RESEARCH PAPER ASSIGNMENT
Ecosystem Ecology (EEB 4609W/5609), Fall 2009

Assignment Overview

This *Research Paper* assignment provides you with an opportunity to explore in depth a question or problem in ecology that interests you. The **specific objectives** of are to help you:

- to help you synthesize and clarify information about some of the current controversies and unresolved issues in ecosystem ecology

- to help you develop written communication abilities that you can use as you pursue your post-graduate career or further study

The first step will be to identify a question or problem to research. Research questions are NOT restricted to material that we have already covered in lecture. Choose a question that interests you. Make sure your question is not too broad or you will have a hard time focusing down. On the other hand, if the question is too narrow, you'll struggle to find good references. Consider bringing together information from multiple sources to synthesize current understanding of a problem or reviewing a current controversy and evaluating its different sides to reach some conclusion. Examples of appropriate research paper questions are:

- How large are effects of elevated CO_2 on NPP expected to be and what are the important factors that constrain these effects?

- What is the current consensus and uncertainty regarding the size and the location of the residual terrestrial carbon sink?

- What are the current threats to ocean systems of elevated CO_2 and what should the immediate research priorities be in this area?

- How do different biofuels compare in terms of the ratio of environmental costs vs. environmental benefits of using them?

- What factors determine the strength of trophic cascades and do these factors operate similarly between terrestrial and aquatic ecosystems?

The intended audience for your research paper is the broad community of ecologists. Thus, your paper should be modeled after the review articles that appear in *Trends in Ecology and Evolution* and *Frontiers in Ecology and the Environment*. Also, for an example of a successful, well-written research paper from a previous year's class, visit the course website.

Writing Resources

For a variety of writing-related resources, check out http://writing.umn.edu/sws. The "Quick Tips" listed at http://writing.umn.edu/sws/quicktips/quicktips.htm are especially useful for getting hints about writing style, grammar, punctuation, etc.

Approach

The research paper is broken down into several steps to help you 1) learn to comfortably navigate the primary literature, 2) formulate the question that you want to answer in your paper, and 3) make a synthetic contribution to ecological science. Your final research paper grade will be based on a PORTFOLIO of these assignments that have the following deadlines:

Sept 18 Introduction to locating sources using the web (during Discussion)

Oct 2 *Navigating a Scientific Paper* Assignment due (in Discussion: 2 copies)

Oct 16 *Research Questions* due (in Discussion: 4 copies)
Peer Workshop: Research Questions
Workshop: Plagiarism

Oct 26 *Research Prospectus* due (in Class)

Nov 9 *First Draft of Research Paper* due (in WebVista and in Class: 4 copies)

Nov 20 *Peer Workshop: First Draft of Research Papers* (in Discussion)

Nov 30 *Second Draft of Research Paper* accompanied by *Revision Memo* due (in WebVista and in Class: 1 copy)

Dec 14 *Final Draft of Research Paper* accompanied by *Cover Letter* due (in WebVista and in Class: 1 copy)

Research Questions For this assignment, articulate in writing two possible research questions for your paper. We will spend class time discussing what makes a good research question. You should choose a research question that 1) interests you and 2) requires that you pull together sometimes-conflicting information from multiple sources to reach a conclusion that will contribute to ecological science. Feel free to pose a question in an area that we have not yet covered in class. I will try to recommend possible research questions throughout the course. It may be helpful to look ahead in the course readings for ideas. Bring 4 copies of your *Research Questions* when they are due. You will spend time in your **writing groups of 3-4 students** in class giving each other constructive feedback to help you settle on a final topic for your *Research Paper*.

Research Prospectus The *Research Prospectus* should include two parts. **First**, state your research question (settle on one based on the feedback you get in class) and write a short paragraph that states in several sentences **why it is important** (i.e., why answering this question will be a contribution to ecology). **Second**, put together an **annotated bibliography** of 3-5 references relevant to that question. For each reference, read it carefully, and, in a short paragraph, **describe both the main points of the paper and how it is relevant to your proposed question**.

First Draft Prepare your first draft as though you are preparing a final draft (see Nuts and Bolts, below, for details). Bring 4 copies of your *First Draft* when they are due. These drafts will be distributed to your **writing group of 3-4 students** and you will spend time in class giving each other constructive feedback. Aim high with this first draft, and use the peer response process to make your paper even better. I will provide guidelines for preparing your peer responses closer to the *Peer Response Workshop* date.

Second Draft Your second draft will be evaluated by the instructor according to the attached "Grading Rubric" but will not be graded. When you turn it in, it should be accompanied a *Revision Memo* explaining how you have responded to Peer Responses (more details to follow).

Final paper Your final draft will be evaluated by the instructor according to the attached "Grading Rubric", with **total points allocated 50% to content-related criteria (points 1-2) and 50% to writing-related criteria (points 3-6)**. When you turn it in, it should be accompanied a *Cover Letter* in which you assess your performance on the research paper assignment and provide an evaluation of how well your peers evaluated your first draft (more details to follow).

Portfolio Grade

In total, the *Research Paper* grade will be worth 25% of your course grade and will be based on a PORTFOLIO that includes the *Research Questions*, *Research Prospectus*, *Peer Response Workshop*, *Revision Memo* (accompanies your *Second Draft*), *Cover Lette*r (accompanies your *Final Paper*), and the *Final Paper*. Specifically, your total *Research Paper* grade will be apportioned among the different assignments as follows:

Research Questions	5%
Research Prospectus	5%
Peer Response Workshop Participation	10%
Revision Memo – accompanies *Second Draft*	2.5%
Cover Letter – accompanies *Final Draft*	2.5%
Final Paper	75%

The *Research Questions*, *Research Prospectus*, *Peer Response Workshop*, *Revision Memo* (accompanies your *Second Draft*), and *Cover Lette*r (accompanies your *Final Paper*) will all be scored with a **1, 2 or 3 (1=poor; 2=good; 3=exceptional)**. The *Final Paper* will be graded based on a **100-point scale according to the criteria described above**.

Late Policy All assignments are due at the beginning of class on the due date. If you have extenuating circumstances that prevent you from turning an assignment in on time, you must make arrangements with the instructor **ahead of time**. NO first drafts will be accepted after the due date. That means that students who don't hand in a first draft on time will forgo the chance to provide a peer review and receive a peer review and will automatically give up 12.5% of the total research paper grade. Students who turn in final papers after the due date will have their grades reduced by one grade for each late day after the due date.

Nuts and Bolts of the Paper

Organization The length of the paper should be 8-10 pages, double-spaced, 12-point Times or Times New Roman font, with 1" margins. *Research Papers* should include the following:

> **An Abstract** that summarizes the paper. The abstract includes an introduction to your central question, why this question is interesting or important, and your main conclusions regarding this question.
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> **An Introduction** that introduces the topic by laying out the context for the paper and answers the following questions: Why is the topic important or interesting or receiving attention from ecologists? What are the major questions or hypotheses that have guided research on this topic recently? What are the current controversies or unanswered questions surrounding the topic? What is the central question that you will focus on in your paper (i.e., what is your objective?)?
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> **A Review** of important classic papers as well as recent papers that address the topic. If presenting a controversy, this is where you describe and review support for the different sides of the issue.
>
> **A Synthetic Conclusion** that both wraps up the current state of knowledge of the paper topic but also points out where this research may be headed in the future. What are the major things that we know about this topic? If you are evaluating a controversy, this is where you draw conclusions about which side has the strongest arguments. What questions remain unanswered and will (should) be the focus of future research efforts?
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> **Bibliography** with all cited references (at least 8-10). See current issues of the journal *Ecology* for examples of how to cite references within the text and bibliography.

Writing style Avoid passive voice. Begin each paragraph with a **topic sentence**. Begin and end your paper (as well as subsections within your paper) with an **introduction** and a **conclusion**. Cite all references **within** the text of your paper, rather than by using footnotes. See *Ecology* for examples of how to format in-text citations and bibiolographies.

Libraries and sources The most useful references are articles written in peer-reviewed scientific journals. Edited volumes (edited books containing review articles) are also useful. Most of the ecological journals and books are housed in **Magrath Library** and the **Entomology/Fisheries/Wildlife Library**. Some of the journals related to climate change and geochemistry are located at **Walter Library**.

World Wide Web Citing information from the World Wide Web in your term paper is NOT appropriate in almost all instances. If you feel you can justify use of the WWW, please come see me and we will discuss it individually.

Electronic Indexes Google Scholar, Web of Science, BIOSIS (and Biological Abstracts), and **Geobase** are the most useful indexes for searching the ecological literature. The TA and your

reference librarians can help you get started with these indices if you are not already familiar with them. You will be introduced to them formally in *Discussion*.

Plagiarism Plagiarism is deliberately handing in another person's work as your own. It may be the work of a classmate, another scientist whose work you read while researching a topic, or something you pulled of the internet. It may be overt, in the form of copying answers from a colleagues' test, or it may be subtle, in the form of quoting or paraphrasing information from another source without properly acknowledging that source. If you want to use *the exact wording* from a published work, because you think it effectively makes a point, you must put the passage in quotation marks and cite the reference. More often, you will want to paraphrase another's ideas. Paraphrasing consists of expressing what an author is saying in your own words. In this case you should include reference to the author you paraphrase to indicate that the ideas are someone else's and not yours. If you are not clear about the differences between scholarly citation, collaboration and paraphrasing, please consult Dr. Hobbie or see the resources available at http://writing.umn.edu/tww/plagiarism/index.htm. All of your drafts will be checked for plagiarism using SafeAssign, when you turn your paper in through WebVista.

Evidence of academic dishonesty in any form will be forwarded to the Student Scholastic Conduct Committee. According to the university policy, academic dishonesty in any portion of academic work shall be grounds for awarding a grade of F for the entire course.

Research Paper Grading Rubric

Criteria	Excellent	Good	Fair	Weak
1. Central question clearly stated and justified				
2. Arguments, insights, and conclusions articulated, accurate and supported by sources				
3. Written to appropriate target audience using proper terms, explanations of concepts and jargon, and formal tone				
4. Properly formatted with Title, Abstract, Introduction, Conclusion, and References				
5. Organized into complete yet concise paragraphs with strong topic sentences that are well linked together				
6. Written with complete sentences, in active voice, without spelling or grammatical errors				
Note: Points 7, 8, and 9 are for Graduate Students Only				
7. Includes clear, testable, mechanistic hypotheses				
8. Study design is sound and is clearly designed to test hypotheses				
9. Broader impacts are clearly stated and the proposed work will have broader impacts in several of the categories outlined by NSF.				
Comments: Final Grade_____				