tell them

- **Middle (body)**
  - **Evidence** – tell them

- **End (conclusion)**
  - **Affirmation** – tell them what you told them

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Basic Structure (IMRaD)

1. **Introduction** (Assertion)
2. **Methods**
3. **Results** (Evidence)
4. **Discussion** (Affirmation)
5. **References**

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Order of Writing

1. **Methods and Results**
   - Write *first*, as you are doing the research and analysis
2. **Introduction and Discussion**
   - Write *after* you have results and select target journal
3. **Title and Abstract**
   - Write *last*

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Abstract (100-300 words)

- Describe problem addressed (1-3 sentences)
- State objectives & hypotheses (1-4 sentences)
- What was done? (methods) (1-2 sentences)
- What did you find? (results) (1-4 sentences)
  - Most important results
- Final statement (conclusion and implications) (1-2 sentences)

*Many people will ONLY read the abstract—it must stand alone*
Introduction (~500 words)

- Answers:
  - What did you study?
  - Why was it studied?
  - Puts your work into context

- Broad statement of purpose/problem
- Broad background
  - Puts work in context
  - Cites key works, reviews
- Narrower background
  - Explains rationale for work
  - 1-2 sentence statement on approach/methods
  - Cites key works
- Ends with 1-3 clear & specific objectives and/or hypotheses

Methods—how did you do your work?

- Use subheadings for readability and organization
  1. Study sites
  2. Study populations/subjects
  3. Research design and sampling
    - Stratification, randomization, controls etc.
  4. Data collection methods
    - Include specific methods, citations to support selection of methods
  5. Data analysis methods
    - Include statistical tests and computer program

Results—what did you find?

- Use subheadings for readability and organization
- Organize following your objectives or hypotheses
- Accurate, brief, clear
- Use figures and tables for most important results
- Do not explain results, only report them
- Use past tense to describe results
  - "Biomass was significantly greater in 2013..."
- Use present tense to refer to figures and tables
  - "Figure 1 shows ..."
Discussion—what do results mean?

- Beginning: answer the research question
  - Are your hypotheses supported or not supported by results?
  - State most important results first
  - What is your major conclusion?
- Middle: interpret your results
  - Compare with other studies
  - Unexpected results?
  - Limitations and improvements?

Discussion—what do results mean?

- End: Conclusions and Implications
  - Restate major conclusions
  - Implications
    - Applications to management
    - Applications to policy
  - Suggest future research

References Cited

- References in text and in references cited MUST BE FORMATTED EXACTLY following journal requirements
- Follow instructions precisely. Details matter!
- Use bibliographic software to help.
  - ENDNOTE
  - Zotero (free)
  - LaTex (free)

When to Cite

- When in doubt, cite!
- When you reference the ideas or work of another person
- When you make an assertion of fact that is not common knowledge
- When you use exact language from another work (MUST appear in quotations with page number)
- NEVER USE ANOTHER PERSON'S WORDS, IDEAS, OR IMAGES WITHOUT CREDITING THEM
You do it! Write Results Section

- Use your
  - Organized statistical output
  - Tables and figures
    to help organize and guide your writing
- **Outline your results first**, using a logical order
  that follows the order of your objectives or
  hypotheses
- Then, fill in outline with your results

You do it! Outline Discussion Section

**Beginning:** Answer the research question
1. Are hypotheses supported?
2. Major conclusions

**Middle:** Interpret results
3. Compare with other studies
4. Unexpected results, explanation of findings
5. Limitations of study

**End:** Conclusions & implications
6. Restate main conclusion(s)
7. Management and policy implications
8. Future research

You do it! Outline Introduction

1. Broad statement of purpose/problem
2. Broad background
   - Put work in context
   - Cite key works, reviews
3. Narrower background
   - Explain rationale for work
   - 1-2 sentence statement on approach/methods
   - Cite key works
4. End with 1-3 clear & specific objectives and/or
   hypotheses

You do it! Write your abstract

- Use the MOR2 conference abstract template
- Based on your results and discussion, write
  your abstract following the guidelines provided
- At the very end, write a TITLE that is specific
  and descriptive of your study and findings
Questions!