

# UNIVERSITY OF CALIFORNIA, SANTA CRUZ

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



SANTA BARBARA • SANTA CRUZ

ENVIRONMENTAL STUDIES DEPARTMENT

SANTA CRUZ, CALIFORNIA 95064

August 12, 2015  
[tpduane@ucsc.edu](mailto:tpduane@ucsc.edu)  
(415) 509-5263

VPDUE Richard Hughy  
(via email: [rph@ucsc.edu](mailto:rph@ucsc.edu))

Re: DC Grant Report

During the 2014-2015 academic year, the Environmental Studies Department was awarded a DCG Funds Grant for “The Environmental Problem Solving Writing Tutor Program” for ENVS 100 – Ecology and Society. ENVS 100/L is a required class for all ENVS majors, and is the only upper division course that all ENVS majors take. The course is the gateway to the upper division in ENVS and serves to achieve the following goals:

- To model how the interdisciplinary use of natural science (especially ecology), social science (especially political science and policy scholarship), and legal scholarship can help understand and address complex environmental problems.
- To help students to articulate, challenge, and justify assumptions or positions about environmental problems, their causes, and appropriate responses.
- To encourage the development and application of key analytical and learning tools.

The major purposes of the funded grant were to formalize our ENVS 100 writing program, and explore new areas to enhance our DC skills raining. Specifically, we developed new methods to encourage students to develop more rigorous and effective process-oriented writing and multi-staged essay drafting. We also sought to increase the writing that students complete and also develop focus on writing style and form. Furthermore, we worked on formal TA training to improve their writing instructional abilities, specifically through developing more standardized, transportable materials for TAs and faculty to use in the future.

The funding was used to support an ENVS 100 lecturer and writing instructor, Phil Longo. Phil worked with two ENVS faculty -- Stacy Philpott (Winter 2015) and Zdravka

Tzankova (Spring 2015) to improve the ENVS 100 writing assignments and writing assignment grading rubrics, to develop detailed weekly lesson plans, and to finalize the ENVS 100 reading handbook for students. In addition, a suite of other handouts, power point presentations, and student writing samples were collected and collated for TA use in writing lab sections. All of these materials have been placed on Google Drive, were shared with all course TAs during the 2014-2015 academic year, and have been shared with the lecturer scheduled to teach ENVS 100 during the 2015-2016 academic year. These materials are attached here.

Thus far, we have assessed the success of this writing program in three ways. First, we have compared students' grades on first drafts of one assignment (Writing Assignment 1.1 and 1.2) to their grade on the revised version of this assignment (Writing Assignment 1 Revised). To do this, we calculated mean, max, min grades on the drafts and compared this with values for the revised version that students submitted approximately 5 weeks later (Table 1). On average, students scores improved by 5.97% between their first and final drafts. This was a significant increase according to a paired t-test ( $P < 0.0001$ ). We attribute these changes to work completed during lab (intensive peer review) and detailed comments provided by their course TA and by the writing instructor on improved grading rubric sheets.

**Table 1.** Scores for two draft (WA1.1, WA1.2) and revised (WA1-R) ENVS 100 writing assignments during Winter 2015.

	WA1.1	WA1.2	WA1-R
Min. Score	36.60%	40%	59%
Max. Score	98.60%	100%	100%
Mean Score	83.09%	82.24%	88.64%
SE Score	0.91%	0.91%	0.64%
No. students completing assignment	149	149	149

Second, we have qualitative reports from the TAs during both Winter 2015 and Spring 2015 that these versions of ENVS 100 were very well facilitated and reportedly much easier to teach than previous versions of ENVS 100. The TAs were highly appreciative of the writing tutor's (now easily available) weekly lesson plans and instructional handouts. The course staff during both quarters held weekly meetings, including all TAs, the writing instructor, faculty member, and undergraduate writing tutor to discuss the lesson plan, tips for teaching the writing lab, and for addressing any arising logistical issues in the course. The meetings were useful for TAs and both faculty members heard many positive comments regarding the materials produced by the writing instructor. Third, anecdotally, transfer of all materials for ENVS 100L between 2014-2015 instructors and 2015-2016 instructors has been extremely easy due to the new standardized assignments, online organization, and effort put forward by the 2014-2015 ENVS 100/L staff.

Please note two aspects of this DC Grant implementation that are of interest: (1) we used a new writing tutor in ENVS 100/L during 2014-2015 and the instructor for ENVS 100/L

in the winter was teaching the course for the first time, so there was a learning curve both for the writing focus of this DC grant and for integrating the various components of the course (the 2014-2015 writing tutor, Phil Longo, will return to teach throughout 2015-2016); and (2) the complex structure for the course—reflecting both the multiple roles it plays in the ENVS curriculum and the fact it is a required course at the upper-division level—has led to serious reconsideration by the ENVS faculty of its structure. The ENVS Curriculum Committee is therefore actively considering several changes to the course to emphasize the centrality of the DC writing element. We believe such changes warrant further discussion among the entire faculty, however, so they will be a topic for an ENVS faculty retreat during Winter 2016. We will then submit any proposed changes in the structure of ENVS 100/L to CEP during Spring 2016 for implementation in 2016-2017.

The extensive attachment includes the ENVS 100/L syllabus, writing assignments, and other materials that we hope will help you review our implementation of the DC Grant. Please contact me at [tpduane@ucsc.edu](mailto:tpduane@ucsc.edu) or (415) 509-5263 if you have any questions.

Sincerely,

Tim Duane  
Professor  
Curriculum Committee Chair  
Environmental Studies Department

Attachment

**ENVS 100/L Ecology and Society, Winter 2015**  
**Course Syllabus & Information**

**Course Number and Title:**

ENVS 100/L -- Ecology and Society

**Class Time and Location:**

Lectures -- Tuesday & Thursday, 8:00-9:45 AM in Earth & Marine Sciences B206

Labs -- see below for times, all sections meet in ISB 431

**Instructors:**

Stacy Philpott (sphilpot@ucsc.edu)

Office hours: Mondays 4:00-6:00 pm in Natural Sciences 2 (NS2) 473

Philip Longo (plongo@ucsc.edu)

Office hours: Mondays 9:00-11:00 am in Natural Sciences 2 (NS2) 459

<b>Section</b>	<b>Teaching Assistant</b>	<b>Office Hours/Location</b>
01, Mon. 2:00-3:45 pm	Rachel Fabian (rfabian@ucsc.edu)	M 11:30-1:30, EMS D480
02, Mon. 4:00-5:45 pm	Rachel Fabian (rfabian@ucsc.edu)	M 11:30-1:30, EMS D480
03, Tues. 2:00-3:45 pm	Juniper Harrower (jharrowe@ucsc.edu)	T/Th 10:00-11:00, NS2 413
04, Wed. 11:00-12:45 pm	Victoria Stout (stout.victoria@gmail.com)	T2:30-3:30,W9:30-10:30, NS2 460
05, Wed. 2:00-3:45 pm	Victoria Stout (stout.victoria@gmail.com)	T2:30-3:30,W9:30-10:30, NS2 460
06, Thurs. 10:00-11:45 am	Melinda Conners (mgconner@ucsc.edu)	T 10:00-12:00, ISB 485
07, Thurs. 12:00-1:45 pm	Melinda Conners (mgconner@ucsc.edu)	T 10:00-12:00, ISB 485
08, Thurs. 4:00-5:45 pm	Juniper Harrower (jharrowe@ucsc.edu)	T/Th 10:00-11:00, NS2 413

**Writing Tutor:**

Schuyler Murphy Rieger (smrieger@ucsc.edu)

Drop-in tutoring hours: Time - Tues 12:00-2:00, ISB 485

**Course Overview**

This 5-unit lecture course explores interdisciplinary approaches to analyzing and addressing environmental problems. The 2-unit writing lab, 100L, is required of all students, and focuses on writing, peer editing, and group projects. This course is designed to introduce students to interdisciplinary environmental themes, debates and tools, but it is not an "overview" or "survey" learning experience. Rather, we hope to help students develop key intellectual foundations and practical tools for upper division work and future careers in the environmental field. This course has also been designed to introduce students to a range of research themes, faculty research interests, and courses in the Department. Finally, success in the environmental field calls for excellent research and writing skills – so we strive to hone critical thinking and advanced writing skills. This course fulfills half of the DC requirement for the major; the other half is met by the senior exit.

## Course Goals

This course has three major goals:

- To model how the interdisciplinary use of natural science (especially ecology), social science (especially political science and policy scholarship), and legal scholarship can help understand and address complex environmental problems.
- To help students to articulate, challenge, and justify assumptions or positions about environmental problems, their causes, and appropriate responses.
- To encourage the development and application of key analytical and learning tools.

In order to achieve those goals, we hope to engage students in the following activities:

- Finding, reading, and critically evaluating scientific and policy literature relevant to environmental issues
- Writing clear, concise arguments about different aspects of environmental issues
- Reading and evaluating graphical and statistical representations of data
- Engaging in group projects, team management and peer review with colleagues
- Explaining and critically examining major environmental challenges as well as different scientific, technical, legal, and policy tools for addressing such challenges
- Identifying future careers in environmental studies
- Developing topical knowledge in several important themes in ecology and society
- Devising theories of change that support the design of successful interventions to address environmental problems
- Constructing policy-relevant arguments and recommendations for decision-makers

## Required Materials

1. This syllabus is your course contract; familiarize yourself with it thoroughly.

2. Many course materials (e.g. readings, assignments, lectures) will be posted on e-Commons (<http://ecommons.ucsc.edu/>). To log into eCommons, you must obtain and use a CruzID Gold password. For more information, visit [http://its.ucsc.edu/services/accounts/change\\_gold\\_password.php](http://its.ucsc.edu/services/accounts/change_gold_password.php)

3. There are **two required texts**, available at the Baytree Bookstore:

- R. Carson. 2000. *Silent Spring*. Penguin Books.
- J. Davis. 2012. *Writing with Sources (4<sup>th</sup> Edition)*. Rowman and Littlefield.

4. We require that you read from and use in lab the Purdue Online Writing Lab (<http://owl.english.purdue.edu/owl/>), and the ENV5 100 Student Handbook (on e-Commons). See reading assignments later in syllabus for details.

5. **Please purchase and bring to lecture and lab EVERY TIME WE MEET a class notebook.** We recommend a hardbound Composition notebook (marbled cover, ~7.5 x 10, 40+ sheets). You will turn in your notebook to your TA periodically. Clearly label the cover of your notebook with your name, SID, TA's first name, and lab day/time.

6. You must purchase **scantron forms** (ONLY **Parscore form F-1712** is allowed) from the Bay Tree Bookstore. You will need four total (one for each of the quizzes). Please bring these on quiz days.

7. Please purchase a **lab folder** in which you can keep drafts of writing assignments, peer review notes, and grading sheets from TAs. You will need to keep everything and turn things in again.

### Course Expectations

#### **We expect students in the course to:**

- Come to the course with a background in politics, economics, ecology, and statistics, allowing us to move beyond review and on to practical, interdisciplinary applications.
- Engage the material deeply and critically; treat your education as if it is helping prepare you to change the world
- Participate conscientiously and professionally in peer-review and group efforts
- Attend lectures and labs and participate fully
- Check your UCSC email account regularly for course announcements, updates to reading or supplementary materials posted on the course eCommons site, etc.
- Complete all assigned readings *before* coming to class
- Complete and turn in *polished* assignments *on time*
- Maintain the highest standards of academic integrity
- Take the initiative to constructively use course resources - teaching assistants, writing tutors, and professors – so as to get the most out of the course
- Treat other students and the teaching staff with respect
- Avoid disrupting other students and the instructors: arrive on time; turn off & put away your cell-phones; use laptops for note-taking only; avoid going in and out during the lecture, and be in your seats and ready to go at the end of breaks

#### **You can expect that the teaching staff will:**

- Be organized
- Be available for help
- Return assignments in a timely fashion
- Treat you with respect
- Do our best to provide you with a stimulating, useful, and positive learning experience.

### Course Evaluation/Grades

#### **ENVS 100 - Lecture Evaluation (100 points total)**

<i>Item</i>	<i>% of grade</i>	<i>points</i>
Writing Assignment 1 (WA1.1 and WA1.2)	15	15
Writing Assignment 1R (WA1-R in schedule)	15	15
Writing Assignment 2 (WA2-indiv, WA2-group)	20	20
Salamander Assignment (stats/write up)	10	10
Quizzes (4, 10 points each)	40	40

## ENVS 100L - Lab Evaluation (100 points total)

<i>Item</i>	<i>% of grade</i>	<i>points</i>
Attendance - <i>If you are late to lab, you will lose attendance credit.</i>	25	25
Participation, including in-lab writing exercises and journal responses.	20	20
Peer review/redrafting process (WA1.1 and WA1.2)	10	10
Writing Assignment 2 (WA2) - group work	10	10
Writing Assignment 2 (WA2) - presentation	15	15
Journal Assignments #1-4 (2.5 points each)	10	10
Short Paper #1	5	5
Short Paper #2	5	5

### Course policies

1. **You can only pass this class and move on to upper-division classes if you pass BOTH lab and lecture.**

2. **Late Assignments.** Late written assignments will be docked 10% per calendar day late (50% maximum deduction per assignment). This includes first drafts due to your peer reviewers. Assignments are due at the start of lecture or lab; assignments received after 8 a.m. will be considered one day late. Assignments turned in must be clean copy and proofread – papers with excessive errors or formatting problems will be returned for clean-up and will be considered late.

3. **Grading Appeals.** Appeals for re-grading of any assignment must be *in writing* to one of the professors (NOT the TAs), and must be received *no sooner* than 12 hours and *no later* than one week after the assignment was returned.

4. **Special Accommodations.** If you qualify for classroom accommodations because of a disability, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to one of the instructors (not TAs) during office hours or by appointment, preferably within the first two weeks of the quarter. Contact DRC by phone at 831-459-2089, or by email at [drc@ucsc.edu](mailto:drc@ucsc.edu) for more information. Any other special accommodations, questions, and/or situations should be directed to your TA or an instructor during the first week of class.

5. **Attendance and catching up.** You cannot get credit for attending a lab other than your own. If you miss lecture or lab, it is your responsibility to obtain missed information from a classmate. Attendance is worth 3.125 points per lab. If you arrive >10 min. late, you earn 2 points. If you arrive >30 min. late, you will get no credit.

6. **Academic Integrity.** We have a *zero tolerance* policy for **plagiarism and cheating**. No credit will be given for an assignment where a breach of academic integrity takes place, and the established UCSC policy process will be followed. Accordingly, students are expected to understand and adhere to the UCSC policies on academic integrity and plagiarism:

**Academic integrity:** [http://www.ucsc.edu/academics/academic\\_integrity/undergraduate\\_students/](http://www.ucsc.edu/academics/academic_integrity/undergraduate_students/)

**Plagiarism:** <http://library.ucsc.edu/science/instruction/CitingSources.pdf>

## Course Writing Tutor

A trained undergraduate writing tutor is available to work with students in ENVS 100/L. We encourage you to seek out his help. You are required to see the writing tutor *before* you go to writing instructor Philip Longo for writing support. You also may be required by your TA or the instructors to visit the writing tutor. The writing tutor can help you with a wide range of writing-related challenges – from deciphering assignments and textual passages, to beginning to think through your papers, to responding to peer or TA/instructor comments, to working on logic, organization, transitions, language, and other elements of your drafts.

You can **e-mail the tutor** to **reserve time** during scheduled weekly tutoring hours or use the **drop-in tutoring hours**. If you cannot make the scheduled hours or they are full, you can try via e-mail to seek an alternate time to meet with the tutor. **The advantage to reserving time in advance is that the tutor can look at your writing before your meeting.** Here's the procedure:

1. **Plan ahead.** The tutor cannot review your work or become available on a moment's notice. Anticipate a 24-hour delay before receiving a response to your email, and up to three days before the tutor is able to read and respond to your draft.
2. Direct your email **with "ENVS 100 Tutoring" in the subject line.** State succinctly what you would like help with, and by what date/time you need it. Specify what office hours you can make in the next week, and several other times you can meet outside of office hours. When you receive an appointment, **e-mail your draft to the tutor at least 24 hours before your appointment** so that the tutor can review it before you meet.
3. While we encourage you to meet with the tutor in person, we know that this may not always be possible. **Some tutoring issues may be handled partly or wholly via email.** If you have specific questions about an assignment or a draft, email your draft to the tutor as an attachment, with your request for help clearly spelled out in the body of the email. The tutor will get back to you and let you know how soon to expect a reply.
4. **Do NOT email or bring the tutor a draft and simply ask him to "edit" or "check over" or "proofread" it, or to "make sure it's okay" or "tell me what's wrong with it."** Be specific and direct in asking for help, and avoid wasting the tutor's time.
5. On the basis of your papers, your TA or a course instructor may require you to get help from the tutor. This is not a punitive measure, and it does not mean we think your writing is seriously flawed. It means we think you can benefit from one-on-one consultation with someone skilled at helping fellow writers. **If you are asked to seek the tutor's help, please cc your TA on substantive email exchanges with the tutor.**
6. When you go to meet with writing tutor, please **bring a hard copy of your paper or assignment.**
7. If you have questions, problems, or suggestions concerning the tutoring program, please direct them to Philip Longo (plongo@ucsc.edu). If you have positive feedback for the tutors, please share it with them and, if you feel like it, with Philip.



### ENVS 100 Lecture and Lab Schedules - Winter 2015

Date	Lecture Topic ( <i>Lecturer</i> )	Reading due in advance	Lab Schedule	Assignments and Due Dates
WEEK 1				
Tu Jan 6	Intro to Environmental Studies ( <i>Philpott</i> )  Intro to WA1 - ( <i>Longo</i> )		<ul style="list-style-type: none"><li>• Intro to lab section</li><li>• Intro to writing</li><li>• Overview of sources</li><li>• Intro to WA1.1 assignment</li></ul>	WA1.1 assigned
Th Jan 8	Environmental Writing ( <i>Longo</i> )	<ul style="list-style-type: none"><li>• Davis 2012, pp. 1-54</li><li>• Rottenberg 2002</li></ul>		
WEEK 2				
Tu Jan 13	Environmental Policy ( <i>Daniel Press</i> )	<ul style="list-style-type: none"><li>• Davis 2012, pp. 54-82</li><li>• <i>Review</i> ENVS 100 handbook, “Env. Policy and Economics”</li><li>• Kraft 2014, “Environmental Policy and Politics”, Ch. 1</li></ul>	<ul style="list-style-type: none"><li>• Intro to peer review</li><li>• WA1.1 Peer review</li><li>• Read OWL APA Workshop: <a href="http://owl.english.purdue.edu/owl/resource/664/01/">http://owl.english.purdue.edu/owl/resource/664/01/</a></li><li>• Sources workshop</li></ul> (Writing Instructor and TA)	Journal Assignments #1 & #2 due in lab  WA1.1 first draft due in lab
Th Jan 15	Environmental Policy ( <i>Daniel Press</i> )	<ul style="list-style-type: none"><li>• Fleischman et al. 2013</li><li>• Kennedy 2014, NY Times Coal</li></ul>		
WEEK 3				
Tu Jan 20	Environmental Ethics and Values ( <i>Philpott</i> )	<ul style="list-style-type: none"><li>• Carson “<i>Silent Spring</i>”, Ch. 1-3</li><li>• Mace et al. 2014</li></ul>	No lab meeting this week	WA1.1 final draft due at beginning of lecture  Journal Assignments #3 & 4 due at beginning of lecture
Th Jan 22	<b>QUIZ 1</b>  Biodiversity & Conservation Purdue ( <i>Philpott</i> )	<ul style="list-style-type: none"><li>• <i>Review</i> ENVS 100 handbook, “General Ecology”</li></ul>		

WEEK 4				
Tu Jan 27	The Rise of Evolutionary Ecology and Applications in Conservation and Agriculture ( <i>Greg Gilbert</i> )	<ul style="list-style-type: none"> <li>Gilbert &amp; Webb 2007</li> </ul>	<ul style="list-style-type: none"> <li>WA1.2 peer review</li> <li>Concision workshop</li> <li>WA1.1 returned to students</li> </ul>	WA1.2 first draft due in lab
Th Jan 29	Conservation Biology and Restoration ( <i>Karen Holl</i> )	<ul style="list-style-type: none"> <li>Noss et al. 2006. Habitat Fragmentation, Ch. 6</li> <li>Van Andel et al. 2012. Restoration Ecology, Ch. 2.</li> </ul>		
WEEK 5				
Tu Feb 3	Carnivore Conservation and Trophic Cascades ( <i>Justine Smith</i> )  Introduction to Campus Reserve Field Trip ( <i>Alex Jones</i> )	<ul style="list-style-type: none"> <li>Crooks &amp; Soule 1999</li> <li>Blumstein &amp; Fernandez-Juricic 2004</li> <li>Estes et al. 2011</li> </ul>	<ul style="list-style-type: none"> <li>Short paper #1 -- (<i>brief presentations of papers followed by class discussion</i>)</li> <li>Strategies for revision</li> <li>Making figures</li> </ul>	WA1.2 final draft due at beginning of lecture  Short paper #1 due in lab  WA2 assigned
Th Feb 5	Conservation as Social Process ( <i>Flora Lu</i> )	<ul style="list-style-type: none"> <li>Lu Holt 2005</li> <li>Review ENVS 100 handbook, "Anthropology"</li> </ul>		
WEEK 6				
Tu Feb 10	<b>QUIZ 2</b>	<ul style="list-style-type: none"> <li>Review ENVS 100 Handbook, "Statistics"</li> <li>Hyde &amp; Simons 2001</li> <li>Ambrose (Chi-square sheet)</li> </ul>	UCSC Campus Natural History Reserve Field Trip (salamander observations) with Alex Jones	
Th Feb 12	Introduction to Agroecology ( <i>Philpott</i> )	<ul style="list-style-type: none"> <li>Gliessman 2007, Ch. 1</li> <li>Carson "Silent Spring", Ch. 7 &amp; 12</li> </ul>		WA1.2 returned WA1-R assigned

WEEK 7				
Tu Feb 17	Introduction to Food Systems (Margaret Fitzsimons)	<ul style="list-style-type: none"> <li>• <a href="http://www.nationalgeographic.com/food-special-compilation/">http://www.nationalgeographic.com/food-special-compilation/</a></li> </ul>	No lab this week -- meet to discuss your panels and presentations	WA2 individual component due at beginning of lecture (email to group before lecture)
Th Feb 19	Conservation and Agroecology - (Philpott)	<ul style="list-style-type: none"> <li>• Vandermeer &amp; Perfecto 2008</li> <li>• Tschartnke et al. 2012</li> <li>• Carson "Silent Spring", Ch. 15-16</li> </ul>		Field trip writing assignment due in lecture
WEEK 8				
Tu Feb 24	Science, policy, and society: the case of pesticides - (Tdzravka Tzankova)	<ul style="list-style-type: none"> <li>• Gladwell 2001</li> <li>• Galt 2008</li> </ul>	<ul style="list-style-type: none"> <li>• Short paper #2 -- (brief presentations of papers followed by class discussion)</li> <li>• Recap of documentation</li> <li>• Recap of figures</li> </ul>	Short paper #2 due in lab
Th Feb 26	<b>QUIZ 3</b>  Making local and exported food sustainable (Philpott)	<ul style="list-style-type: none"> <li>• McKibben 2005</li> </ul>		WA1-R due at beginning of lecture
WEEK 9				
Tu Mar 3	Environmental Action: Grassroots Activism or Green Consuming (Andy Szasz)	<ul style="list-style-type: none"> <li>• Szasz, p. 69-99 in "Ecopopulism"</li> <li>• Szasz, p. 105-133 in "Shopping Our Way to Safety"</li> </ul>	WA2 Panels and presentations	WA2 group component due at beginning of lecture
Th Mar 5	Climate Change and Environmental Governance (Jeff Bury)	<ul style="list-style-type: none"> <li>• Speth 2005, p. 75-116</li> <li>• Agrawal &amp; Lemos 2007</li> </ul>	WA2 Group Evaluations	
WEEK 10				
Tu Mar 10	Environmental Education (Whitney Cohen)	<ul style="list-style-type: none"> <li>• Orr (Ecol. Literacy Foreword) 2005</li> <li>• Capra (Ecol. Literacy Preface) 2005</li> </ul>	Lab Evaluations	
Th Mar 12	<b>QUIZ 4</b>  Looking Forward: Environmental Successes (Philpott)	<ul style="list-style-type: none"> <li>• Carson "Silent Spring", Ch. 17</li> </ul>		

## Frequently Asked Questions from Students (Lab)

### WA1.1

#### **Formatting**

1. Should it have a header? Subheadings? Title page? Abstract?

*Based on previous years' models: No title page, no abstract, but there should be a header.*

*There no subheadings necessary for WA1.1 However, for WA1.2 and WA1-R, yes there should be subheadings. -Phil*

#### **Style**

#### **Rhetoric**

1. How do I structure a good argument?

*There is no easy answer for this question, but rather this is something students are working on and developing skills on in these essays. For students who have a difficult time understanding an article, refer them to Rottenberg, show examples from the texts we are reading, and/or refer them to [Purdue OWL's section on argumentation](#). -Phil*

#### **Audience Awareness**

1. How much should I expect the audience to know about my topic?

*Based on previous models and a reading of the assignment: The assignment directs students: "Ultimately you should be able to point towards a policy that would address and ameliorate the environmental issue." So I'm assuming from this that a policy-audience is appropriate to have in mind- this would assume that they are somewhat knowledgeable about environmental issues and basic principles and premises (e.g. CO2 emissions are the major contributor to climate change), but may not know the specific ins-and-outs of a specific issue (e.g. how solar panels affect desert animals). Part of the difficulty for students is to figure out in a short space, what is the most important information to explain to this audience. (In the future, perhaps we should clarify the "audience" more on the assignment.) -Phil*

<p><b>Today's Objectives</b></p> <ul style="list-style-type: none"> <li>• Introduction to Lab Section (~20 min)</li> <li>• Intro to Writing (~45-50)</li> <li>• Overview of Sources (~15-20)</li> <li>• Intro to WA1.1 Assignment (~15)</li> </ul> <p><b>Projectable Resources</b></p> <p><a href="#">UCSC Library ENVS Research Guide</a> eCommons Lab/Writing Resources questions below</p> <p><b>Post-Lab</b></p> <p>Collect writing responses, review and call attention to Phil for students needing extra writing assistance</p>	<p><b>TA Prep</b></p> <ul style="list-style-type: none"> <li>• Familiarize self with syllabus, Lab v. Lecture assignments, grades</li> <li>• Reading: Review Davis chapter, "The Challenges of Academic Writing in the Age of Misinformation" (<a href="#">library online version</a>)</li> <li>• Review eCommons Lab/Writing resources and UCSC ENVS Research Guide</li> <li>• Test out searches with above using an example topic (preferably from your own research area)</li> </ul> <p><b>Bring to Lab:</b></p> <ul style="list-style-type: none"> <li>• Copy of Roster</li> <li>• Copies of WA1.1 and syllabus (only if holding lab on Monday)</li> <li>• WA1.1 Flowchart</li> </ul>
--	---

### I. Introduction to Lab Section (~10 min)

Introduce yourselves professionally and, to the extent you feel comfortable, personally. Have students do the same; minimum names, but usually something more like hometowns, something fun they did over the break, etc. (You'll be able to reinforce this with the writing exercise/icebreaker described below.) Just be sure to ask everyone to share the same things (no less, but no more), so that people who tend to be more talkative don't monopolize the time/conversation to the detriment of shyer students.

*\* you could also bring index cards and ask students information about themselves that you think would be useful to you (e.g. prior courses, interests, outside activities, experience, etc.)*

### II. Section Policies and Procedures (~10 min)

Let them know how important attendance, our late policy (e.g., attendance deduction if more than ten minutes late, no attendance credit if more than half hour late), and you cannot change sections other than through online enrollment system, period. You might also explain the purpose of the lab section v lecture and alert students to the fact that their lab grade is based on the writing *process* and lecture on *product* (and that certain writing assignments will be collected *in* lecture).

### III. In Class Writing/Icebreaker (Part one: 15-25 min)

*if you have a laptop with you, you might project these questions.*

Have students answer the following questions. You can explain we'll be doing a lot of writing exercises in labs/section. So first they'll be addressing the following questions in writing, give them each topic with about 5-10 min. to write on each one. Give students the question, make sure everyone is done and then follow with the next. Important: Explain that while these need not be in polished prose they do need to be legible for you to read them. Plus they'll need their names and section number on them.

***- Why are you an Environmental Studies major? What are the goals you hope to accomplish in this major—civic, professional, personal, other?***

***- Who are one or two scientists, writers, journalists, or figures in the broader environmental field you have found most inspiring and why? I am guessing a number of people might be initially stumped by this one, so perhaps be ready with some prompts—e.g., having them think about particular circumstances in which they may have encountered these figures—not just reading and media, but also lectures, their own research, conversations with friends and family, maybe even people they know on campus?***

***- What is your single most memorable experience in the ENVS major to date? What would you recommend to your peers to do/check out/not miss out on in terms of classes, readings, internships, issues?***

#### **IV. In Class Writing/Icebreaker Part Two (~25 min time permitting)**

After students finish their writing, break them up into groups of four or five. Students pass their writing around and read all of the other writing in their group. They then have a short group discussion about what they have read. This creates a feeling of community as students get to know the names and a bit about a few other students in the section instead of trying to remember everyone. Then return to a whole group discussion in which you can ask for volunteers (or call on students) to read what they have written and note the key points on the board. If there's a lack of volunteers you can solicit responses to specific questions. Try and call on anyone who doesn't participate. What's really helpful is for you to make a list on the board of key figures from the second question and "things not to miss out on" from the third. You can either use the board or project off your computer.

#### **V. Collect Responses**

Collect, read and record responses. Rationale: These responses should help us identify a few things. First, you can see who's thoughtful, engaged and articulate at the start of the quarter. Know that many students will become more conversant and involved. If students have very little to say about why they're majoring in ENVS, if they can't name any key figures, or if they don't have any memorable ENVS-related experiences this is telling and good for us to know. In fact, it'd be great if we could get a sense of what you see in these in-class writings in terms of the levels of background knowledge and experience, reasons for choosing the major and types of responses you see. Second, take note of any really rough prose especially English language issues such as preposition and article problems, incoherent phrasing, etc. I'd like to identify these students right away and have you refer them to Phil or Stacy, the tutor (Schuyler) and/or your office hours for their first writing assignment, which we start right away.

#### **VI. Overview of Sources (~10-15)**

Since we are diving right into research, the first two journal entries (due next lab) will require students to understand the difference between background sources and scholarly sources. Before section, come up with a research topic (preferably your own) to demonstrate for students. Phil will go more in-depth

with this on the Thursday lecture, but this is a good opportunity to introduce students to the UCSC ENVIS Library Research Guide and the Lab/Writing Resources folder on eCommons.

**Background sources- “reference” sources that will give students background on an issue.** Explain to students why this is necessary using a topic from your own research or a possible WA1.1 topic. Use the [UCSC library guide](#) to show them where to find these sources and run an example search on GAYLE.

**Scholarly Sources- peer reviewed sources based on original research.** Explain why these sources are different from background sources and show students where to find them on the UCSC library research guide focusing on databases. If you have time, run an example search.

#### **V. WA 1 Prep Activity (~20 min)**

*First, give out the WA1.1 Flow Chart and run through the dates, particularly for Rachel’s Monday lab. Then guide the students through the following activity:*

**Brainstorm possible topics for WA1. What environmental issues have you been studying? Working on? Hearing about? (plastic bag bans, desal, long-range development plan for campus, pesticides, strawberries and methyl bromide)**

**Pick one and briefly state why you’re choosing it.**

**Now spend five minutes or so and briefly list what you know about your topic already (for example, impressions, observations you’ve made, striking statistics or facts, extent of problem, important people/groups/institutions involved, schools of thought, debates, common misconceptions, possible policy positions).**

**Build a list of questions about your topic you’d like to learn the answers to through research. Make the list as long as you can. Spend a good chunk of time on this list. (I often model exhaustive questioning.)**

**PASS AROUND questions, students star most interesting one and add any they can think of.**

**Look over your questions now with your peer feedback. Circle the most interesting one to you. Write on a fresh piece of paper.**

**Build a list off the one question. What else do you need to know to answer your focusing question?**

**Make a list of what you need to find out. (Here is also a good place to work on keywords)**

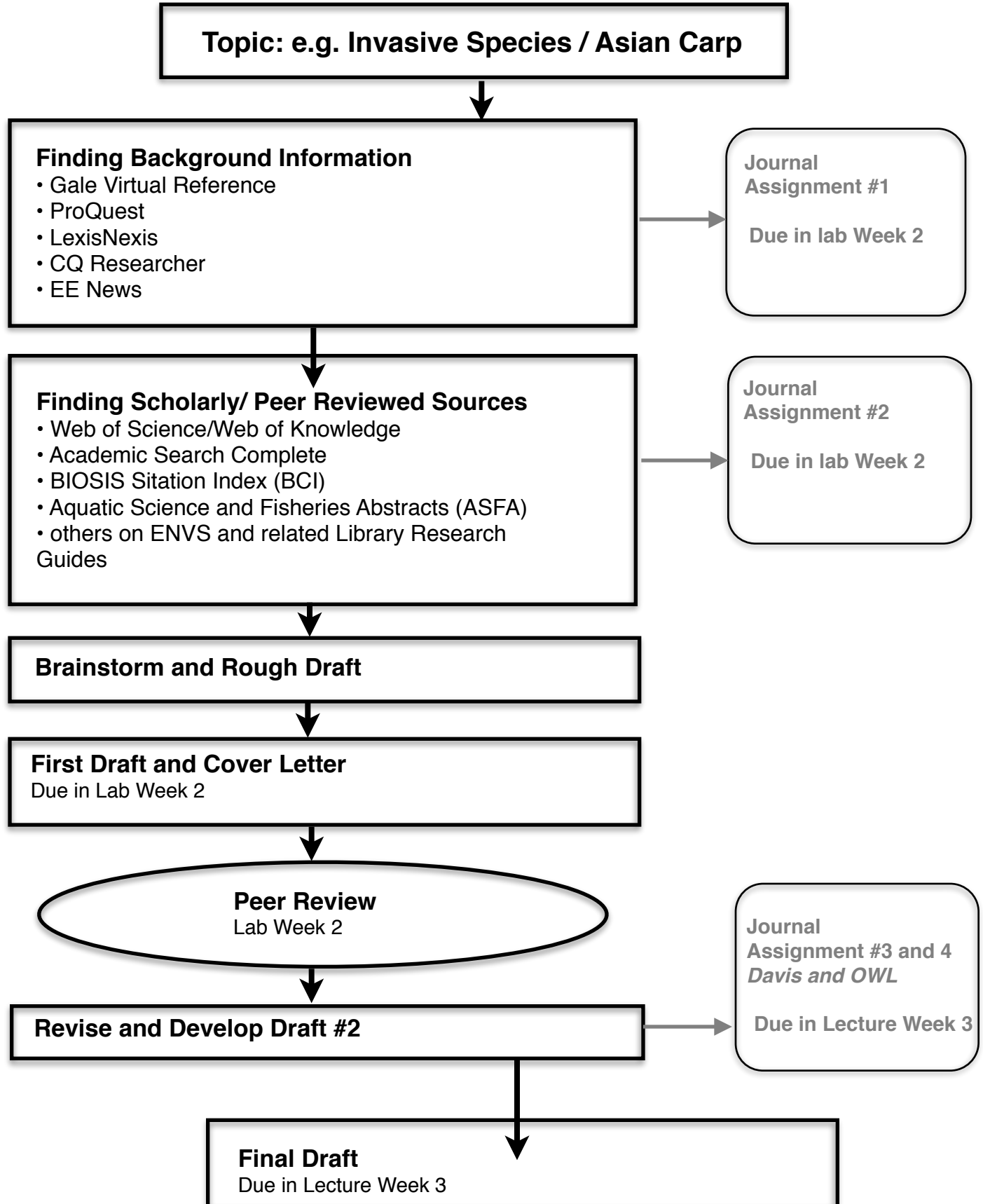
**Make yourself a to-do list with dates—look at your syllabus/WA 1 assignment.**

## VI. Wrap Up

Remind students of what is due next lab: **Journal Assignments #1 & #2 and WA1.1 first draft** (advise them to do journal assignments *before* first draft)



## ENVS 100L WA 1.1 Process Flow Chart



<b>Today's Objectives</b> <ul style="list-style-type: none"> <li>• Sources Workshop (20-30)</li> <li>• Intro to Peer Review (5-10)</li> <li>• Peer Review (1 hour)</li> </ul> <b>Post-Lab</b> <ul style="list-style-type: none"> <li>• Collect WA1.1 First Draft</li> <li>• Collect Journal Assignments 1-2</li> </ul>	<b>TA Prep</b> <ul style="list-style-type: none"> <li>• Review Davis, pp. 21-54</li> <li>• Review <a href="#">Purdue OWL APA Style</a></li> <li>• Make copies of Peer Review Handouts</li> </ul> <b>Bring to Lab</b> <ul style="list-style-type: none"> <li>• Enough copies of Peer Review Handout (Google Drive) need copies 3-4 <i>per student</i></li> <li>• Purdue OWL APA citation handout or projection</li> </ul>
---	---

### 1. Review Journal #1-2 Assignments (10-15)

Have students share assignments and create a list of helpful background sources v. scholarly peer reviewed sources. Have students share journals and resources they found helpful. Basically, get them talking about sources and sharing them and do some troubleshooting with them. It would be helpful to have your laptop/projector for this to show the sources.

### 2. When to paraphrase and when to quote? (10)

*This will set them up for Journal #3. This is all from Davis (29-31), which they should have read at this point, but its good to remind them:*

**paraphrase:** when all you need is the information itself (*remind them that paraphrasing needs to have proper citation*)

**quote:** Source itself is under consideration  
 Original wording helps illustrate your point  
 Opinion is controversial or unusual  
 The work itself is the subject (N/A)

### 3. Basic APA in-text citation (10)

*This will set them up for Journal #4*

Show some examples from [Purdue OWL](#) (projection) and field questions. Ask them to review a citation in their own work.

### 4. Explaining Peer Review (5)

Explain the purpose of peer review in the scholarly sense and explain how this session will be a mini version of that. Explain that their job is not to “correct” the essay and that they are more of a scholarly *peer* than a copy-editor or a teacher. Remind them again that they are not “correcting” the piece (they will want to focus on minor grammar issues and typos). Explain to them the importance of prioritizing **Global Issues** (argument, evidence, logic and structure) over **local ones** (grammar, spelling) because the local ones can be more easily spotted and corrected by the writer.

### 5. Peer Review (1 hour)

*hand out peer review sheets*

Divide the students up into groups of 2-3 depending on number in lab. Explain to students that in turn (about 15 minutes per student), each writer will 1) pass out their essay. 2) have peer reviewers read the cover letter. 3) writer will read the essay *out loud* to the group. 4) group will write comments on the peer review sheet and essay. 5) group will give writer directed oral feedback at the end highlighting the “global issues”

**If time at the end, have the writer review the comments and come up with a “task list” for revision.**

**Finally, Remind students that WA 1.1 is due *in LECTURE Week 3* and for them to take another look at the style and formatting guidelines for the essay before handing it in.**

# Welcome to the Purdue OWL



This page is brought to you by the OWL at Purdue (<https://owl.english.purdue.edu/>). When printing this page, you must include the entire legal notice at bottom.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

## Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## General Format

Please use the example at the bottom of this page to cite the Purdue OWL in APA.

To see a side-by-side comparison of the three most widely used citation styles, including a chart of all APA citation guidelines, see the [Citation Style Chart](#).

You can also watch our [APA vidcast series](#) on the [Purdue OWL YouTube Channel](#).

## General APA Guidelines

Your essay should be typed, double-spaced on standard-sized paper (8.5" x 11") with 1" margins on all sides. You should use a clear font that is highly readable. APA recommends using 12 pt. Times New Roman font.

Include a **page header** (also known as the "**running head**") at the top of every page. To create a **page header/running head**, insert page numbers flush right. Then type "TITLE OF YOUR PAPER" in the header flush left using all capital letters. The **running head** is a shortened version of your paper's title and cannot exceed 50 characters including spacing and punctuation.

## Major Paper Sections

Your essay should include **four** major sections: the **Title Page**, **Abstract**, **Main Body**, and **References**.

### Title Page

The title page should contain the **title** of the paper, the **author's name**, and the **institutional affiliation**. Include the page header (described above) flush left with the page number flush right at the top of the page. Please note that on the title page, your page header/running head should look like this:

Running head: TITLE OF YOUR PAPER

Pages after the title page should have a running head that looks like this:

TITLE OF YOUR PAPER

After consulting with publication specialists at the APA, OWL staff learned that the APA 6th edition, first printing sample papers have **incorrect** examples of Running heads on pages after the title page. This [link](#) will take you to the APA site where you can find a complete list of all the errors in the APA's 6th edition style guide.

Type your **title** in upper and lowercase letters centered in the upper half of the page. APA recommends that your title be no more than 12 words in length and that it should not contain abbreviations or words that serve no purpose. Your title may take up one or two lines. All text on the title page, and throughout your paper, should be double-spaced.

Beneath the title, type the **author's name**: first name, middle initial(s), and last name. Do not use titles (Dr.) or degrees (PhD).

Beneath the author's name, type the **institutional affiliation**, which should indicate the location where the author(s) conducted the research.

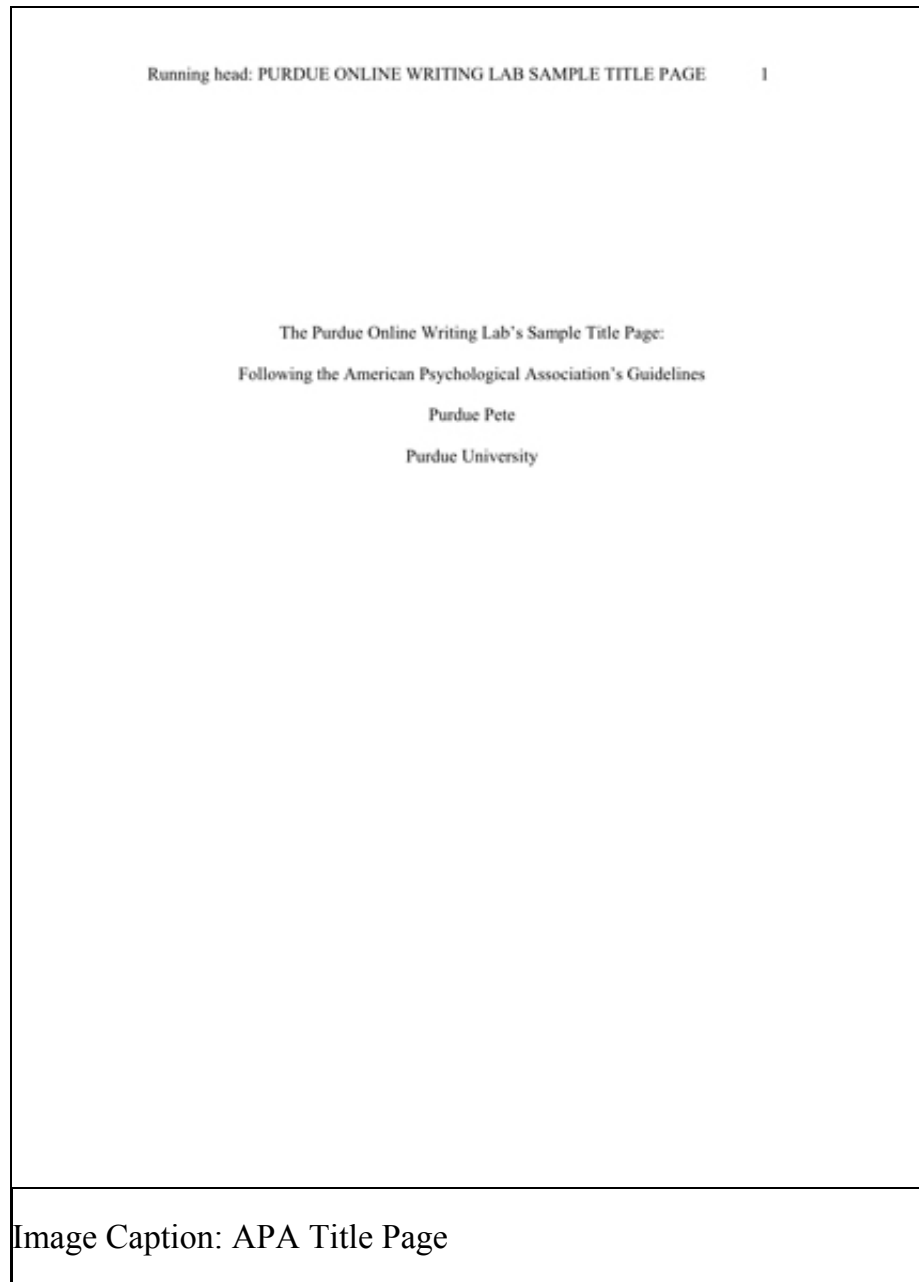


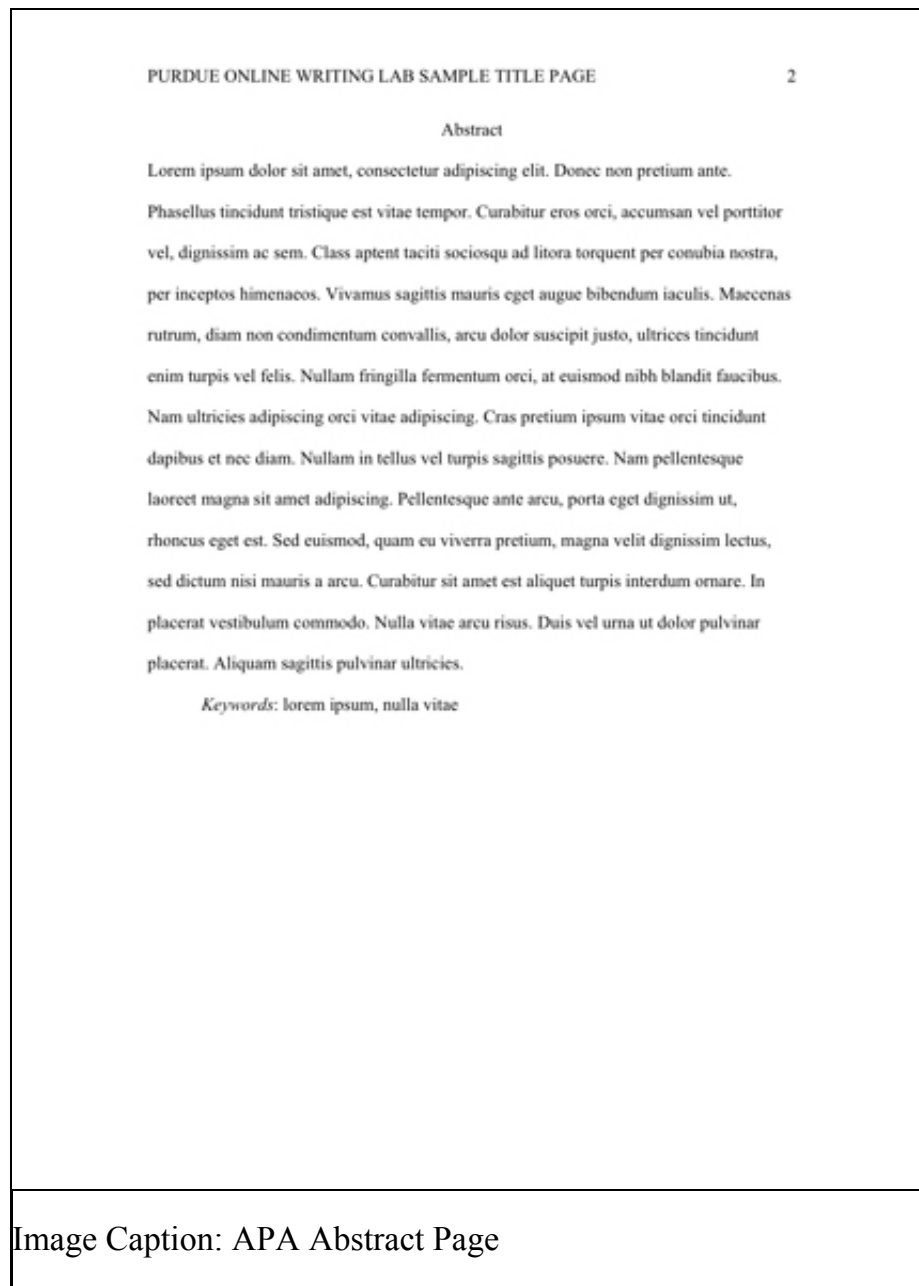
Image Caption: APA Title Page

## Abstract

Begin a new page. Your abstract page should already include the **page header** (described above). On the first line of the abstract page, center the word “Abstract” (no bold, formatting, italics, underlining, or quotation marks).

Beginning with the next line, write a concise summary of the key points of your research. (Do not indent.) Your abstract should contain at least your research topic, research questions, participants, methods, results, data analysis, and conclusions. You may also include possible implications of your research and future work you see connected with your findings. Your abstract should be a single paragraph double-spaced. Your abstract should be between 150 and 250 words.

You may also want to list keywords from your paper in your abstract. To do this, indent as you would if you were starting a new paragraph, type *Keywords:* (italicized), and then list your keywords. Listing your keywords will help researchers find your work in databases.



Please see our [Sample APA Paper](#) resource to see an example of an APA paper. You may also visit our [Additional Resources](#) page for more examples of APA papers.

## How to Cite the Purdue OWL in APA

## Individual Resources

Contributors' names and the last edited date can be found in the orange boxes at the top of every page on the OWL.

Contributors' names (Last edited date). *Title of resource*. Retrieved from <http://Web address for OWL resource>

Angeli, E., Wagner, J., Lawrick, E., Moore, K., Anderson, M., Soderlund, L., & Brizee, A. (2010, May 5). *General format*. Retrieved from <http://owl.english.purdue.edu/owl/resource/560/01/>

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## In-Text Citations: The Basics

Reference citations in text are covered on pages 169-179 of the Publication Manual. What follows are some general guidelines for referring to the works of others in your essay.

**Note:** APA style requires authors to use the past tense or present perfect tense when using signal phrases to describe earlier research, for example, Jones (1998) **found** or Jones (1998) **has found**...

### APA citation basics

When using APA format, follow the author-date method of in-text citation. This means that the author's last name and the year of publication for the source should appear in the text, for example, (Jones, 1998), and a complete reference should appear in the reference list at the end of the paper.

If you are referring to an idea from another work but **NOT** directly quoting the material, or making reference to an entire book, article or other work, you only have to make reference to the author and year of publication and not the page number in your in-text reference. All sources that are cited in the text must appear in the reference list at the end of the paper.

### In-text citation capitalization, quotes, and italics/underlining

- Always capitalize proper nouns, including author names and initials: D. Jones.
- If you refer to the title of a source within your paper, capitalize all words that are four letters long or greater within the title of a source: *Permanence and Change*. Exceptions apply to short words that are verbs, nouns, pronouns, adjectives, and adverbs: *Writing New Media*, *There Is Nothing Left to Lose*.

(**Note:** in your References list, only the first word of a title will be capitalized: *Writing new*

media.)

- When capitalizing titles, capitalize both words in a hyphenated compound word: *Natural-Born Cyborgs*.
- Capitalize the first word after a dash or colon: "Defining Film Rhetoric: The Case of Hitchcock's *Vertigo*."
- Italicize or underline the titles of longer works such as books, edited collections, movies, television series, documentaries, or albums: *The Closing of the American Mind*; *The Wizard of Oz*; *Friends*.
- Put quotation marks around the titles of shorter works such as journal articles, articles from edited collections, television series episodes, and song titles: "Multimedia Narration: Constructing Possible Worlds"; "The One Where Chandler Can't Cry."

## Short quotations

If you are directly quoting from a work, you will need to include the author, year of publication, and the page number for the reference (preceded by "p."). Introduce the quotation with a signal phrase that includes the author's last name followed by the date of publication in parentheses.

According to Jones (1998), "Students often had difficulty using APA style, especially when it was their first time" (p. 199).

Jones (1998) found "students often had difficulty using APA style" (p. 199); what implications does this have for teachers?

If the author is not named in a signal phrase, place the author's last name, the year of publication, and the page number in parentheses after the quotation.

She stated, "Students often had difficulty using APA style" (Jones, 1998, p. 199), but she did not offer an explanation as to why.

## Long quotations

Place direct quotations that are 40 words, or longer, in a free-standing block of typewritten lines, and omit quotation marks. Start the quotation on a new line, indented 1/2 inch from the left margin, i.e., in the same place you would begin a new paragraph. Type the entire quotation on the new margin, and indent the first line of any subsequent paragraph within the quotation 1/2 inch from the new margin. Maintain double-spacing throughout. The parenthetical citation should come after the closing punctuation mark.

Jones's (1998) study found the following:  
Students often had difficulty using APA style, especially when it was their first time citing sources. This difficulty could be attributed to the fact that many students failed to purchase a style manual or to ask their teacher for help. (p. 199)

## Summary or paraphrase

If you are paraphrasing an idea from another work, you only have to make reference to the author and year of publication in your in-text reference, but APA guidelines encourage you to also provide the page number (although it is not required.)

According to Jones (1998), APA style is a difficult citation format for first-time learners.  
APA style is a difficult citation format for first-time learners (Jones, 1998, p. 199).



**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

## **Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# **In-Text Citations: Author/Authors**

APA style has a series of important rules on using author names as part of the author-date system. There are additional rules for citing indirect sources, electronic sources, and sources without page numbers.

## **Citing an Author or Authors**

**A Work by Two Authors:** Name both authors in the signal phrase or in the parentheses each time you cite the work. Use the word "and" between the authors' names within the text and use the ampersand in the parentheses.

Research by Wegener and Petty (1994) supports...  
(Wegener & Petty, 1994)

**A Work by Three to Five Authors:** List all the authors in the signal phrase or in parentheses the first time you cite the source. Use the word "and" between the authors' names within the text and use the ampersand in the parentheses.

(Kernis, Cornell, Sun, Berry, & Harlow, 1993)

In subsequent citations, only use the first author's last name followed by "et al." in the signal phrase or in parentheses.

(Kernis et al., 1993)  
In *et al.*, *et* should not be followed by a period.

**Six or More Authors:** Use the first author's name followed by et al. in the signal phrase or in parentheses.

Harris et al. (2001) argued...  
(Harris et al., 2001)

**Unknown Author:** If the work does not have an author, cite the source by its title in the signal phrase or use the first word or two in the parentheses. Titles of books and reports are italicized or underlined; titles of articles, chapters, and web pages are in quotation marks.

A similar study was done of students learning to format research papers ("Using APA," 2001).

**Note:** In the rare case the "Anonymous" is used for the author, treat it as the author's name (Anonymous, 2001). In the reference list, use the name Anonymous as the author.

**Organization as an Author:** If the author is an organization or a government agency, mention the organization in the signal phrase or in the parenthetical citation the first time you cite the source.

According to the American Psychological Association (2000),...

If the organization has a well-known abbreviation, include the abbreviation in brackets the first time the source is cited and then use only the abbreviation in later citations.

First citation: (Mothers Against Drunk Driving [MADD], 2000)

Second citation: (MADD, 2000)

**Two or More Works in the Same Parentheses:** When your parenthetical citation includes two or more works, order them the same way they appear in the reference list (viz., alphabetically), separated by a semi-colon.

(Berndt, 2002; Harlow, 1983)

**Authors With the Same Last Name:** To prevent confusion, use first initials with the last names.

(E. Johnson, 2001; L. Johnson, 1998)

**Two or More Works by the Same Author in the Same Year:** If you have two sources by the same author in the same year, use lower-case letters (a, b, c) with the year to order the entries in the reference list. Use the lower-case letters with the year in the in-text citation.

Research by Berndt (1981a) illustrated that...

**Introductions, Prefaces, Forewords, and Afterwords:** When citing an Introduction, Preface, Foreword, or Afterwords in-text, cite the appropriate author and year as usual.

(Funk & Kolln, 1992)

**Personal Communication:** For interviews, letters, e-mails, and other person-to-person communication, cite the communicator's name, the fact that it was personal communication, and the date of the communication. Do not include personal communication in the reference list.

(E. Robbins, personal communication, January 4, 2001).

A. P. Smith also claimed that many of her students had difficulties with APA style (personal communication, November 3, 2002).

## Citing Indirect Sources

If you use a source that was cited in another source, name the original source in your signal phrase. List the secondary source in your reference list and include the secondary source in the parentheses.

Johnson argued that...(as cited in Smith, 2003, p. 102).

**Note:** When citing material in parentheses, set off the citation with a comma, as above. Also, try to locate the original material and cite the original source.

## Electronic Sources

If possible, cite an electronic document the same as any other document by using the author-date style.

Kenneth (2000) explained...

**Unknown Author and Unknown Date:** If no author or date is given, use the title in your signal phrase or the first word or two of the title in the parentheses and use the abbreviation "n.d." (for "no

date").

Another study of students and research decisions discovered that students succeeded with tutoring ("Tutoring and APA," n.d.).

## Sources Without Page Numbers

When an electronic source lacks page numbers, you should try to include information that will help readers find the passage being cited. When an electronic document has numbered paragraphs, use the abbreviation "para." followed by the paragraph number (Hall, 2001, para. 5). If the paragraphs are not numbered and the document includes headings, provide the appropriate heading and specify the paragraph under that heading. Note that in some electronic sources, like Web pages, people can use the Find function in their browser to locate any passages you cite.

According to Smith (1997), ... (Mind over Matter section, para. 6).

**Note:** Never use the page numbers of Web pages you print out; different computers print Web pages with different pagination.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## Footnotes and Endnotes

APA does not recommend the use of footnotes and endnotes because they are often expensive for publishers to reproduce. However, if explanatory notes still prove necessary to your document, APA details the use of two types of footnotes: content and copyright.

When using either type of footnote, insert a number formatted in superscript following almost any punctuation mark. Footnote numbers should not follow dashes ( — ), and if they appear in a sentence in parentheses, the footnote number should be inserted within the parentheses.

Scientists examined—over several years<sup>1</sup>—the fossilized remains of the woolly-wooly yak.<sup>2</sup> (These have now been transferred to the Chauan Museum.<sup>3</sup>)

When using the footnote function in a word-processing program like Microsoft Word, place all footnotes at the bottom of the page on which they appear. Footnotes may also appear on the final page of your document (usually this is after the References page). Center the word “Footnotes” at the top of the page. Indent five spaces on the first line of each footnote. Then, follow normal paragraph spacing rules. Double-space throughout.

<sup>1</sup> While the method of examination for the woolly-wooly yak provides important insights to this research, this document does not focus on this particular species.

## Content Notes

Content Notes provide supplemental information to your readers. When providing Content Notes, be brief and focus on only one subject. Try to limit your comments to one small paragraph.

Content Notes can also point readers to information that is available in more detail elsewhere.

<sup>1</sup> See Blackmur (1995), especially chapters 3 and 4, for an insightful analysis of this extraordinary animal.

## Copyright Permission Notes

If you quote more than 500 words of published material or think you may be in violation of “Fair Use” copyright laws, you must get the formal permission of the author(s). All other sources simply appear in the reference list.

Follow the same formatting rules as with Content Notes for noting copyright permissions. Then attach a copy of the permission letter to the document.

If you are reproducing a graphic, chart, or table, from some other source, you must provide a special note at the bottom of the item that includes copyright information. You should also submit written permission along with your work. Begin the citation with “*Note*.”

*Note.* From “Title of the article,” by W. Jones and R. Smith, 2007, *Journal Title*, 21, p. 122.  
Copyright 2007 by Copyright Holder. Reprinted with permission.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# Reference List: Basic Rules

Your reference list should appear at the end of your paper. It provides the information necessary for a reader to locate and retrieve any source you cite in the body of the paper. Each source you cite in the paper must appear in your reference list; likewise, each entry in the reference list must be cited in your text.

Your references should begin on a new page separate from the text of the essay; label this page "References" centered at the top of the page (do NOT bold, underline, or use quotation marks for the title). All text should be double-spaced just like the rest of your essay.

## Basic Rules

- All lines after the first line of each entry in your reference list should be indented one-half inch from the left margin. This is called hanging indentation.
- Authors' names are inverted (last name first); give the last name and initials for all authors of a particular work for up to and including seven authors. If the work has more than seven authors, list the first six authors and then use ellipses after the sixth author's name. After the ellipses, list the last author's name of the work.

- Reference list entries should be alphabetized by the last name of the first author of each work.
- For multiple articles by the same author, or authors listed in the same order, list the entries in chronological order, from earliest to most recent.
- Present the journal title in full.
- Maintain the punctuation and capitalization that is used by the journal in its title.
  - For example: *ReCALL* not *RECALL* or *Knowledge Management Research & Practice* not *Knowledge Management Research and Practice*.
- Capitalize all major words in journal titles.
- When referring to books, chapters, articles, or Web pages, capitalize only the first letter of the first word of a title and subtitle, the first word after a colon or a dash in the title, and proper nouns. Do not capitalize the first letter of the second word in a hyphenated compound word.
- Italicize titles of longer works such as books and journals.
- Do not italicize, underline, or put quotes around the titles of shorter works such as journal articles or essays in edited collections.
- **Please note:** While the APA manual provides many examples of how to cite common types of sources, it does not provide rules on how to cite all types of sources. Therefore, if you have a source that APA does not include, APA suggests that you find the example that is most similar to your source and use that format. For more information, see page 193 of the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### **Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## **Reference List: Author/Authors**

The following rules for handling works by a single author or multiple authors apply to all APA-style references in your reference list, regardless of the type of work (book, article, electronic resource, etc.)

### **Single Author**

Last name first, followed by author initials.

Berndt, T. J. (2002). Friendship quality and social development. *Current Directions in Psychological Science*, 11, 7-10.

### **Two Authors**

List by their last names and initials. Use the ampersand instead of "and."

Wegener, D. T., & Petty, R. E. (1994). Mood management across affective states: The hedonic contingency hypothesis. *Journal of Personality and Social Psychology*, 66, 1034-1048.

### **Three to Seven Authors**

List by last names and initials; commas separate author names, while the last author name is preceded again by ampersand.

Kernis, M. H., Cornell, D. P., Sun, C. R., Berry, A., Harlow, T., & Bach, J. S. (1993). There's more to self-esteem than whether it is high or low: The importance of stability of self-esteem. *Journal of Personality and Social Psychology*, 65, 1190-1204.

### **More Than Seven Authors**

List by last names and initials; commas separate author names. After the sixth author's name, use an ellipses in place of the author names. Then provide the final author name. There should be no more than seven names.

Miller, F. H., Choi, M. J., Angeli, L. L., Harland, A. A., Stamos, J. A., Thomas, S. T., . . . Rubin, L. H. (2009). Web site usability for the blind and low-vision user. *Technical Communication*, 57, 323-335.

### **Organization as Author**

American Psychological Association. (2003).

### **Unknown Author**

*Merriam-Webster's collegiate dictionary* (10th ed.).(1993). Springfield, MA: Merriam-Webster.

**NOTE:** When your essay includes parenthetical citations of sources with no author named, use a shortened version of the source's title instead of an author's name. Use quotation marks and italics as appropriate. For example, parenthetical citations of the source above would appear as follows: (*Merriam-Webster's*, 1993).

### **Two or More Works by the Same Author**

Use the author's name for all entries and list the entries by the year (earliest comes first).

Berndt, T. J. (1981).

Berndt, T. J. (1999).

When an author appears both as a sole author and, in another citation, as the first author of a group, list the one-author entries first.

Berndt, T. J. (1999). Friends' influence on students' adjustment to school. *Educational Psychologist*, 34, 15-28.

Berndt, T. J., & Keefe, K. (1995). Friends' influence on adolescents' adjustment to school. *Child Development*, 66, 1312-1329.

References that have the same first author and different second and/or third authors are arranged alphabetically by the last name of the second author, or the last name of the third if the first and second authors are the same.

Wegener, D. T., Kerr, N. L., Fleming, M. A., & Petty, R. E. (2000). Flexible corrections of juror judgments: Implications for jury instructions. *Psychology, Public Policy, and Law*, 6, 629-654.

Wegener, D. T., Petty, R. E., & Klein, D. J. (1994). Effects of mood on high elaboration attitude change: The mediating role of likelihood judgments. *European Journal of Social Psychology*, 24, 25-43.

## Two or More Works by the Same Author in the Same Year

If you are using more than one reference by the same author (or the same group of authors listed in the same order) published in the same year, organize them in the reference list alphabetically by the title of the article or chapter. Then assign letter suffixes to the year. Refer to these sources in your essay as they appear in your reference list, e.g.: "Berndt (1981a) makes similar claims..."

Berndt, T. J. (1981a). Age changes and changes over time in prosocial intentions and behavior between friends. *Developmental Psychology*, 17, 408-416.

Berndt, T. J. (1981b). Effects of friendship on prosocial intentions and behavior. *Child Development*, 52, 636-643.

## Introductions, Prefaces, Forewords, and Afterwords

Cite the publishing information about a book as usual, but cite Introduction, Preface, Foreword, or Afterword (whatever title is applicable) as the chapter of the book.

Funk, R., & Kolln, M. (1998). Introduction. In E. W. Ludlow (Ed.), *Understanding English grammar* (pp. 1-2). Needham, MA: Allyn and Bacon.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# Reference List: Articles in Periodicals

## Basic Form

APA style dictates that authors are named last name followed by initials; publication year goes between parentheses, followed by a period. The title of the article is in sentence-case, meaning only the first word and proper nouns in the title are capitalized. The periodical title is run in title case, and is followed by the volume number which, with the title, is also italicized. If a DOI has been assigned to the article that you are using, you should include this after the page numbers for the article. If no DOI has been assigned and you are accessing the periodical online, use the URL of the website from which you are retrieving the periodical.

Author, A. A., Author, B. B., & Author, C. C. (Year). Title of article. *Title of Periodical*, volume number(issue number), pages. <http://dx.doi.org/xx.xxx/yyyyy>

## Article in Journal Paginated by Volume

Journals that are paginated by volume begin with page one in issue one, and continue numbering issue two where issue one ended, etc.

Harlow, H. F. (1983). Fundamentals for preparing psychology journal articles. *Journal of Comparative and Physiological Psychology*, 55, 893-896.

### **Article in Journal Paginated by Issue**

Journals paginated by issue begin with page one every issue; therefore, the issue number gets indicated in parentheses after the volume. The parentheses and issue number are not italicized or underlined.

Scruton, R. (1996). The eclipse of listening. *The New Criterion*, 15(3), 5-13.

### **Article in a Magazine**

Henry, W. A., III. (1990, April 9). Making the grade in today's schools. *Time*, 135, 28-31.

### **Article in a Newspaper**

Unlike other periodicals, p. or pp. precedes page numbers for a newspaper reference in APA style. Single pages take p., e.g., p. B2; multiple pages take pp., e.g., pp. B2, B4 or pp. C1, C3-C4.

Schultz, S. (2005, December 28). Calls made to strengthen state energy policies. *The Country Today*, pp. 1A, 2A.

**Note:** Because of issues with html coding, the listings below using brackets contain spaces that are not to be used with your listings. Use a space as normal before the brackets, but do not include a space following the bracket.

### **Letter to the Editor**

Moller, G. (2002, August). Ripples versus rumbles [Letter to the editor]. *Scientific American*, 287(2), 12.

### **Review**

Baumeister, R. F. (1993). Exposing the self-knowledge myth [Review of the book *The self-knower: A hero under control*, by R. A. Wicklund & M. Eckert]. *Contemporary Psychology*, 38, 466-467.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### **Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## **Reference List: Books**



## Basic Format for Books

Author, A. A. (Year of publication). *Title of work: Capital letter also for subtitle*. Location: Publisher.

**Note:** For "Location," you should always list the city and the state using the two letter postal abbreviation without periods (New York, NY).

Calfee, R. C., & Valencia, R. R. (1991). *APA guide to preparing manuscripts for journal publication*. Washington, DC: American Psychological Association.

## Edited Book, No Author

Duncan, G. J., & Brooks-Gunn, J. (Eds.). (1997). *Consequences of growing up poor*. New York, NY: Russell Sage Foundation.

## Edited Book with an Author or Authors

Plath, S. (2000). *The unabridged journals*. K. V. Kukil (Ed.). New York, NY: Anchor.

## A Translation

Laplace, P. S. (1951). *A philosophical essay on probabilities*. (F. W. Truscott & F. L. Emory, Trans.). New York, NY: Dover. (Original work published 1814)

**Note:** When you cite a republished work, like the one above, in your text, it should appear with both dates: Laplace (1814/1951).

## Edition Other Than the First

Helfer, M. E., Kempe, R. S., & Krugman, R. D. (1997). *The battered child* (5th ed.). Chicago, IL: University of Chicago Press.

## Article or Chapter in an Edited Book

Author, A. A., & Author, B. B. (Year of publication). Title of chapter. In A. A. Editor & B. B. Editor (Eds.), *Title of book* (pages of chapter). Location: Publisher.

**Note:** When you list the pages of the chapter or essay in parentheses after the book title, use "pp." before the numbers: (pp. 1-21). This abbreviation, however, does not appear before the page numbers in periodical references, except for newspapers.

O'Neil, J. M., & Egan, J. (1992). Men's and women's gender role journeys: A metaphor for healing, transition, and transformation. In B. R. Wainrib (Ed.), *Gender issues across the life cycle* (pp. 107-123). New York, NY: Springer.

## Multivolume Work

Wiener, P. (Ed.). (1973). *Dictionary of the history of ideas* (Vols. 1-4). New York, NY: Scribner's.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

**Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## Reference List: Other Print Sources

### An Entry in an Encyclopedia

Bergmann, P. G. (1993). Relativity. In *The New Encyclopedia Britannica*. (Vol. 26, pp. 501-508). Chicago, IL: Encyclopedia Britannica.

### Work Discussed in a Secondary Source

List the source the work was discussed in:

Coltheart, M., Curtis, B., Atkins, P., & Haller, M. (1993). Models of reading aloud: Dual-route and parallel-distributed-processing approaches. *Psychological Review*, 100, 589-608.

**NOTE:** Give the secondary source in the references list; in the text, name the original work, and give a citation for the secondary source. For example, if Seidenberg and McClelland's work is cited in Coltheart et al. and you did not read the original work, list the Coltheart et al. reference in the References. In the text, use the following citation:

In Seidenberg and McClelland's study (as cited in Coltheart, Curtis, Atkins, & Haller, 1993), ...

### Dissertation Abstract

Yoshida, Y. (2001). Essays in urban transportation. *Dissertation Abstracts International*, 62, 7741A.

### Dissertation, Published

Lastname, F. N. (Year). *Title of dissertation* (Doctoral dissertation). Retrieved from Name of database. (Accession or Order Number)

### Dissertation, Unpublished

Lastname, F. N. (Year). *Title of dissertation* (Unpublished doctoral dissertation). Name of Institution, Location.

### Government Document

National Institute of Mental Health. (1990). *Clinical training in serious mental illness* (DHHS Publication No. ADM 90-1679). Washington, DC: U.S. Government Printing Office.

For information about citing legal sources in your reference list, see the [University of Nebraska, Kearney page on Citing Legal Materials in APA Style](#).

### Report From a Private Organization

American Psychiatric Association. (2000). *Practice guidelines for the treatment of patients with eating disorders* (2nd ed.). Washington, DC: Author.

## Conference Proceedings

Schnase, J. L., & Cunnius, E. L. (Eds.). (1995). Proceedings from CSCL '95: *The First International Conference on Computer Support for Collaborative Learning*. Mahwah, NJ: Erlbaum.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# Reference List: Electronic Sources (Web Publications)

**Please note:** There are no spaces used with brackets in APA. When possible, include the year, month, and date in references. If the month and date are not available, use the year of publication. Please note, too, that the OWL still includes information about print sources and databases for those still working with these sources.

## Article From an Online Periodical

Online articles follow the same guidelines for printed articles. Include all information the online host makes available, including an issue number in parentheses.

Author, A. A., & Author, B. B. (Date of publication). Title of article. *Title of Online Periodical, volume number*(issue number if available). Retrieved from <http://www.someaddress.com/full/url/>

Bernstein, M. (2002). 10 tips on writing the living Web. *A List Apart: For People Who Make Websites*, 149. Retrieved from <http://www.alistapart.com/articles/writeliving>

## Online Scholarly Journal Article: Citing DOIs

**Please note:** In August of 2011 the formatting recommendations for DOIs changed. DOIs are now rendered as an alpha-numeric string which acts as an active link. According to *The APA Style Guide to Electronic References*, 6<sup>th</sup> edition, you should use the DOI format which the article appears with. So, if it is using the older numeric string, use that as the DOI. If, however, it is presented as the newer alpha-numeric string, use that as the DOI. The Purdue OWL maintains examples of citations using both DOI styles.

Because online materials can potentially change URLs, APA recommends providing a Digital Object Identifier (DOI), when it is available, as opposed to the URL. DOIs are an attempt to provide stable, long-lasting links for online articles. They are unique to their documents and consist of a long alphanumeric code. Many-but not all-publishers will provide an article's DOI on the first page of the

document.

Note that some online bibliographies provide an article's DOI but may "hide" the code under a button which may read "Article" or may be an abbreviation of a vendor's name like "CrossRef" or "PubMed." This button will usually lead the user to the full article which will include the DOI. Find DOI's from print publications or ones that go to dead links with CrossRef.org's "DOI Resolver," which is displayed in a central location on their home page.

### **Article From an Online Periodical with DOI Assigned**

Author, A. A., & Author, B. B. (Date of publication). Title of article. *Title of Journal*, volume number, page range. doi:0000000/000000000000 or <http://dx.doi.org/10.0000/0000>

Brownlie, D. (2007). Toward effective poster presentations: An annotated bibliography. *European Journal of Marketing*, 41, 1245-1283. doi:10.1108/03090560710821161

Wooldridge, M.B., & Shapka, J. (2012). Playing with technology: Mother-toddler interaction scores lower during play with electronic toys. *Journal of Applied Developmental Psychology*, 33(5), 211-218. <http://dx.doi.org/10.1016/j.appdev.2012.05.005>

### **Article From an Online Periodical with no DOI Assigned**

Online scholarly journal articles without a DOI require the URL of the journal home page. Remember that one goal of citations is to provide your readers with enough information to find the article; providing the journal home page aids readers in this process.

Author, A. A., & Author, B. B. (Date of publication). Title of article. *Title of Journal*, volume number. Retrieved from <http://www.journalhomepage.com/full/url/>

Kenneth, I. A. (2000). A Buddhist response to the nature of human rights. *Journal of Buddhist Ethics*, 8. Retrieved from <http://www.cac.psu.edu/jbe/twocont.html>

### **Article from a Database**

**Please note:** APA states that including database information in citations is not necessary because databases change over time (p. 192). However, the OWL still includes information about databases for those users who need database information.

When referencing a print article obtained from an online database (such as a database in the library), provide appropriate print citation information (formatted just like a "normal" print citation would be for that type of work). By providing this information, you allow people to retrieve the print version if they do not have access to the database from which you retrieved the article. You can also include the item number or accession number or database URL at the end, but the APA manual says that this is not required.

If you are citing a database article that is available in other places, such as a journal or magazine, include the homepage's URL. You may have to do a web search of the article's title, author, etc. to find the URL.

For articles that are easily located, do not provide database information. If the article is difficult to locate, then you can provide database information. Only use retrieval dates if the source could change, such as Wikis. For more about citing articles retrieved from electronic databases, see pages 187-192 of the Publication Manual.

Author, A. A., & Author, B. B. (Date of publication). Title of article. *Title of Journal*, volume number, page range. Retrieved from <http://www.someaddress.com/full/url/>

Smyth, A. M., Parker, A. L., & Pease, D. L. (2002). A study of enjoyment of peas. *Journal of Abnormal Eating*, 8(3), 120-125. Retrieved from <http://www.articlehomepage.com/full/url/>

## Abstract

If you only cite an abstract but the full text of the article is also available, cite the online abstract as any other online citations, adding "[Abstract]" after the article or source name. However, if the full text is not available, you may use an abstract that is available through an abstracts database as a secondary source.

Paterson, P. (2008). How well do young offenders with Asperger Syndrome cope in custody?: Two prison case studies [Abstract]. *British Journal of Learning Disabilities*, 36(1), 54-58.

Hendricks, J., Applebaum, R., & Kunkel, S. (2010). A world apart? Bridging the gap between theory and applied social gerontology. *Gerontologist*, 50(3), 284-293. Abstract retrieved from Abstracts in Social Gerontology database. (Accession No. 50360869)

## Newspaper Article

Author, A. A. (Year, Month Day). Title of article. *Title of Newspaper*. Retrieved from <http://www.someaddress.com/full/url/>

Parker-Pope, T. (2008, May 6). Psychiatry handbook linked to drug industry. *The New York Times*. Retrieved from <http://well.blogs.nytimes.com>

## Electronic Books

Electronic books may include books found on personal websites, databases, or even in audio form. Use the following format if the book you are using is *only* provided in a digital format or is difficult to find in print. If the work is not directly available online or must be purchased, use "Available from," rather than "Retrieved from," and point readers to where they can find it. For books available in print form and electronic form, include the publish date in parentheses after the author's name. For references to e-book editions, be sure to include the type and version of e-book you are referencing (e.g., "[Kindle DX version]"). If DOIs are available, provide them at the end of the reference.

De Huff, E. W. (n.d.). *Taytay's tales: Traditional Pueblo Indian tales*. Retrieved from <http://digital.library.upenn.edu/women/dehuff/taytay/taytay.html>

Davis, J. (n.d.). *Familiar birdsongs of the Northwest*. Available from <http://www.powells.com/cgi-bin/biblio?inkey=1-9780931686108-0>

## Kindle Books

To cite Kindle (or other e-book formats) you must include the following information: The author, date of publication, title, e-book version, and either the Digital Object Identifier (DOI) number, or the place where you downloaded the book. Please note that the DOI/place of download is used in-place of publisher

information.

Here's an example:

Stoker, B. (1897). *Dracula* [Kindle DX version]. Retrieved from Amazon.com

### **Chapter/Section of a Web Document or Online Book Chapter**

Author, A. A., & Author, B. B. (Date of publication). Title of article. In *Title of book or larger document* (chapter or section number). Retrieved from <http://www.someaddress.com/full/url/>

Engelshcall, R. S. (1997). Module mod\_rewrite: URL Rewriting Engine. In *Apache HTTP Server version 1.3 documentation* (Apache modules). Retrieved from [http://httpd.apache.org/docs/1.3/mod/mod\\_rewrite.html](http://httpd.apache.org/docs/1.3/mod/mod_rewrite.html)

Peckinpugh, J. (2003). Change in the Nineties. In J. S. Bough and G. B. DuBois (Eds.), *A century of growth in America*. Retrieved from GoldStar database.

**NOTE:** Use a chapter or section identifier and provide a URL that links directly to the chapter section, not the home page of the Web site.

### **Online Book Reviews**

Cite the information as you normally would for the work you are quoting. (The first example below is from a newspaper article; the second is from a scholarly journal.) In brackets, write "Review of the book" and give the title of the reviewed work. Provide the web address after the words "Retrieved from," if the review is freely available to anyone. If the review comes from a subscription service or database, write "Available from" and provide the information where the review can be purchased.

Zacharek, S. (2008, April 27). Natural women [Review of the book *Girls like us*]. *The New York Times*. Retrieved from <http://www.nytimes.com/2008/04/27/books/review/Zacharek-t.html?pagewanted=2>

Castle, G. (2007). New millennial Joyce [Review of the books *Twenty-first Joyce*, *Joyce's critics: Transitions in reading and culture*, and *Joyce's messianism: Dante, negative existence, and the messianic self*]. *Modern Fiction Studies*, 50(1), 163-173. Available from Project MUSE Web site: [http://muse.jhu.edu/journals/modern\\_fiction\\_studies/toc/mfs52.1.html](http://muse.jhu.edu/journals/modern_fiction_studies/toc/mfs52.1.html)

### **Dissertation/Thesis from a Database**

Biswas, S. (2008). *Dopamine D3 receptor: A neuroprotective treatment target in Parkinson's disease*. Retrieved from ProQuest Digital Dissertations. (AAT 3295214)

### **Online Encyclopedias and Dictionaries**

Often encyclopedias and dictionaries do not provide bylines (authors' names). When no byline is present, move the entry name to the front of the citation. Provide publication dates if present or specify (n.d.) if no date is present in the entry.

Feminism. (n.d.). In *Encyclopædia Britannica online*. Retrieved from

## Online Bibliographies and Annotated Bibliographies

Jürgens, R. (2005). *HIV/AIDS and HCV in Prisons: A Select Annotated Bibliography*. Retrieved from [http://www.hc-sc.gc.ca/ahc-asc/alt\\_formats/hpb-dgps/pdf/intactiv/hiv-vih-aids-sida-prison-carcerale\\_e.pdf](http://www.hc-sc.gc.ca/ahc-asc/alt_formats/hpb-dgps/pdf/intactiv/hiv-vih-aids-sida-prison-carcerale_e.pdf)

## Data Sets

Point readers to raw data by providing a Web address (use "Retrieved from") or a general place that houses data sets on the site (use "Available from").

United States Department of Housing and Urban Development. (2008). *Indiana income limits* [Data file]. Retrieved from [http://www.huduser.org/Datasets/IL/IL08/in\\_fy2008.pdf](http://www.huduser.org/Datasets/IL/IL08/in_fy2008.pdf)

## Graphic Data (e.g. Interactive Maps and Other Graphic Representations of Data)

Give the name of the researching organization followed by the date. In brackets, provide a brief explanation of what type of data is there and in what form it appears. Finally, provide the project name and retrieval information.

Solar Radiation and Climate Experiment. (2007). [Graph illustration the SORCE Spectral Plot May 8, 2008]. *Solar Spectral Data Access from the SIM, SOLSTICE, and XPS Instruments*. Retrieved from [http://lasp.colorado.edu/cgi-bin/ion-p?page=input\\_data\\_for\\_spectra.ion](http://lasp.colorado.edu/cgi-bin/ion-p?page=input_data_for_spectra.ion)

## Qualitative Data and Online Interviews

If an interview is not retrievable in audio or print form, cite the interview only in the text (not in the reference list) and provide the month, day, and year in the text. If an audio file or transcript is available online, use the following model, specifying the medium in brackets (e.g. [Interview transcript, Interview audio file]):

Butler, C. (Interviewer) & Stevenson, R. (Interviewee). (1999). *Oral History 2* [Interview transcript]. Retrieved from Johnson Space Center Oral Histories Project Web site: [http://www11.jsc.nasa.gov/history/oral\\_histories/oral\\_histories.htm](http://www11.jsc.nasa.gov/history/oral_histories/oral_histories.htm)

## Online Lecture Notes and Presentation Slides

When citing online lecture notes, be sure to provide the file format in brackets after the lecture title (e.g. PowerPoint slides, Word document).

Hallam, A. *Duality in consumer theory* [PDF document]. Retrieved from Lecture Notes Online Web site: <http://www.econ.iastate.edu/classes/econ501/Hallam/index.html>

Roberts, K. F. (1998). *Federal regulations of chemicals in the environment* [PowerPoint slides]. Retrieved from <http://siri.uvm.edu/ppt/40hrenv/index.html>

## Nonperiodical Web Document or Report

List as much of the following information as possible (you sometimes have to hunt around to find the information; don't be lazy. If there is a page like <http://www.somesite.com/somepage.htm>, and

somepage.htm doesn't have the information you're looking for, move up the URL to <http://www.somesite.com/>):

Author, A. A., & Author, B. B. (Date of publication). *Title of document*. Retrieved from <http://Web address>

Angeli, E., Wagner, J., Lawrick, E., Moore, K., Anderson, M., Soderland, L., & Brizee, A. (2010, May 5). *General format*. Retrieved from <http://owl.english.purdue.edu/owl/resource/560/01/>

**NOTE:** When an Internet document is more than one Web page, provide a URL that links to the home page or entry page for the document. Also, if there isn't a date available for the document use (n.d.) for no date.

To cite a *YouTube* video, the APA recommends following the above format.

### **Computer Software/Downloaded Software**

Do not cite standard office software (e.g. Word, Excel) or programming languages. Provide references only for specialized software.

Ludwig, T. (2002). PsychInquiry [computer software]. New York: Worth.

Software that is downloaded from a Web site should provide the software's version and year when available.

Hayes, B., Tesar, B., & Zuraw, K. (2003). OTSoft: Optimality Theory Software (Version 2.1) [Software]. Available from <http://www.linguistics.ucla.edu/people/hayes/otsoft/>

### **E-mail**

E-mails are not included in the list of references, though you parenthetically cite them in your main text: (E. Robbins, personal communication, January 4, 2001).

### **Online Forum or Discussion Board Posting**

Include the title of the message, and the URL of the newsgroup or discussion board. Please note that titles for items in online communities (e.g. blogs, newsgroups, forums) are not italicized. If the author's name is not available, provide the screen name. Place identifiers like post or message numbers, if available, in brackets. If available, provide the URL where the message is archived (e.g. "Message posted to..., archived at...").

Frook, B. D. (1999, July 23). New inventions in the cyberworld of toylandia [Msg 25]. Message posted to <http://groups.earthlink.com/forum/messages/00025.html>

### **Blog (Weblog) and Video Blog Post**

Include the title of the message and the URL. Please note that titles for items in online communities (e.g. blogs, newsgroups, forums) are not italicized. If the author's name is not available, provide the screen name.

J Dean. (2008, May 7). When the self emerges: Is that me in the mirror? [Web log comment]. Retrieved from <http://www.spring.org.uk/the1sttransport>



Psychology Video Blog #3 [Video file]. Retrieved from <http://www.youtube.com/watch?v=lqM90eQi5-M>

## Wikis

Please note that the *APA Style Guide to Electronic References* warns writers that wikis (like Wikipedia, for example) are collaborative projects that cannot guarantee the verifiability or expertise of their entries.

OLPC Peru/Arahuay. (n.d.). Retrieved April 29, 2011 from the OLPC Wiki: [http://wiki.laptop.org/go/OLPC\\_Peru/Arahuay](http://wiki.laptop.org/go/OLPC_Peru/Arahuay)

## Audio Podcast

For all podcasts, provide as much information as possible; not all of the following information will be available. Possible addition identifiers may include Producer, Director, etc.

Bell, T., & Phillips, T. (2008, May 6). A solar flare. *Science @ NASA Podcast*. Podcast retrieved from <http://science.nasa.gov/podcast.htm>

## Video Podcasts

For all podcasts, provide as much information as possible; not all of the following information will be available. Possible addition identifiers may include Producer, Director, etc.

Scott, D. (Producer). (2007, January 5). The community college classroom [Episode 7]. *Adventures in Education*. Podcast retrieved from <http://www.adveeducation.com>

For more help with citing electronic sources, please use these links:

- [Documenting Electronic Sources](#)
- [APA style web site's coverage of electronic references](#)
- [APA Frequently Asked Questions](#)

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# Reference List: Other Non-Print Sources

## Interviews, Email, and Other Personal Communication

No personal communication is included in your reference list; instead, parenthetically cite the communicator's name, the phrase "personal communication," and the date of the communication in

your main text only.

(E. Robbins, personal communication, January 4, 2001).

A. P. Smith also claimed that many of her students had difficulties with APA style (personal communication, November 3, 2002).

## **Motion Picture**

Basic reference list format:

Producer, P. P. (Producer), & Director, D. D. (Director). (Date of publication). *Title of motion picture* [Motion picture]. Country of origin: Studio or distributor.

**Note:** If a movie or video tape is not available in wide distribution, add the following to your citation after the country of origin: (Available from Distributor name, full address and zip code).

### **A Motion Picture or Video Tape with International or National Availability**

Smith, J. D. (Producer), & Smithee, A. F. (Director). (2001). *Really big disaster movie* [Motion picture]. United States: Paramount Pictures.

### **A Motion Picture or Video Tape with Limited Availability**

Harris, M. (Producer), & Turley, M. J. (Director). (2002). *Writing labs: A history* [Motion picture]. (Available from Purdue University Pictures, 500 Oval Drive, West Lafayette, IN 47907)

## **Television Broadcast or Series Episode**

Writer, W. W. (Writer), & Director, D. D. (Director). (Date of broadcast or copyright). Title of broadcast [*Television broadcast or Television series*]. In P. Producer (Producer). City, state of origin: Studio or distributor.

### **Single Episode of a Television Series**

Writer, W. W. (Writer), & Director, D. D. (Director). (Date of publication). Title of episode [Television series episode]. In P. Producer (Producer), *Series title*. City, state of origin: Studio or distributor.

Wendy, S. W. (Writer), & Martian, I. R. (Director). (1986). The rising angel and the falling ape [Television series episode]. In D. Dude (Producer), *Creatures and monsters*. Los Angeles, CA: Belarus Studios.

## **Television Broadcast**

Important, I. M. (Producer). (1990, November 1). *The nightly news hour* [Television broadcast]. New York, NY: Central Broadcasting Service.

### **A Television Series**

Bellisario, D. L. (Producer). (1992). *Exciting action show* [Television series]. Hollywood, CA: American Broadcasting Company.

## Music Recording

Songwriter, W. W. (Date of copyright). Title of song [Recorded by artist if different from song writer]. On *Title of album* [Medium of recording]. Location: Label. (Recording date if different from copyright date).

Taupin, B. (1975). Someone saved my life tonight [Recorded by Elton John]. On *Captain fantastic and the brown dirt cowboy* [CD]. London, England: Big Pig Music Limited.

For more about citing audiovisual media, see pages 209-210 of the APA Publication Manual 6th Edition, second printing.

For information about citing legal sources in your reference list, see [the Westfield State College page on Citing Legal Materials in APA Style](#).

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## Additional Resources

It's always best to consult the Publication Manual first for any APA question. If you are using APA style for a class assignment, it's a good idea to consult your professor, advisor, TA, or other campus resources for help with using APA style—they're the ones who can tell you how the style should apply in your particular case. For extraordinary questions that aren't covered clearly in the style manual or haven't been answered by your teacher or advisor, contact us via [email by using our OWL tutor email form](#).

### Print Resources

Here are some print resources for using APA style. Click The Purdue OWL does not make any profit from nor does it endorse these agencies; links are merely offered for information. Most of these books are probably available in your local library. From the American Psychological Association:

- *Publication Manual of the American Psychological Association* (6th edition) (ISBN 13: 978-1-4338-0561-5; ISBN 10: 1-4338-0561-8)
- *Mastering APA Style: Instructor's Resource Guide* (ISBN: 1557988900)
- *Mastering APA Style: Student's Workbook and Training Guide* (ISBN: 143380557X)
- *Presenting Your Findings: A Practical Guide for Creating Tables* (ISBN: 143380705X)
- *Displaying Your Findings: A Practical Guide for Creating Figures, Posters, and Presentations* (ISBN: 143380706X)

From other publishers:

- *Writing With Style: APA Style Made Easy* (ISBN: 084003167X)
- *Writing With Style: APA Style for Social Work* (ISBN: 084003198X)

## Online Resources from the APA

- [APA Style Website](#)
- [APA Style Blog](#)

## Other Online Resources: Documenting and Referencing Sources

- [Citing Legal Materials in APA Style](#) (Westfield State College)

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# Types of APA Papers

There are two common types of papers written in fields using APA Style: the literature review and the experimental report. Each has unique requirements concerning the sections that must be included in the paper.

## Literature review

A literature review is a critical summary of what the scientific literature says about your specific topic or question. Often student research in APA fields falls into this category. Your professor might ask you to write this kind of paper to demonstrate your familiarity with work in the field pertinent to the research you hope to conduct.

A literature review typically contains the following sections:

- Title page
- Introduction section
- List of references

Some instructors may also want you to write an abstract for a literature review, so be sure to check with them when given an assignment. Also, the length of a literature review and the required number of sources will vary based on course and instructor preferences.

**NOTE:** A literature review and an annotated bibliography are **not** synonymous. If you are asked to write an annotated bibliography, you should consult the *Publication Manual of the American Psychological Association* for the APA Format for Annotated Bibliographies.

## Experimental report

In many of the social sciences, you will be asked to design and conduct your own experimental research. If so, you will need to write up your paper using a structure that is more complex than that used for just a literature review. We have a complete resource devoted to writing an experimental report in the field of psychology [here](#).

This structure follows the scientific method, but it also makes your paper easier to follow by providing those familiar cues that help your reader efficiently scan your information for:

- Why the topic is important (covered in your introduction)
- What the problem is (also covered in your introduction)
- What you did to try to solve the problem (covered in your methods section)
- What you found (covered in your results section)
- What you think your findings mean (covered in your discussion section)

Thus an experimental report typically includes the following sections.

- Title page
- Abstract
- Introduction
- Method
- Results
- Discussion
- References
- Appendices(if necessary)
- Tables and/or figures (if necessary)

Make sure to check the guidelines for your assignment or any guidelines that have been given to you by an editor of a journal before you submit a manuscript containing the sections listed above.

As with the literature review, the length of this report may vary by course or by journal, but most often it will be determined by the scope of the research conducted.

## Other papers

If you are writing a paper that fits neither of these categories, follow the guidelines about [General Format](#), consult your instructor, or look up advice in the *Publication Manual of the American Psychological Association*.

When submitting a manuscript to a journal, make sure you follow the guidelines described in the submission policies of that publication, and include as many sections as you think are applicable to presenting your material. Remember to keep your audience in mind as you are making this decision. If certain information is particularly pertinent for conveying your research, then ensure that there is a section of your paper that adequately addresses that information.

**Contributors:**Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# APA Stylistics: Avoiding Bias

Researchers who use APA often work with a variety of populations, some of whom tend to be stereotyped by the use of labels and other biased forms of language. Therefore, APA offers specific

recommendations for eliminating bias in language concerning race, disability, and sexuality.

## **Make Adjustments to Labels**

Although you should avoid labeling whenever possible, it is sometimes difficult to accurately account for the identity of your research population or individual participants without using language that can be read as biased. Making adjustments in how you use identifiers and other linguistic categories can improve the clarity of your writing and minimize the likelihood of offending your readers.

In general, you should call people what they prefer to be called, especially when dealing with race and ethnicity. But sometimes the common conventions of language inadvertently contain biases towards certain populations - e.g. using "normal" in contrast to someone identified as "disabled." Therefore, you should be aware of how your choice of terminology may come across to your reader, particularly if they identify with the population in question.

You can find an in-depth discussion of this issue and specific recommendations for how to appropriately represent people in your text on the APA website on the following pages:

- [Removing Bias in Language: Disabilities](#)
- [Removing Bias in Language: Race & Ethnicity](#)
- [Removing Bias in Language: Sexuality](#)

## **Avoid Gendered Pronouns**

While you should always be clear about the sex identity of your participants (if you conducted an experiment), so that gender differences are obvious, you should not use gender terms when they aren't necessary. In other words, you should not use "he," "his" or "men" as generic terms applying to both sexes.

APA does not recommend replacing "he" with "he or she," "she or he," "he/she," "(s)he," "s/he," or alternating between "he" and "she" because these substitutions are awkward and can distract the reader from the point you are trying to make. The pronouns "he" or "she" inevitably cause the reader to think of only that gender, which may not be what you intend.

To avoid the bias of using gendered pronouns:

- Rephrase the sentence
- Use plural nouns or plural pronouns - this way you can use "they" or "their"
- Replace the pronoun with an article - instead of "his," use "the"
- Drop the pronoun - many sentences sound fine if you just omit the troublesome "his" from the sentence
- Replace the pronoun with a noun such as "person," "individual," "child," "researcher," etc.

For more about addressing gender in academic writing, visit the OWL's handout on [non-sexist language](#) use.

## **Find Alternative Descriptors**

To avoid unintentional biases in your language, look to the parameters of your research itself. When writing up an experimental report, describe your participants by the measures you used to classify them in the experiment, as long as the labels are not offensive.

**Example:** If you had people take a test measuring their reaction times and you were interested in

looking at the differences between people who had fast reaction times and those with slow reaction times, you could call the first group the "fast reaction time group" and the second the "slow reaction time group."

Also, use adjectives to serve as descriptors rather than labels. When you use terms such as "the elderly" or "the amnesiacs," the people lose their individuality. One way to avoid this is to insert an adjective (e.g., "elderly people," "amnesic patients"). Another way is to mention the person first and follow this with a descriptive phrase (e.g., "people diagnosed with amnesia"), although it can be cumbersome to keep repeating phrases like this.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### **Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## **APA Stylistics: Basics**

Writing in APA is more than simply learning the formula for citations or following a certain page layout. APA also includes the stylistics of your writing, from point of view to word choice.

### **Point of View and Voice**

When writing in APA Style, you can use the first person point of view when discussing your research steps ("I studied ...") and when referring to yourself and your co-authors ("We examined the literature ..."). Use first person to discuss research steps rather than anthropomorphising the work. For example, a study cannot "control" or "interpret"; you and your co-authors, however, can.

In general, you should foreground the research and not the researchers ("The results indicate ..."). Avoid using the editorial "we"; if you use "we" in your writing, be sure that "we" refers to you and your fellow researchers.

It is a common misconception that foregrounding the research requires using the passive voice ("Experiments have been conducted ..."). This is inaccurate. Rather, you would use pronouns in place of "experiments" ("We conducted experiments ...").

APA Style encourages using the active voice ("We interpreted the results ..."). The active voice is particularly important in experimental reports, where the subject performing the action should be clearly identified (e.g. "We interviewed ..." vs. "The participants responded ...").

Consult the OWL handout for more on the distinction between [passive and active voice](#).

### **Clarity and Conciseness**

Clarity and conciseness in writing are important when conveying research in APA Style. You don't want to misrepresent the details of a study or confuse your readers with wordiness or unnecessarily complex sentences.

For clarity, be specific rather than vague in descriptions and explanations. Unpack details accurately



to provide adequate information to your readers so they can follow the development of your study.

**Example:** "It was predicted that marital conflict would predict behavior problems in school-aged children."

To clarify this vague hypothesis, use parallel structure to outline specific ideas:

"The first hypothesis stated that marital conflict would predict behavior problems in school-aged children. The second hypothesis stated that the effect would be stronger for girls than for boys. The third hypothesis stated that older girls would be more affected by marital conflict than younger girls."

To be more concise, particularly in introductory material or abstracts, you should pare out unnecessary words and condense information when you can (see the OWL handout on [Conciseness](#) in academic writing for suggestions).

**Example:** The above list of hypotheses might be rephrased concisely as: "The authors wanted to investigate whether marital conflict would predict behavior problems in children and they wanted to know if the effect was greater for girls than for boys, particularly when they examined two different age groups of girls."

Balancing the need for clarity, which can require unpacking information, and the need for conciseness, which requires condensing information, is a challenge. Study published articles and reports in your field for examples of how to achieve this balance.

## Word Choice

You should even be careful in selecting certain words or terms. Within the social sciences, commonly used words take on different meanings and can have a significant effect on how your readers interpret your reported findings or claims. To increase clarity, avoid bias, and control how your readers will receive your information, you should make certain substitutions:

- Use terms like "participants" or "respondents" (rather than "subjects") to indicate how individuals were involved in your research
- Use terms like "children" or "community members" to provide more detail about who was participating in the study
- Use phrases like "The evidence *suggests* ..." or "Our study *indicates* ..." rather than referring to "proof" or "proves" because no single study can prove a theory or hypothesis

As with the other stylistic suggestions here, you should study the discourse of your field to see what terminology is most often used.

## Avoiding Poetic Language

Writing papers in APA Style is unlike writing in more creative or literary styles that draw on poetic expressions and figurative language. Such linguistic devices can detract from conveying your information clearly and may come across to readers as forced when it is inappropriately used to explain an issue or your findings.

Therefore, you should:

- minimize the amount of figurative language used in an APA paper, such as metaphors and analogies unless they are helpful in conveying a complex idea
- avoid rhyming schemes, alliteration, or other poetic devices typically found in verse
- use simple, descriptive adjectives and plain language that does not risk confusing your



meaning

**Contributors:**Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# APA Headings and Seriation

## Headings

APA Style uses a unique headings system to separate and classify paper sections. There are 5 **heading levels** in APA. The 6<sup>th</sup> edition of the APA manual revises and simplifies previous heading guidelines. Regardless of the number of levels, always use the headings in order, beginning with level 1. The format of each level is illustrated below:

APA Headings	
Level	Format
1	<b>Centered, Boldface, Uppercase and Lowercase Headings</b>
2	<b>Left-aligned, Boldface, Uppercase and Lowercase Heading</b>
3	<b>Indented, boldface, lowercase heading with a period.</b> Begin body text after the period.
4	<b><i>Indented, boldface, italicized, lowercase heading with a period.</i></b> Begin body text after the period.
5	<b><i>Indented, italicized, lowercase heading with a period.</i></b> Begin body text after the period.

Thus, if the article has four sections, some of which have subsections and some of which don't, use headings depending on the level of subordination. Section headings receive level one format. Subsections receive level two format. Subsections of subsections receive level three format. For example:

**Method** (Level 1)

**Site of Study** (Level 2)

**Participant Population** (Level 2)

**Teachers.** (Level 3)

**Students.** (Level 3)

**Results** (Level 1)

**Spatial Ability** (Level 2)

**Test one.** (Level 3)

*Teachers with experience.* (Level 4)

*Teachers in training.* (Level 4)

**Test two.** (Level 3)

## **Kinesthetic Ability** (Level 2)

In APA Style, the Introduction section never gets a heading and headings are not indicated by letters or numbers. Levels of headings will depend upon the length and organization of your paper. Regardless, always begin with level one headings and proceed to level two, etc.

## **Seriation**

APA also allows for seriation in the body text to help authors organize and present key ideas. For numbered seriation, do the following:

On the basis of four generations of usability testing on the Purdue OWL, the Purdue OWL Usability Team recommended the following:

1. Move the navigation bar from the right to the left side of the OWL pages.
2. Integrate branded graphics (the Writing Lab and OWL logos) into the text on the OWL homepage.
3. Add a search box to every page of the OWL.
4. Develop an OWL site map.
5. Develop a three-tiered navigation system.

For lists that do not communicate hierarchical order or chronology, use bullets:

In general, participants found user-centered OWL mock up to be easier to use. What follows are samples of participants' responses:

- "This version is easier to use."
- "Version two seems better organized."
- "It took me a few minutes to learn how to use this version, but after that, I felt more comfortable with it."

Authors may also use seriation for paragraph length text.

For seriation within sentences, authors may use letters:

On the basis of research conducted by the usability team, OWL staff have completed (a) the OWL site map; (b) integrating graphics with text on the OWL homepage; (c) search boxes on all OWL pages except the orange OWL resources (that is pending; we do have a search page); (d) moving the navigation bar to the left side of pages on all OWL resources except in the orange area (that is pending); (e) piloting the first phase of the three-tiered navigation system, as illustrated in the new Engagement section.

Authors may also separate points with bullet lists:

On the basis of the research conducted by the usability team, OWL staff have completed

- the OWL site map;
- integrating graphics with text on the OWL homepage;
- search boxes on all OWL pages except the orange OWL resources (that is pending; we do have a search page);

- moving the navigation bar to the left side of pages on all OWL resources except in the orange area (that is pending);
- piloting the first phase of the three-tiered navigation system, as illustrated in the new Engagement section.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

**Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## APA PowerPoint Slide Presentation

Select the APA PowerPoint Presentation link in the Media box above to download slides that provide a detailed review of the APA citation style.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

**Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## APA Sample Paper

Click on the link above in the Media box to download the pdf handout, APA Sample Paper.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

**Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## APA Tables and Figures 1

The purpose of tables and figures in documents is to enhance your readers' understanding of the information in the document. Most word processing software available today will allow you to create your own tables and figures, and even the most basic of word processors permit the embedding of

images, thus enabling you to include tables and figures in almost any document.

## General guidelines

**Necessity.** Visual material such as tables and figures can be used quickly and efficiently to present a large amount of information to an audience, but visuals must be used to assist communication, not to use up space, or disguise marginally significant results behind a screen of complicated statistics. Ask yourself this question first: Is the table or figure necessary? For example, it is better to present simple descriptive statistics in the text, not in a table.

**Relation of Tables or Figures and Text.** Because tables and figures supplement the text, refer in the text to all tables and figures used and explain what the reader should look for when using the table or figure. Focus only on the important point the reader should draw from them, and leave the details for the reader to examine on her own.

**Documentation.** If you are using figures, tables and/or data from other sources, be sure to gather all the information you will need to properly document your sources.

**Integrity and Independence.** Each table and figure must be intelligible without reference to the text, so be sure to include an explanation of every abbreviation (except the standard statistical symbols and abbreviations).

**Organization, Consistency, and Coherence.** Number all tables sequentially as you refer to them in the text (Table 1, Table 2, etc.), likewise for figures (Figure 1, Figure 2, etc.). Abbreviations, terminology, probability level values must be consistent across tables and figures in the same article. Likewise, formats, titles, and headings must be consistent. Do not repeat the same data in different tables.

## Tables

### Table Checklist

- Is the table necessary?
- Is the entire table single- or double-spaced (including the title, headings, and notes)?
- Are all comparable tables presented consistently?
- Is the title brief but explanatory?
- Does every column have a column heading?
- Are all abbreviations; special use of italics, parentheses, and dashes; and special symbols explained?
- Are all probability level values correctly identified, and are asterisks attached to the appropriate table entries? Is a probability level assigned the same number of asterisks in all the tables in the same document?
- Are the notes organized according to the convention of general, specific, probability?
- Are all vertical rules eliminated?
- If the table or its data are from another source, is the source properly cited?
- Is the table referred to in the text?

## Tables

Data in a table that would require only two or fewer columns and rows should be presented in the text. More complex data is better presented in tabular format. In order for quantitative data to be presented clearly and efficiently, it must be arranged logically, e.g. data to be compared must be presented next to one another (before/after, young/old, male/female, etc.), and statistical information (means, standard deviations, N values) must be presented in separate parts of the table. If possible,

use canonical forms (such as ANOVA, regression, or correlation) to communicate your data effectively.

Table 1			
<i>Dogs Scoring Above Average on Intelligence by Breed and Gender</i>			
Breed	Male	Female	%
Dachshund	123	234	17.6
Terrier	456	567	31.1
Siberian Husky <sup>a</sup>	789	891	51.3
Totals ( <i>N</i> = 3060)	1368	1692	
<i>Note.</i> Average score = 150. No animals were harmed during testing.			
<sup>a</sup> Three huskies (one male, two female) escaped before testing was completed and are therefore not included in the table			
Image Caption: Table 1			

Table Structure

The following image illustrates the basic structure of tables.

Table 2			
<i>Title</i>			
Header			
Subhead	Column Head	Column Head	Column Head
Row 1	123	234	17.6
Row 2	456	567	31.1
Row 3	789	891	51.3
Row 4	1368	1692	
Image Caption: Table 2			

**Numbers.** Number all tables with arabic numerals sequentially. Do not use suffix letters (e.g. Table 3a, 3b, 3c); instead, combine the related tables. If the manuscript includes an appendix with tables, identify them with capital letters and arabic numerals (e.g. Table A1, Table B2).

**Titles.** Like the title of the paper itself, each table must have a clear and concise title. When appropriate, you may use the title to explain an abbreviation parenthetically.

Example: *Comparison of Median Income of Adopted Children (AC) v. Foster Children (FC)*

**Headings.** Keep headings clear and brief. The heading should not be much wider than the widest entry in the column. Use of standard abbreviations can aid in achieving that goal. All columns must have headings, even the stub column (see example structure), which customarily lists the major independent variables.

**Body.** In reporting the data, consistency is key: Numerals should be expressed to a consistent number of decimal places that is determined by the precision of measurement. Never change the unit of measurement or the number of decimal places in the same column.

Specific Types of Tables

**Analysis of Variance (ANOVA) Tables.** The conventional format for an ANOVA table is to list the source in the stub column, then the degrees of freedom (df) and the  $F$  ratios. Give the between-subject variables and error first, then within-subject and any error. Mean square errors must be enclosed in parentheses. Provide a general note to the table to explain what those values mean (see example). Use asterisks to identify statistically significant  $F$  ratios, and provide a probability footnote.

Table 3				
<i>Sample ANOVA Table</i>				
Stubhead	$df$	$F$	$\eta$	$p$
Column spanner				
Row 1	1	0.67	.55	.41
Row 2	2	0.02	.01	.39
Row 3	3	0.15	.33	.34
Row 4	4	1.00	.76	.54
Note. This is where authors provide extra information important to the data, such as findings that approach statistical significance depending on the p value: Significant at the $p < 0.05$ level.				
Image Caption: Table 3 ANOVA Table				

**Regression.** Conventional reporting of regression analysis follows two formats. If the study is purely applied, list only the raw or unstandardized coefficients ( $B$ ). If the study is purely theoretical, list only the standardized coefficients ( $\beta$ ). If the study was neither purely applied nor theoretical, then list both standardized and unstandardized coefficients. Specify the type of analysis, either hierarchical or simultaneous, and provide the increments of change if you used hierarchical regression.

Table 4			
<i>Sample Regression Table</i>			
Stubhead	$B$	$SE B$	$\beta$
Row 1			
Row 2	-4.56	1.87	-.34
Row 3	0.43	0.23	.86
Row 4			
Row 5	-1.22	1.43	-.66
Row 6	0.89	0.65	.38
Row 7	0.77	0.83	-.01
Notes. $R^2 = .34$ ( $ps < .05$ ).			
Image Caption: Table 4 Regression Table			

**Notes in Tables**

There are three types of notes for tables: general, specific, and probability notes. All of them must be placed below the table in that order.

**General** notes explain, qualify or provide information about the table as a whole. Put explanations of abbreviations, symbols, etc. here.

Example: *Note.* The racial categories used by the US Census (African-American, Asian American, Latinos/-as, Native-American, and Pacific Islander) have been collapsed into the category “non-White.” E = excludes respondents who self-identified as “White” and at least one other “non-White” race.

**Specific** notes explain, qualify or provide information about a particular column, row, or individual entry. To indicate specific notes, use superscript lowercase letters (e.g. <sup>a</sup>, <sup>b</sup>, <sup>c</sup>), and order the superscripts from left to right, top to bottom. Each table’s first footnote must be the superscript <sup>a</sup>.

Example: <sup>a</sup> n = 823. <sup>b</sup> One participant in this group was diagnosed with schizophrenia during the survey.

**Probability** notes provide the reader with the results of the tests for statistical significance. Asterisks indicate the values for which the null hypothesis is rejected, with the probability (p value) specified in the probability note. Such notes are required only when relevant to the data in the table. Consistently use the same number of asterisks for a given alpha level throughout your paper.

Example: \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

Image Caption: Sample Table Notes

If you need to distinguish between two-tailed and one-tailed tests in the same table, use asterisks for two-tailed p values and an alternate symbol (such as daggers) for one-tailed p values.

Example: \* $p < .05$ , two-tailed. \*\* $p < .01$ , two-tailed. † $p < .05$ , one-tailed. †† $p < .01$ , one-tailed.

Image Caption: More Table Notes

## Tables from Other Sources

If using tables from a source, copy the structure of the original exactly, and cite the source in accordance with [APA style](#).

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# APA Tables and Figures 2

## Figures

### Figure Checklist

- Is the figure necessary?
- Is the figure simple, clean, and free of extraneous detail?
- Are the data plotted accurately?
- Is the grid scale correctly proportioned?
- Is the lettering large and dark enough to read? Is the lettering compatible in size with the rest of the figure?
- Are parallel figures or equally important figures prepared according to the same scale?
- Are terms spelled correctly?
- Are all abbreviations and symbols explained in a figure legend or figure caption? Are the symbols, abbreviations, and terminology in the figure consistent with those in the figure caption? In other figures? In the text?
- Are the figures numbered consecutively with Arabic numerals?
- Are all figures mentioned in the text?

As tables supplement the text, so should each figure.

### Types of Figures

**Graphs** are good at quickly conveying relationships like comparison and distribution. The most common forms of graphs are scatter plots, line graphs, bar graphs, pictorial graphs, and pie graphs. For more details and specifics on what kind of information, relations, and meaning can be expressed with the different types of graphs, consult your textbook on quantitative analysis. Spreadsheet programs, such as Microsoft Excel, can generate the graphs for you.

**Scatter plots** are composed of individual dots that represent the value of a specific event on the scale established by the two variables plotted on the *x*- and *y*-axes. When the dots cluster together, a correlation is implied. On the other hand, when the dots are scattered randomly, no correlation is seen.



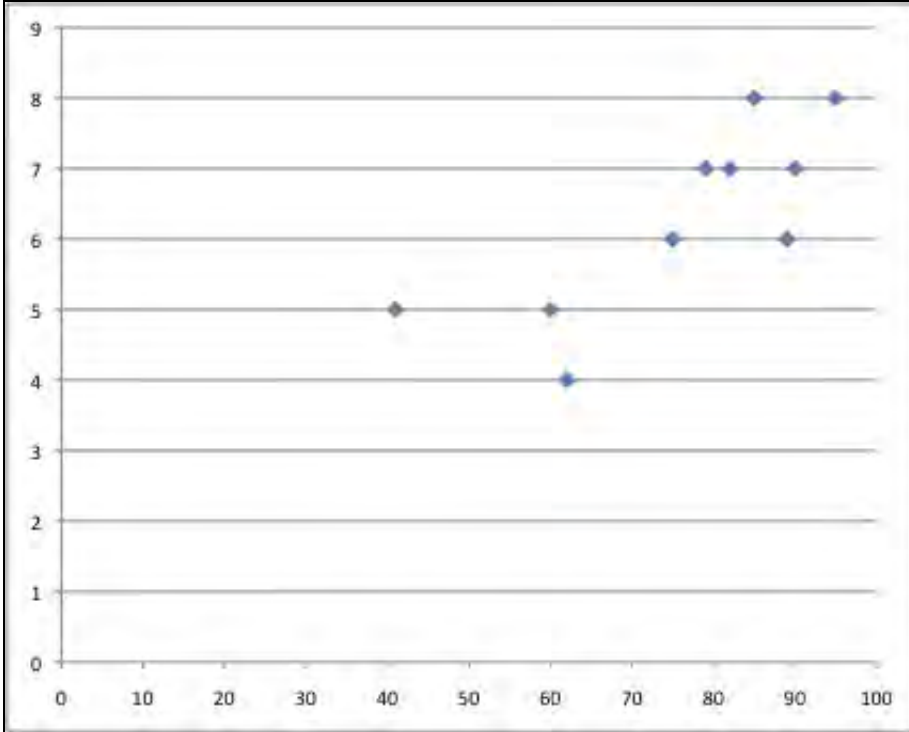


Image Caption: Scatter Plot Graph

**Line graphs** depict the relationship between quantitative variables. Customarily, the independent variable is plotted along the *x*-axis (horizontally) and the dependent variable is plotted along the *y*-axis (vertically). See example Figure 1...

**Bar graphs** come in three main types: 1) solid vertical or horizontal bars, 2) multiple bar graphs, and 3) sliding bars. In solid bar graphs, the independent variable is categorical, and each bar represents one kind of datum, e. g. a bar graph of monthly expenditures. A multiple bar graph can show more complex information than a simple bar graph, e. g. monthly expenditures divided into categories (housing, food, transportation, etc.). In sliding bar graphs, the bars are divided by a horizontal line which serves as the baseline, enabling the representation of data above and below a specific reference point, e. g. high and low temperatures v. average temperature.

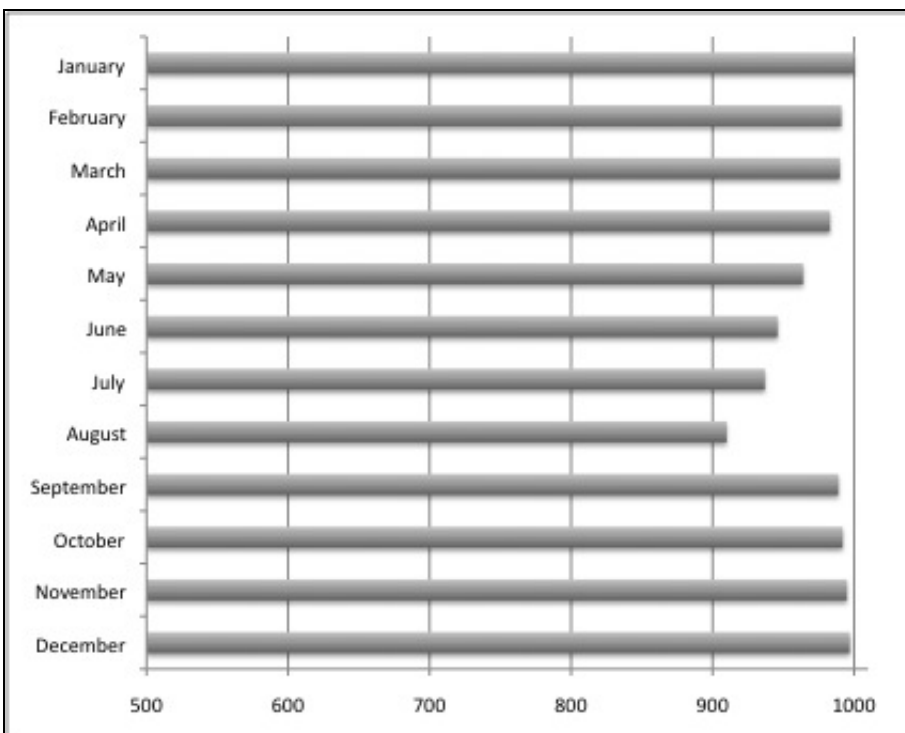


Image Caption: Bar Graph

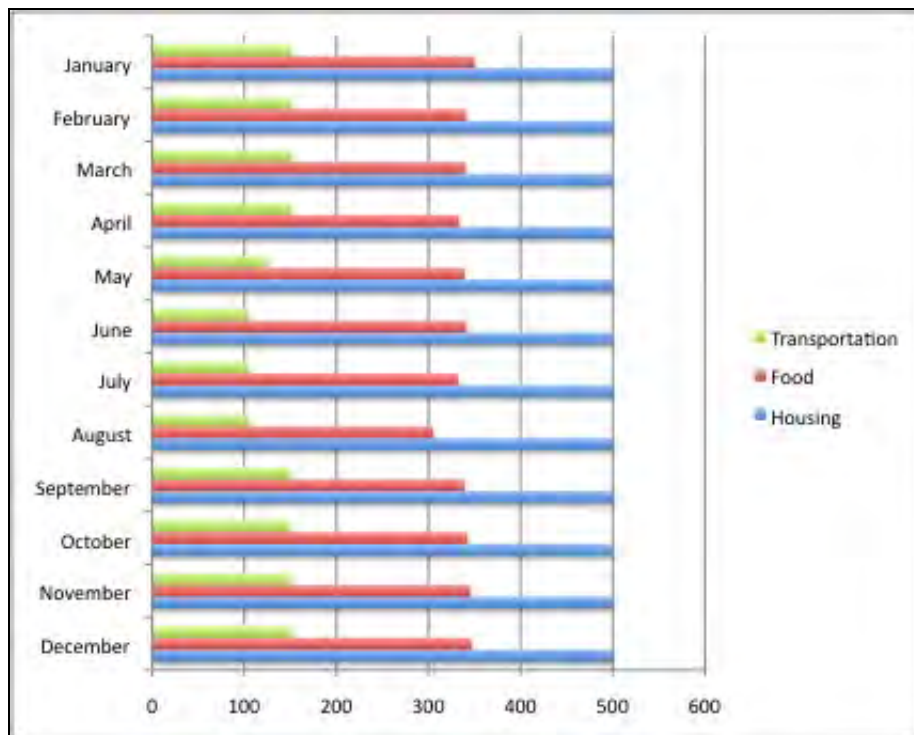


Image Caption: Bar Graph by Type

**Pictorial graphs** can be used to show quantitative differences between groups. Pictorial graphs can be very deceptive: if the height of an image is doubled, its area is quadrupled. Therefore, great care should be taken that images representing the same values must be the same size.

**Circle (pie) graphs** are used to represent percentages and proportions. For the sake of readability, no more than five variables should be compared in a single pie graph. The segments should be ordered very strictly: beginning at twelve o'clock, order them from the largest to the smallest, and shade the segments from dark to light (i.e., the largest segment should be the darkest). Lines and dots can be used for shading in black and white documents.

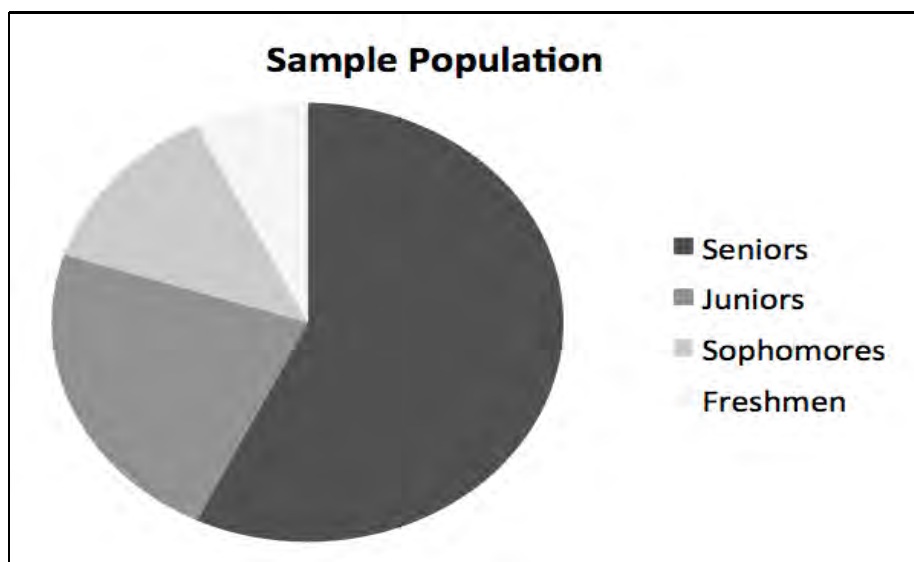
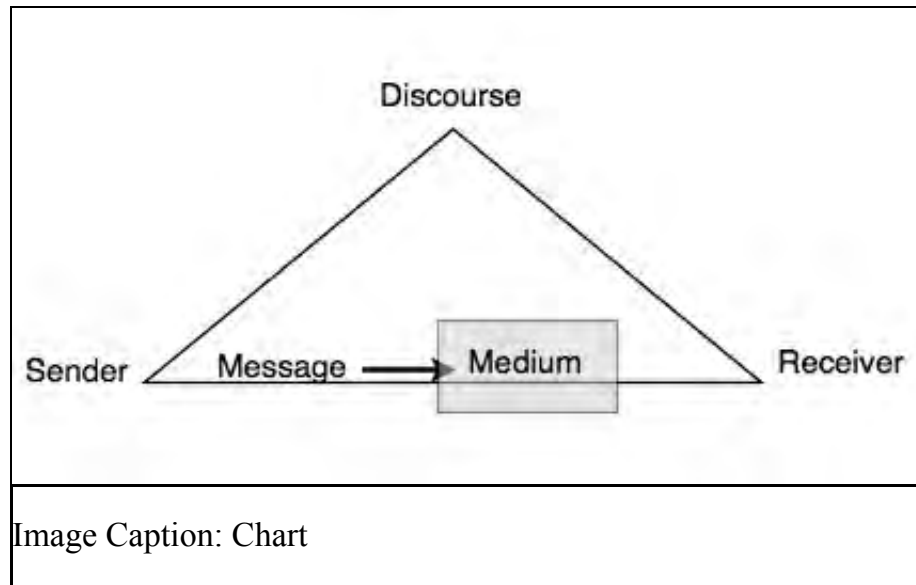


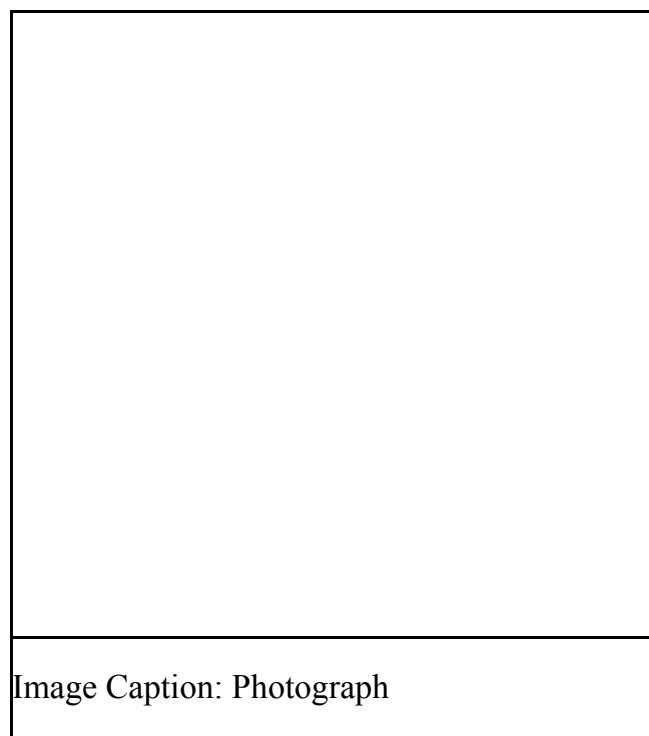
Image Caption: Circle (or Pie) Graph

**Charts** are used to represent the components of larger objects or groups (e. g. a tribal hierarchy), the

steps in a process (as in a flow-chart), or the schematics of an object (the components of a cell phone).



**Drawings and photographs** can be used to communicate very specific information about a subject. Thanks to software, both are now highly manipulable. For the sake of readability and simplicity, line drawings should be used, and photographs should have the highest possible contrast between the background and focal point. Cropping, cutting out extraneous detail, can be very beneficial for a photograph. Use software like GraphicConverter or Photoshop to convert color photographs to black and white before printing on a laser printer. Otherwise most printers will produce an image with poor contrast.



## Preparing Figures

In preparing figures, communication and readability must be the ultimate criteria. Avoid the temptation to use the special effects available in most advanced software packages. While three-dimensional effects, shading, and layered text may look interesting to the author, overuse, inconsistent use, and misuse may distort the data, and distract or even annoy readers. Design properly done is inconspicuous, almost invisible, because it supports communication. Design

improperly, or amateurishly, done draws the reader's attention from the data, and makes him or her question the author's credibility.

The APA has determined specifications for the size of figures and the fonts used in them. Figures of one column must be between 2 and 3.25 inches wide (5 to 8.45 cm). Two-column figures must be between 4.25 and 6.875 inches wide (10.6 to 17.5 cm). The height of figures should not exceed the top and bottom margins. The text in a figure should be in a san serif font (such as Helvetica, Arial, or Futura). The font size must be between eight and fourteen point. Use circles and squares to distinguish curves on a line graph (at the same font size as the other labels). (See examples above.)

## Captions and Legends

For figures, make sure to include the figure number and a title with a legend and caption. These elements appear **below** the visual display. For the figure number, type *Figure X*. Then type the title of the figure in sentence case. Follow the title with a legend that explains the symbols in the figure and a caption that explains the figure:

*Figure 1.* How to create figures in APA style. This figure illustrates effective elements in APA style figures.

Captions serve as a brief, but complete, explanation and as a title. For example, “*Figure 4. Population*” is insufficient, whereas “*Figure 4. Population of Grand Rapids, MI by race (1980)*” is better. If the figure has a title in the image, crop it.

Graphs should always include a legend that explains the symbols, abbreviations, and terminology used in the figure. These terms must be consistent with those used in the text and in other figures. The lettering in the legend should be of the same type and size as that used in the figure.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## APA Abbreviations

In APA, abbreviations should be limited to instances when a) the abbreviation is standard and will not interfere with the reader's understanding and b) if space and repetition can be greatly avoided through abbreviation.

There are a few common trends in abbreviating that you should follow when using APA, though there are always exceptions to these rules. When abbreviating a term, use the full term the first time you use it, followed immediately by the abbreviation in parentheses.

According to the American Psychological Association (APA), abbreviations are best used only when they allow for clear communication with the audience.

*Exceptions:* Standard abbreviations like units of measurement and states do not need to be written out. APA also allows abbreviations that appear as words in *Meriam-Webster's Collegiate Dictionary*

to be used without explanation (IQ, REM, AIDS, HIV).

Do not use periods or spaces in abbreviations of all capital letters, unless it is a proper name *or* refers to participants using identity-concealing labels:

MA, CD, HTML, APA

P. D. James, J. R. R. Tolkien, E. B. White *or* F.I.M., S.W.F.

*Exceptions:* Use a period when abbreviating the United States as an adjective (U.S. Marines or U.S. Senator)

Use a period if the abbreviation is Latin abbreviation or a reference abbreviation:

etc., e.g., a.m. *or* Vol. 7, p. 12, 4th ed.

Do not use periods when abbreviating measurements:

cd, ft, lb, mi, min

*Exceptions:* Use a period when abbreviating inch (in.) to avoid confusion.

Units of measurement and statistical abbreviations should only be abbreviated when accompanied by numerical values:

7 mg, 12 mi,  $M = 7.5$

measured in milligrams, several miles after the exit, the means were determined

Only certain units of time should be abbreviated.

Do not abbreviate:

day, week, month, year

Do abbreviate:

hr, min, ms, ns, s

To form the plural of abbreviations, add s alone without apostrophe or italicization.

vols., IQs, Eds.

*Exception:* Do not add s to pluralize units of measurement (12 m not 12 ms).

## Abbreviations in Citations

Citations should be as condensed as possible, so you should know the basic rules of abbreviation endorsed by the APA to provide your readers with reference information.

Always abbreviate the first and middle names of authors, editors, etc.

Shakespeare, W., Chomsky, N.

Use the following abbreviations within citations (take note of capitalization):

APA Citation Abbreviations	
Book Part	Abbreviation

edition	ed.
revised edition	Rev. ed.
Second Edition	2 <sup>nd</sup> ed.
Editor(s)	Ed. or Eds.
Translator(s)	Trans.
No date	n.d.
Page(s)	p. or pp.
Volume(s)	Vol. or Vols.
Number	No.
Part	Pt.
Technical Report	Tech. Rep.
Supplement	Suppl.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### Summary:

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## Statistics in APA

When including statistics in written text, be sure to include enough information for the reader to understand the study. Although the amount of explanation and data included depends upon the study, APA style has guidelines for the representation of statistical information:

- Do not give references for statistics unless the statistic is uncommon, used unconventionally, or is the focus of the article
- Do not give formulas for common statistics (i.e. mean, *t* test)
- Do not repeat descriptive statistics in the text if they're represented in a table or figure
- Use terms like *respectively* and *in order* when enumerating a series of statistics; this illustrates the relationship between the numbers in the series.

### Punctuating statistics

Use parentheses to enclose statistical values:

...proved to be statistically significant ( $p = .42$ ) with all variables.

Use parentheses to enclose degrees of freedom:

$$t(45) = 4.35$$

$$F(3, 87) = 2.11$$

Use brackets to enclose limits of confidence intervals:

89% CIs [3.45, 2.7], [-6.0, 3.89], and [-7.23, 1.89]

Use standard typeface (no bolding or italicization) when writing Greek letters, subscripts that function as identifiers, and abbreviations that are not variables.

Use **boldface** for vectors and matrices:

$\mathbf{V}, \Sigma$

Use *italics* for statistical symbols (other than vectors and matrices):

*t, F, N*

Use an *italicized*, uppercase *N* in reference to number of subjects or participants in the total sample.

*N* = 328

Use an *italicized*, lowercase *n* in reference to only a portion of the sample.

*n* = 42

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

**Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## APA Classroom Poster

The APA poster at the link below is a printable jpg file you may download and print out at different sizes for use in classrooms, writing centers, or as a pocket reference. Please keep in mind that the file size, as a print-quality resource (120 dpi), is large, so it may take a while to download. You may adjust the print size of the poster from your print menu. As is, the poster is 27 x 36 inches.

Because the poster is quite large, standard printers cannot print the poster. If you do not have access to a printer that can print large documents, contact a local print shop to print the poster. The Purdue OWL cannot grant requests to print and mail posters.

If you do not have access to a print shop to print the poster, please use the resources we have available [here](#) for printing on standard 8.5 x 11 inch paper. Go to resource you would like to print, scroll down to the bottom of the page, and click "Full Resource for Printing."

Also please note that the poster only contains *basic* APA guidelines. For detailed instructions, please see the complete OWL APA resources [here](#).

The Purdue OWL APA Classroom Poster was developed by Kate Bouwens for the Purdue Professional Writing - Purdue OWL Internship class, English 490, in spring 2009.

[Purdue OWL APA Classroom Poster](#) (Please note: The poster is best viewed in Firefox.)

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

**Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

# APA Changes 6th Edition

The American Psychological Association (APA) updated its style manual in the summer of 2009. This resource presents the changes made between the fifth and sixth editions. Please note that the first printing of the APA sixth edition contained misprints; if you are using the APA manual, make sure you are using at least the second printing of the sixth edition.

Traditionally, psychologists were the main users of APA, but recently, students and writers in other fields began using APA style. Therefore, the sixth edition was written with a broader audience in mind. The changes made to the sixth edition reflect this broader audience.

This resource was created following the APA manual’s “What’s New in APA,” is organized according to the APA manual chapters, and highlights updates to the sixth edition that most concern student writers instead of those interested in publishing manuscripts. For a more complete discussion of the changes, please visit [this site](#).

## Levels of Heading

Headings are used to help guide the reader through a document. The levels are organized by levels of subordination, and each section of the paper should start with the highest level of heading.

### Fifth Edition (Section 3.31 in the APA manual)

APA Headings	
Level	Format
5	CENTERED UPPERCASE HEADINGS
2	Centered Uppercase and Lowercase Headings
3	<i>Centered, Italicized, Uppercase and Lowercase Headings</i>
4	<i>Left-aligned, Italicized, Uppercase and Lowercase Side Heading</i>
5	<i>Indented, italicized, lowercase paragraph heading ending with a period.</i>

### Sixth Edition (3.03)

APA Headings	
Level	Format
1	<b>Centered, Boldface, Uppercase and Lowercase Headings</b>



2	<b>Left-aligned, Boldface, Uppercase and Lowercase Heading</b>
3	<b>Indented, boldface, lowercase heading with a period.</b>
4	<b><i>Indented, boldface, italicized, lowercase heading with a period.</i></b>
5	<b><i>Indented, italicized, lowercase heading with a period.</i></b>

For example, in a scientific report following APA style, a report contains three sections: Method, Results, and Discussion. Each of these sections start with level 1 headings:

## **Methods (Level 1)**

### **Site of Study (Level 2)**

### **Participant Population (Level 2)**

**Teachers.** (Level 3)

**Students.** (Level 3)

## **Results (Level 1)**

### **Spatial Ability (Level 2)**

**Test one.** (level 3)

***Teachers with experience.*** (Level 4)

***Teachers in training.*** (Level 4)

**Test two.** (Level 3)

### **Kinesthetic Ability (Level 2)**

## **Reducing Bias in Language (3.11)**

Using precise language is expected in scientific writing, and the sixth edition offers new ways in which to talk about research participants (note that “subjects” is still an acceptable term to use, but “participants” is more representative of the individuals’ roles in the research project).

**Refer to participants at the appropriate level of specificity.** The manual provides the example of using women and men to refer to all human beings instead of only using man. Man is appropriate to use when referring to one man but not when referring to a population that includes men and women.

**Refer to participants how they wish to be called.** Try to avoid labels if possible, but if this is not avoidable, be respectful. Focus on the people and not the label. For example, instead of labeling a group “the elderly” or “the arthritic,” labels in which individuals are lost, try “older adults” or “a woman with arthritis.”

**Acknowledge participants’ participation while still following the rules in your field.** For example, a cognitive psychology student might use the term “subjects” in her research report, but a

nursing student might use the term “patients” to refer to those who participated in his research. Whatever term you choose to use, be sure you are consistent throughout your paper and with your field’s guidelines.

## The Mechanics of Style

**Spacing (4.01).** Regarding punctuation in manuscript drafts, APA suggests using two spaces after periods ending sentences to aid readability.

One space: “Previous research shows that patients are interested in palliative care. This research project explores how to discuss palliative care with patients.”

Two spaces: “Previous research shows that patients are interested in palliative care. This research project explores how to discuss palliative care with patients.”

**Approximations (4.31-32).** Use words to express approximations of days, months, and year.

“I started spelunking about four years ago.”

**Reporting statistics (4.35, 44, and 10).** Use a zero before the decimal point with numbers less than one when the statistic can be greater than one.

0.56 kg

Do not use a zero before the decimal point when the number cannot be greater than one.

$r = .015$

Include effect sizes and confidence intervals with statistics. This will allow the reader to more fully understand the conducted analyses.

Use brackets to group together confidence interval limits in both the body text and tables (5.15).

“95% CIs [-7.2, 4.3], [9.2, 12.4], and [-1.2, -0.5]” (p. 94)

## Displaying Results

The sixth edition includes a section (5.01) on the purpose of displaying data. This section can help you decide when and how to display your data. For example, your data might show that you are exploring data and information, or your data may serve a storage purpose for later retrieval.

More than likely, though, your data will serve either a communication purpose to show you have discovered meaning in data and you want to show/communicate to others this meaning.

**Figures.** Figures include graphs, charts, maps, drawings, and photographs. As a general rule, only include figures when they add to the value of the paper. If the figure merely repeats what is written in the paper, do not include it, as it does not add any new information to the paper.

The sixth edition also emphasizes the importance of clearly labeling electrophysiological, radiological, and genetic data.

## References

## Direct Quotations (6.01-21)

The sixth edition provides explicit rules for direct quotations and states that you must credit the source when “paraphrasing, quoting an author directly, or describing an idea that influenced your work” (p. 170).

If the quotation is less than 40 words, incorporate the quotation into the text and place quotation marks round the quotation. Cite the source immediately after the quotation and continue with the sentence.

Porter (1998) has stated that, “The internetworked classroom has the potential (not yet realized) to empower students” (p. 5), and this research project examines this potential.

If the quotation you are using falls at the end of the sentence, enclose the quotation with quotation marks without including the quotation’s original punctuation. Here’s a sentence as it appears in the original text:

“Semantic frames/domains represent one of the two major organizing principles for conceptual structure” (Croft & Cruse, 2004, p. 32).

Here’s what the sentence looks like when quoted within a text:

In arguing for frame semantics, Croft and Cruse (2004) asserted, “Semantic frames/domains represent one of the two major organizing principles for conceptual structure” (p. 32).

If the quotation has more than 40 words, use a block quotation. Begin the quotation on a new line and indent a half-inch from the left margin. Double-space the entire quotation, and at the end of the quotation, provide citation information after the final punctuation mark.

John Nicholson (1820) anticipated this effect when discussing farming methods in the nineteenth century:

Perhaps it would be well, if some institution were devised, and supported at the expense of the State, which would be so organized as would tend most effectually to produce a due degree of emulation among Farmers, by rewards and honorary distinctions conferred by those who, by their successful experimental efforts and improvements, should render themselves duly entitled to them. (p. 92)

## The Reference List

References that appear in the text must appear in the references list in alphabetical order by the author’s last name, with the exception of personal communication; only cite personal communication in the text, not in the reference list.

**Electronic sources (6.31).** Because electronic publishing has become a standard in research, the sixth edition provides an overview of electronic sources and how to reference them, specifically with URLs and DOIs.

URLs, more commonly known as a web address, locate information housed on the Internet. The fifth edition specified that references to electronic sources should refer to the article’s or document’s URL. However, they are prone to “breaking” or deleting, and to resolve issues associated with the unstable nature of URLs, publishers have started using DOIs with articles.

For more details on how to cite electronic sources with following the sixth edition, consult your APA

manual or [the OWL's resource on citing electronic sources](#).

While citing from a webpage, you may not be able to find a page number to refer to, i.e., there is no pagination. Instead, refer to the paragraph number from which you are citing where you would usually insert a page number by using "para." instead of "p.". Be sure to include the author's/s' name/s and year, too, if applicable.

"The Purdue University Writing Lab and Purdue Online Writing Lab (OWL) assist clients in their development as writers—no matter what their skill level—with on-campus consultations, online participation, and community engagement" (Purdue OWL, 2010, "Mission," para. 1).

"Mission" is used here to refer to the section in which this quote was found.

**Contributors:** Joshua M. Paiz, Elizabeth Angeli, Jodi Wagner, Elena Lawrick, Kristen Moore, Michael Anderson, Lars Soderlund, Allen Brizee, Russell Keck.

### **Summary:**

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

## **OWL Mail APA FAQs**

The following FAQs address issues in APA citation and/or formatting. The entries in this section are based on frequently asked questions received by our [OWL Mail Tutors](#). We encourage you to scan through these before you send your APA related questions into OWL Mail. Also, Further information on APA style and citation can be found at the [Purdue OWL's APA Style and Formatting](#) resource.

### **I'm writing an APA style paper, but I can't get the header on the first page to be different than the subsequent pages. How do I set a different header on the first page?**

If you are using *Word 2007*, you can make the header of the first page different from the header on the second and following pages. To do this, please follow these steps:

1. After opening *Word 2007*, click on "Insert" at the top of the page.
2. Click on "Header" and choose the Header template you wish to use. Type in the text you would like for the first page.
3. When you type in your text in the header, you will see the "Design" tab is highlighted. There you can click on "Different first page." This will allow you to type in different text within your header beginning with page two.

If you do not have a version of *Word* which allows you to do this, you can simply type "Running Head: SHORTENED TITLE OF YOUR PAPER" at the upper most line on the first page without typing it inside the header. Then type the shortened title inside the header as you wish it to appear throughout your document.

## **Using APA, how do I cite an author if their work is referenced more than once in a single paragraph?**

Here's what the 6<sup>th</sup> edition of the APA manual says: "Within a paragraph, when the name of the author is part of the narrative...you need not include the year in subsequent nonparenthetical references to a study as long as the study cannot be confused with other studies cited in the article. Do include the year in all parenthetical citations" (pg. 174).

In other words, every time you bring up the author in a new paragraph, you should use the year, but you don't have to within a paragraph, as long as it's clear from your wording that you are discussing the same author. If you were giving a direct quotation that needed a parenthetical reference for the page number, then you'd include the year as well.

## **How do I cite a work that has no listed author in an APA-style paper?**

According to the OWL website's resource on APA-style citations, "When your essay includes parenthetical citations of sources with no author named, use a shortened version of the source's title instead of an author's name. Use quotation marks and italics as appropriate. For example, parenthetical citations of the source above would appear as follows: (*Merriam-Webster's* 1993)." The bibliographical citation is as follows:

*Merriam-Webster's collegiate dictionary* (10<sup>th</sup> ed.).(1993). Springfield, MA: Merriam-Webster.

## **What do I do if the source-type that I'm using doesn't appear in any APA reference/style guides?**

The APA manual models several different templates for references, but the forms given may not apply to all documents. In this case, the APA manual states that you should format the entry as best you can in accordance with their models:

"Occasionally, however, you may need to use a reference for a source for which this chapter does not provide specific guidance. In such a case choose the example that is most like your source and follow that format...When in doubt, provide more information rather than less." (American Psychological Association, 2009 p. 193).

## **What do I do if a website is missing information required for an APA-style citation?**

[The APA Style Blog](#) is a helpful source when it comes to citing websites with missing information.

For example, if your website has no author, you can use the following example as a template for the citation for your reference page:

All 33 Chile miners freed in flawless rescue. (2010, October 13). Retrieved from [http://www.msnbc.msn.com/id/39625809/ns/world\\_news-americas/](http://www.msnbc.msn.com/id/39625809/ns/world_news-americas/)

As you can see, the title of the document is moved up to where the author's name would be.

If your website has no date, you can put "n.d." instead. For example:

The College of William and Mary. (n.d.). College mission statement. Retrieved from

## **If I co-author a paper, how should the author's names appear in an APA-style title page?**

According to the 6<sup>th</sup> edition of the APA manual, "The names of the authors should appear in the order of their contributions, centered between the side margins. For names with suffixes (e.g., Jr. and III), separate the suffix from the rest of the name with a space instead of a comma. The institutional affiliation should be centered under the author's name, on the next line" (p. 24).

Some examples include the following:

Two authors, one affiliation:

John Q. Foster II and Roy R. Davis Jr.  
Educational Testing Service, Princeton, New Jersey

Three authors, one affiliation:

Juanita Fuentes, Paul Dykes, and Susan Watanabe  
University of Colorado at Boulder

Two authors, two affiliations:

David Wolf  
University of California, Berkeley  
Amanda Blue  
Brandon University

Three authors, two affiliations:

Mariah Meade and Sylvia Earleywine  
Georgetown University

## **I'm including clip art in my APA style *PowerPoint* presentation. How do I properly cite the clip art that I'm going to use?**

If you are using the clip art simply to adorn your *PowerPoint* presentation, you don't need to cite it. The 6<sup>th</sup> Edition of the APA manual does not offer a specific discussion of this issue, but it seems unnecessary to provide citation on a document presented via the Microsoft program for stock images that are specific to that software package.

However, if the clip art is presented in a separate medium (like a handout), and you want to be very thorough about citation or if your presentation is specifically about clip art and the point is to discuss clip art from different sources, then you should cite the source. Here is the format you should follow:

Title of Program (Version number)[Description of format]. Location: Name of producer.

Here's the example in the 6<sup>th</sup> Edition of the APA manual:

Comprehensive Meta-Analysis (Version 2) [Computer Software]. Englewood, NJ: Biostat.

For the clip art from on-line sources, because these are texts that are relocated from an outside source, you should probably cite them regardless of the situation. Here's the format:

Name of image creator, A. A. (Year images was made). Title of image in italics [medium of image - i.e file type]. Retrieved from <http://.....>

## **How do I cite unpublished works in APA?**

Here is the relevant format from the APA manual, 6<sup>th</sup> edition, p. 211:

Unpublished manuscripts with a university cited:

Blackwell, E., & Conrod, P.J. (2003). *A five dimensional measure of drinking motives*. Unpublished manuscript, Department of Psychology, University of British Columbia, Vancouver, Canada.

Manuscript in progress or submitted for publication:

Ting, J. Y., Florsheim, P., & Huang, W. (2008). *Mental health help-seeking in ethnic minority populations: A theoretical perspective*. Manuscript submitted for publication [or "Manuscript in preparation"].

Along with the format for the latter work, you can add the university where the author works (if indeed they are doing research as part of their position with a university or college).

## **I'm writing a paper about computer-aided writing instruction. How do I cite pieces of software in APA?**

According to the 6<sup>th</sup> edition of the APA manual, here is the general format for citing software:

Rightsholder, A.A. (Year). Title of program (Version number) [Description of form]. Location: Name of producer.

Alternatively, instead of using "Location:..." you can use "Retrieved from <http://www....>"

If you can't find who the rightsholder is (i.e. the company or person who made the software), you can start the citation with the name of the program.

Here's another example from the manual:

Comprehensive Meta-Analysis (Version 2) [Computer software]. Englewood, NJ: Biostat.

The date may be excluded if it is not available.

If you are citing a piece of software for a smartphone or a video game console, I would use the most descriptive term for the kind of software you're using, i.e., [iPhone application].

## How do I cite my professor's classroom *PowerPoint* presentations in APA?

Your first choice is to follow the format for online *PowerPoint* presentation slides exemplified on [this page of the Purdue OWL](#), and to simply not include the url:

You would reference this source in-text as you normally would by the author's last name and date.

Your second choice is to refer to the lecture as personal communication. For an example, please see [this resource on the Purdue OWL](#).

Please note: personal communication is only cited in-text and not within your References list.

## How do I cite lecture notes in my APA-style research paper?

The citation on the Reference page for the lecture notes would look like the following in APA:

Author. (year). In italics write the name or title of the lecture. Personal Collection of (the lecturer's name), school or organization they teach for, city, state.

Berliner, A. (1959). Lecture on Reminiscences of Wundt and Leipsig. Personal Collection of A. Berliner, University of Akron, Akron OH.

## How do I cite a work of art, like Salvador Dali's *The Ecumenical Council*, in APA?

There is no "official" APA citation style for paintings or other works of art, but the APA Style Blog recently addressed this question with the in a recent post. You can access that post by [clicking here](#).

As they say, "There are no guidelines for paintings, sculptures, or more complicated installations (e.g., a chair, a photo of a chair, and a definition of "chair"). So let's use the Franken reference concept to model a few ways to handle art in your reference list."

The basic format they suggest is below (using Wyeth's painting *Christina's world* as an example:

Wyeth, A. (1948). *Christina's world* [Painting]. Retrieved from <http://www.moma.org/explore/collection/index>

## I created and administered my own survey for a project. How would I cite this survey in an APA-style paper?

Since a survey you conducted yourself is not published elsewhere by someone else, you do not cite it in the same way you cite other materials. Instead, in your paper you describe your survey and make it clear that the data you're referring to is from the survey, usually by saying so in introductory sentences. In your paper, you should include a short overview of your survey method: whom the survey was administered to, how it was administered, how many responses you got, and what kind of questions you asked. You should include a copy of the survey instrument (the full set of questions asked) as an appendix to your paper. You do not need to include your survey in your works cited list.

## How does one cite state bills in APA?

APA follows the guidelines for legal citations in the United States as outlined in *The Bluebook*<sup>®</sup>.



You can access a version of The Bluebook by [clicking here](#).

However, guidelines for references to legal materials can also be found on pages 216-224 in the 6<sup>th</sup> of the *Publication Manual of the APA*.

The following sample reference to a statute in a state code and its explanation can be found on page 220:

Mental Care and Treatment Act, 4 Kan. Stat. Ann. §§ 59-2901-2941 (1983 & Supp. 1992).

Explanation: This Kansas act can be found in codified version between sections 2901 and 2941 in Chapter 59 of volume 4 of the 1983 edition of Kansas Statutes Annotated. Two amendments to the act and additional references are provided in the 1992 supplement for the Kansas Statutes Annotated.

## **How do I cite artifacts in an APA-style paper?**

Artifacts may fall under "Archival Documents and Collections." An extensive explanation of this can be found in the 6<sup>th</sup> edition of the APA publication manual. The general format for this reference is as follows:

Author, A. A. (Year, Month Day). *Title of material*. [Description of material]. Name of Collection (Call number, Box number, File name or number, etc.). Name of Repository, Location.

This general format may be modified for collections requiring more or less specific information to locate materials, for different types of collections, or for additional descriptive information. If the artifact you are referencing is not accessible by others, nor is it reproducible, it may not need to be cited.

## **How do I cite a products instructional guide (e.g., the Apple iPad user's manual) in APA?**

While the APA publication manual lists many different references, product instructions are not something that has a specific reference example. Since there is not a specific reference guideline for instructions, I would adapt another similar reference for your uses. For example:

Title of the Instructions (Year). *Name of the product*. Company Name, City, State. Current Location of the Product.

Note: If the product is maintained at a business, list the name of the business and city, state for the "current location of product." If you own the product you are referencing, list "Copy in possession of author."

## **How do I cite genealogies in APA?**

The APA does not seem to specifically address this issue, probably because it is very particular. Here's what we've been able to find from other sources:

Genealogy.com offers a method of citing birth/death certificates, which can be found by [clicking here](#) and scrolling down to the "Official Records" section of the page.

Archive.gov also offers suggestions on how to cite birth/death certificates, which can be accessed by [clicking here](#).

---

## WA 1.1 Peer Review Guidelines

Reviewer's Name: \_\_\_\_\_

Reviewer's Contact Info: \_\_\_\_\_

### Argument (write below)

1. What is the author's argument? Restate it below. Don't copy it; put it in your own words.
2. What reasons does the author give to support her/his argument? List them.
3. Are the reasons clear and concise? Are they in the author's own words? How could these be improved?

### Evidence and Sources (mark on the essay itself)

1. Is there enough evidence to support the author's reasons? What type—is it from peer-reviewed sources?
2. Is the evidence introduced and/or cited?
3. Are quotations used well, i.e., should the quoted material in fact be directly quoted or would paraphrase suffice? (review the criteria from Davis)

### Style and Standards (mark on the essay itself)

1. Do the citations conform to APA style?
2. Does the intro give you a sense of the issue, what's at stake, a bit of the context and background and what the author's position is? How could it be improved? Could it be more concise (probably). See if there are any unnecessary words/phrases/sentences/ideas.
3. Does the conclusion reiterate and sum up the arguments provided above? If not, suggest what you'd expect to see—don't word it, just help the author brainstorm and bulletpoint the primary ideas.

**Final Thoughts** (write below)

1. Be sure to address the author's concerns in their cover letter.
2. What writing or research resources (e.g. sections of Purdue OWL, Davis, Library research guides) might be helpful for the author in revision?
3. Finally, what else can you think of to help the author improve? Try and brainstorm any and everything. Remember the author need not follow up on every suggestion but it's important to critically think about the paper as a whole.

<p><b>Today's Objectives:</b></p> <ul style="list-style-type: none"> <li>• Recap of WA 1.1 (~15-20)</li> <li>• Concision Exercise (~30-40)</li> <li>• WA1.2 Peer Review (~45-60)</li> <li>• Hand back WA1.1 (make sure to do this <i>at end</i> of section)</li> </ul> <p><b>Projectable Resources:</b></p> <p><a href="#">Purdue OWL on Conciseness</a></p> <p>Concision samples (Google Drive)</p>	<p><b>TA Prep</b></p> <ul style="list-style-type: none"> <li>• models of good arguments and/or concision from student essays or own writing</li> <li>• review concision on Purdue OWL</li> </ul> <p><b>Bring to Lab</b></p> <ul style="list-style-type: none"> <li>• WA1.2 Peer Review Guidelines (3-4/student)</li> <li>• Concision Handout (or project)</li> <li>• Concision Example (or project)</li> <li>• WA1.1 to return (at end)</li> </ul>
--	--

### 1. Recap of WA 1.1 and writing of WA 1.2 (~15-20)

Take a moment to check in with students on how WA1.1 went and some of the issues they have come across with WA1.2. For example, "What are the challenges to arguing the 'other side,' especially in forming a counterargument to Part 1?"

Depending on what most students are struggling with, you could take one of two different approaches here:

**1) Focus on argumentation.** Give criteria for argumentation and show examples of effective, clear and well-supported arguments from student essays (anonymously and preferably from a different section you teach).

*OR (you probably won't have time for both)*

**2) Focus on research for counter-evidence.** Some strategies are the CQ Researcher Pro/Con embedded essay (look at sources there). Work backwards with students focusing on appeals to economic or social benefits, appeals to traditions, history and certain rights, etc. and then consider who would be invested in such research (you might also discuss "gray" literature here and evaluating these types of sources- see the "Gray literature guide" on eCommons for assistance).

### 2. Concision Exercise (~30-40)

- Project OWL resource on Conciseness. Be, well, concise- look at a few examples of each type.
- After you go through some samples, as a group, generate a short list of "principles" for being more concise
- Work through the **sample** on Google Drive. I suggest you project it, but you could also have copies for each student to edit on their own. If you feel confident with editing in Google Drive on the fly, then edit

with the students' input. NOTE: please "make a copy" of the document and label with your section or name so that the original document is preserved for others.

- Let students know that this is a first draft of WA1.1 from a few years back. The student needs to eliminate a half a page. I also put the word count up top (you can go to the TOOL menu on Google Drive to recalculate) so you could also see how much you can eliminate as a group with word count.
- You don't need to do the whole essay. Prioritize the first and last paragraphs. Project the paragraph, read the sentences out loud. Solicit feedback from students on how it can be more concise.
- If you feel comfortable with this, begin to eliminate words and edit on screen. Take it sentence-by-sentence *slowly*. The whole point of this exercise is to bring students' scale down to the sentence, phrase, and word level. Give them a sentence, ask them to rewrite it more concisely. Edit accordingly.
- Afterward, review some of the strategies you used to recap the points from Purdue OWL.

### **3. Peer Review (~45-60)**

- First, review some strategies and principles of Peer Review. What went well last time? What can be improved?
- Put students into groups of 3-4 (try to mix up the groups from last time)
- With the remaining time, divide up the time into 4 to make sure each student has enough time for their essay. Remind students to focus on concision (although they will probably do this anyway!)

### **4. Handback WA1.1**

You might want to leave a few minutes in case students have questions or want to ask about office hours, etc. This is a great opportunity to have students come to your office hours, contact Schuyler or Phil.

Examples from student papers:

The problem set up

Ocean trawling will continue to destroy marine ecosystems without the implementation of new regulations and policies for the fishing industry.

Background of ocean trawling (who/what/where)

Impact on marine ecosystems

Regulations and policies

The problem set up

The development of a hydropower dam along the Colorado River will impact local habitats and biodiversity, outweighing the benefits to society.

Background the dam project (who/what /where)

Impact on biodiversity

Alternative solutions

The problem set up

We can reduce the large impacts on ecosystems while still maintaining profitable yields by switching from a monoculture to an intercropped agricultural system. This will require better knowledge on plant and disease interactions and soil fertility practices.

Difference between intercropping and monoculture (background).

Difference between yields

Difference between environmental impacts

Future solutions

Problem set up (water shortages)

While desalinization could reduce the impact of current water shortages, the economic and environmental costs far outweigh the benefits.

Desalinization in Santa Cruz

Environmental and economic costs

Possible solutions

## ENVS 100 WA1.1 Sample, Words: 683

### Wildlife in Dire Crisis: The Commercial Bushmeat Trade in Africa

Imagine a world without color, void of beauty and wonder; a hollow and silent black abyss that indeed will exist if humans continue to annihilate already endangered species and threaten countless others to endure the same bleak fate. In an oversight hearing before the Subcommittee on Fisheries Conservation, Wildlife and Oceans, the Project Manager of the Central African Regional Program for the Environment, U.S. Agency for International Development, James Graham (2002), has cautioned: “over the next 5 to 10 years commercial bushmeat hunting will constitute the most immediate threat to wildlife conservation in Central Africa” (p. 18). Africa is one of the many regions in the world in which the bushmeat trade is currently being practiced. This industry involves the slaughtering of wildlife species including endangered and threatened species, which are then sold for profit. Mr. Marcellin Agnagna (2002), Chairman of CITES Bushmeat Working Group, has given the following testimony: “the subsistence needs of yesterday have yielded to an improper lucrative exploitation of natural resources beyond reasonable limits and, most notably, the commerce of bushmeat” (30: *The Developing Crisis*). This is a multifaceted global issue of epic proportions that demands immediate action. The practice of the bushmeat trade in Africa must be banned due to the exploitation of endangered species which are already threatened by extinction.

Numerous species are in peril due to the commercial bushmeat trade thus biodiversity will forever be distorted if such a practice continues to exist. In an article regarding wildlife extraction in African forests, according to John E. Fa and Carlos A. Peres (2001), “an estimated 579 million animals are consumed in the Congo Basin annually; around 5 million tonnes of dressed bushmeat” (223). The adverse affects of not banning the bushmeat trade would wreak havoc by causing ecological devastation across the globe. Another expert who addressed the committee was Michael Hutchins (2002), Co-Chairman of the Bushmeat Crisis Task Force who has warned, “unsustainable hunting risks the irreversible extinction of species across Africa...the loss of keystone species could alter the structure and the function of African ecological systems (38: *The Developing Crisis*). This grim projection clearly demonstrates the future



catastrophic consequences of permanently altering the natural world by continuing to participate in the bushmeat trade.

Only a few species which have fallen prey to the bushmeat trade have been banned from being hunted but threatened species also remain at risk. Dr. Kenneth Stansell (2002), Assistant Director for International Affairs, Fish and Wildlife Service has stated that numerous “endangered or threatened species are . . . victims of over-exploitation” (9: *The Developing Crisis*). Despite a ban in place for certain species, the trade is nonetheless still performed within the black market; this threatens the existence of other species that could potentially meet the same fate as those which are already endangered or extinct. As implied by E Bowen-Jones, D Brown and E J Z Robinson (2003), in an article regarding the economic commodity of bushmeat: demand is the main factor that steers the bushmeat trade. However, in the Malaysian state of Sarawak, a new law prohibits, “all commercial trade in wildlife” (Robinson et al., 1999). If such policies were adopted and enforced throughout the world, biodiversity would thrive and species would no longer be subjected to such widespread inhumane annihilation.

The potential hazard that the commercial bushmeat trade presents is a harsh reality which requires prompt attention. Jeffrey Burnam (2002), Deputy Assistant Secretary for Environment, Bureau of Oceans and International Environmental and Scientific Affairs, has asserted that “we all share the common goal of preserving biological diversity for future generations” (5: *The Developing Crisis*). If indeed we all do possess a place in our hearts to preserve such rich biodiversity, then is it not imperative to save species in peril from the snares of the bushmeat trade? Should it not be banned in Africa and ultimately across the globe? The looming threat posed by the bushmeat trade--to hurtle species into the throes of extinction and forever change the face of biodiversity as it is now known--must be heeded at once.

## WA 1.2 Peer Review Guidelines

Reviewer's Name: \_\_\_\_\_

Reviewer's Contact Info: \_\_\_\_\_

### Argument (write below)

1. What is the author's argument? Restate it below. Don't copy it; put it in your own words.
2. What reasons does the author give to support her/his argument? List them.
3. Are the reasons clear and concise? Are they in the author's own words? How could these be improved?

### Evidence and Sources (mark on the essay itself)

1. Is there enough evidence to support the author's reasons? What type—is it from peer-reviewed sources?
2. Is the evidence introduced and/or cited?
3. Are quotations used well, i.e., should the quoted material in fact be directly quoted or would paraphrase suffice? (according to the criteria from Davis)

### Style and Standards (mark on the essay itself)

1. Do the citations conform to APA style?
2. Does the intro give you a sense of the issue, what's at stake, a bit of the context and background and what the author's position is? How could it be improved? Could it be more concise (probably). See if there are any unnecessary words/phrases/sentences/ideas.
3. Does the conclusion reiterate and sum up the arguments provided above? If not, suggest what you'd expect to see—don't word it, just help the author brainstorm and bulletpoint the primary ideas.

**Final Thoughts** (write below)

1. Be sure to address the author's concerns in their cover letter.
2. What writing or research resources (e.g. sections of Purdue OWL, Davis, Library research guides) might be helpful for the author in revision?
3. Finally, what else can you think of to help the author improve? Try and brainstorm any and everything. Remember the author need not follow up on every suggestion but it's important to critically think about the paper as a whole.

<b>Objectives</b> Presentations of Short Papers (~30) Strategies for Revision (~20) Introduction to Figures (~20) Introduction to WA2 (~30)	<b>TA Prep</b> <ul style="list-style-type: none"> <li>• Review <a href="#">Purdue OWL on Figures</a></li> <li>• Review sample figures</li> <li>• Revision examples from your own work</li> </ul>
<b>Projectable Resources</b> <a href="#">Purdue OWL on Figures</a> Models of figures (folder on Google Drive) WA2 Flowchart (Google Drive)	<b>Bring to Lab</b> <ul style="list-style-type: none"> <li>• Creation of groups</li> <li>• WA2 Assignment</li> </ul>

### 1. Presentation of Short Papers (30)

*The point here is generate a lively and useful discussion of materials from lecture. One good way of doing this is starting off in small groups and then moving to a larger lab-wide discussion. There are two ways to do this-*

- Divide students up into small groups (3-4) and have them read their short essays to each other. Then have a conversation about some of the main issues, problems or debates that intersect or come up across multiple essays.

*-or-*

- Go around to each student and have them discuss some of the issues in their short paper (without reading it). This allows everyone to participate and hear topics. As students are going around talking about their short paper, develop a list of questions to generate discussion among the entire lab group.

*Both of these should lead you into a good 10-15 minute discussion of recent lecture topics, questions, etc. This is a good chance to be a bit more loose and casual and have students engage with each other.*

### 2. Strategies for Revision (20)

- Ask students what strategies work (or do not work) for them and develop a list on the board/projector. Talk about how they revised WA 1.2.
- Discuss your own revision strategies for your own work. **You can show examples here too.**
- Revision Strategy:

Explain the *difference* between revision, editing and proofreading

**Revision:** global issues, like argument, evidence, structure, conclusions, reasons. *These should be addressed by the writer first.* Give some examples and have students discuss how they revised these things for WA1 series. (Peter Elbow, a composition researcher, calls this the “skeleton” of an essay)

**Editing:** local paragraph and sentence-level issues. Emphasize here the writer is working on *communication to the reader* and focusing on concision, clarity, specificity and precision. They are

thinking about how sentences fit together and how paragraphs are constructed so that each sentence “coheres” and “connects” with the ones before and after it. In short, this is at a smaller scale. (Elbow calls this the “muscles” of an essay). The concision exercise from Week 4 Lab is a good example of what students should be doing in the editing phase.

**Proofreading:** most students really only do this, ignoring the revision and editing. Here students are looking for *errors and mistakes*. This should be done last (Elbow calls this “the skin”) after editing. Students are focusing on things like APA in-text citation, formatting, grammar, punctuation and minor-usage issues.

### **How to do this?**

Talk about your own strategies, as writers talking about their own writing is most effective for students. But here are some principles:

1. Built in enough time to do three separate phases (revision, editing, proofreading)
2. For editing, some strategies are to a) read out loud b) have a paper copy c) go backward, sentence by sentence or paragraph by paragraph through the essay- this will allow them to focus on language rather than revision issues
3. Do editing and proofreading in small chunks so they can come back to the essay with “fresh eyes”

*To reinforce this, if you have time, you might have students create a list of revision items, editing items, and proofreading items on their Short Paper #1. Or have them edit and proofread the first paragraph.*

### **3. Making Figures**

First, explain the general use of figures (preferably in your own work or lecture readings). Then explain that for WA2, they will be making their own figure.

Then, take students through sample figures. Take some time on each one to ask students things they notice about the figures- how the information is presented, what leads to clarity, what the purpose of the figure is, how the figure was constructed (both in terms of research and design), etc. The point here is to expose students to many figures so they can understand some of the principles and guidelines for figures.

Once you do this, generate a list of principles for figures with the help of students. Ask something like: “What makes an effective figure?”

I’ve included the Purdue OWL link on figures, but use this *after* you’ve done a thorough investigation of figures with students. It’s also a possibility of not using Purdue OWL, but let them know that the link is available on the Writing Resources folder of eCommons. Up to you!

#### 4. WA2

Project WA2 flowchart. Walk them through the various logistical things about their individual participation and group. Pay special attention focusing on the *individual* section today and emphasize that they should do their individual portion *first*.

Then, give students their issue and position *but **don't** put them into their groups yet*. Begin this activity:

1. Write the title of your topic on top of the paper. A brief description will do. Put your name on top and write legibly.

2. Spend 5 minutes or so and briefly list everything you know about the topic (e.g. impressions, observations you've made, striking stats of facts, extent of the problem, important groups/people/institutions involved, misconceptions, etc.)

3. Build a list of research questions that you'd like to learn the answers to. Think about how to argue the position you've been given and anticipate counter-arguments from the opposing side.  
(TA- model this for students)

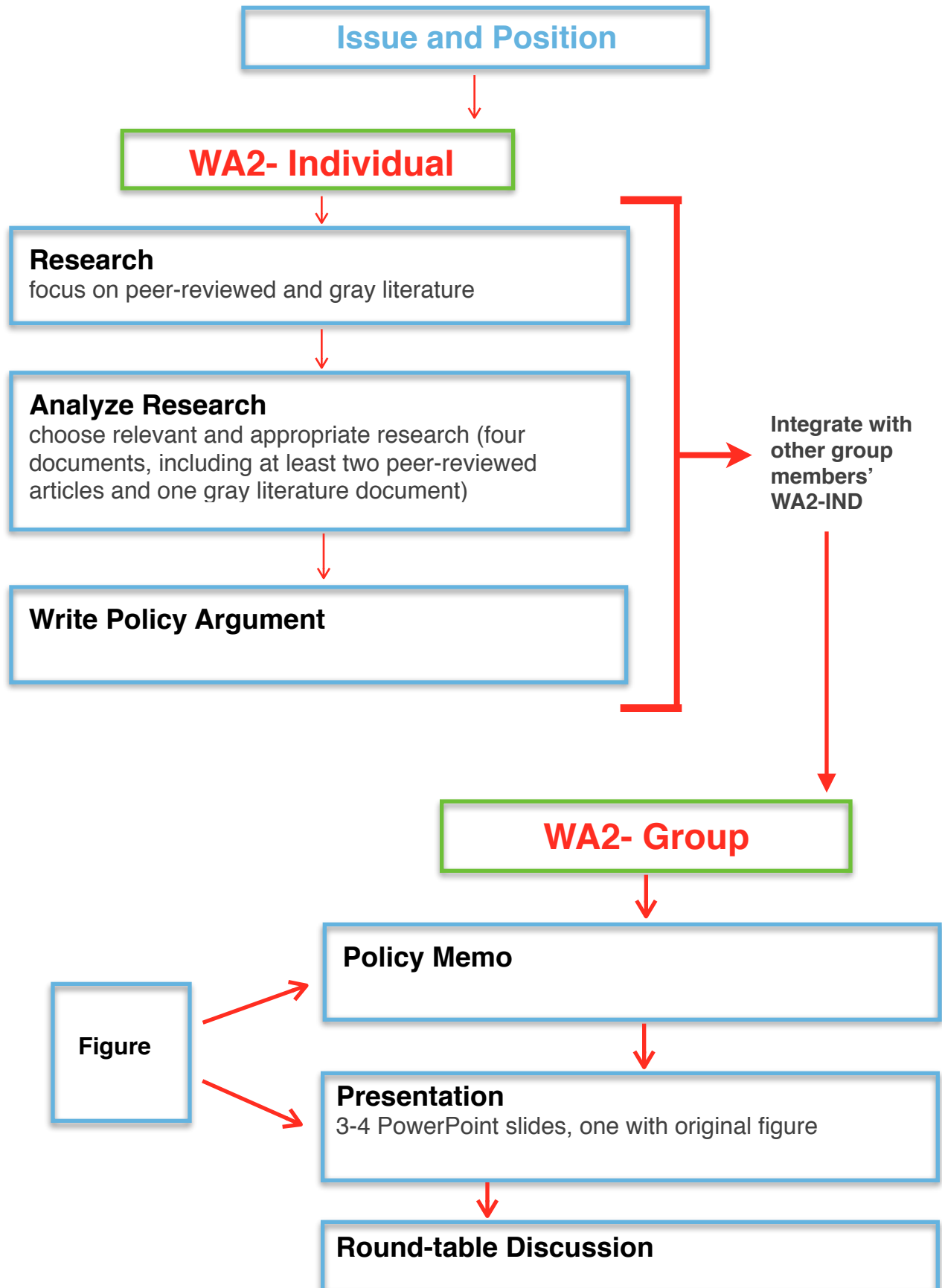
4. Have students pass around their lists (do one circle on each side of classroom) and star what they think are the most important questions, and add questions they can think of.

5. Students should have their own list back. Look over your own questions with peer feedback. Circle the *most* interesting and it write a *new, more focused question* on the back of the paper.

6. Build a *new* list off of this one focused question.  
(mention to students that this is a revision process they went through- narrowing down and clarifying the main point)

7. NOW, put students into their groups by issue/position, introduce themselves, and **exchange contact information with each other**. Have them refocus their research questions so there is a diversity of research questions and topics. Emphasize that they should focus on their own first, but that you are meeting in groups today to get setup for logistics of the group meetings, *because students will need to take responsibility for setting up times, contacting each other, etc. as we are not meeting in lab until week 8 again and they will have to email their WA2-IND to their group by Tuesday, 2/17 (week 8)*

## ENVS 100L WA2-Ind and WA2-Group Flowchart



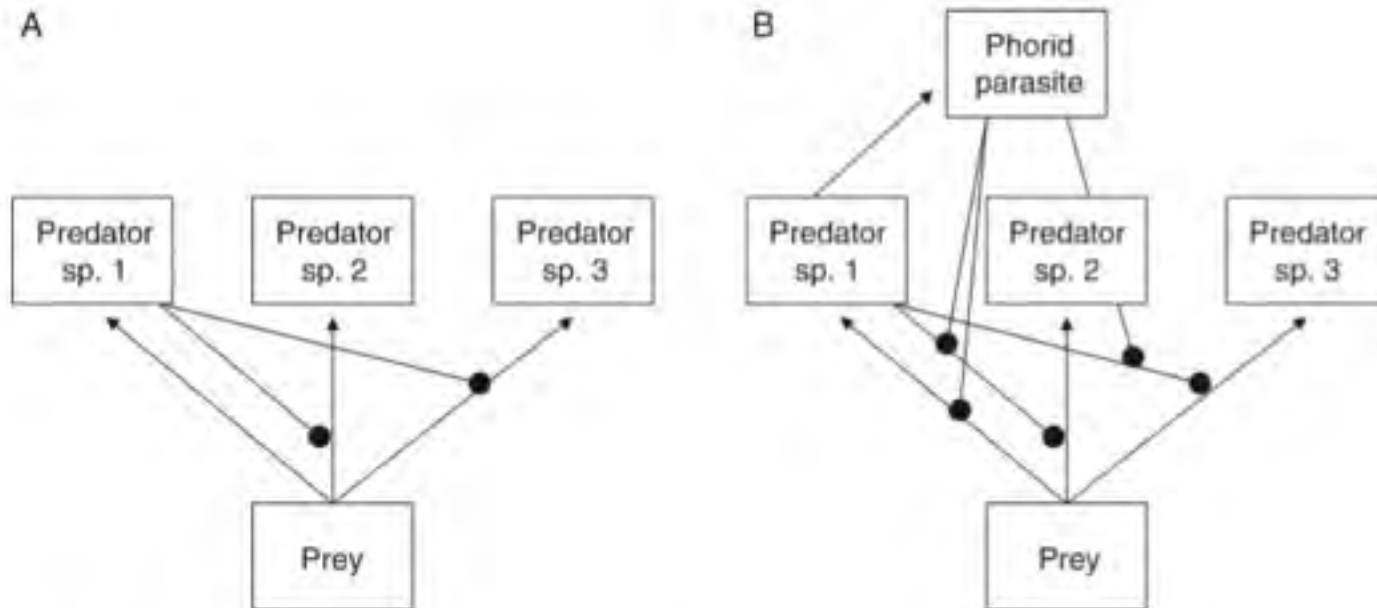


FIG. 1. Hypothetical multi-predator food web in a coffee agroecosystem (A) with and (B) without the presence of a specialist phorid parasite. Without the phorid, the three species of predators (ants) share a common prey resource, and aggression from predator sp. 1 limits the activity of the other two predator species, reducing their effects on prey. In the presence of the specialist phorid parasite, the foraging behavior of predator sp. 1 is reduced, resulting in a trait-mediated cascade that increases activity of predator sp. 2 and sp. 3, while still limiting the prey. Arrows represent direct energy transfer. Circles show trait-mediated effects.



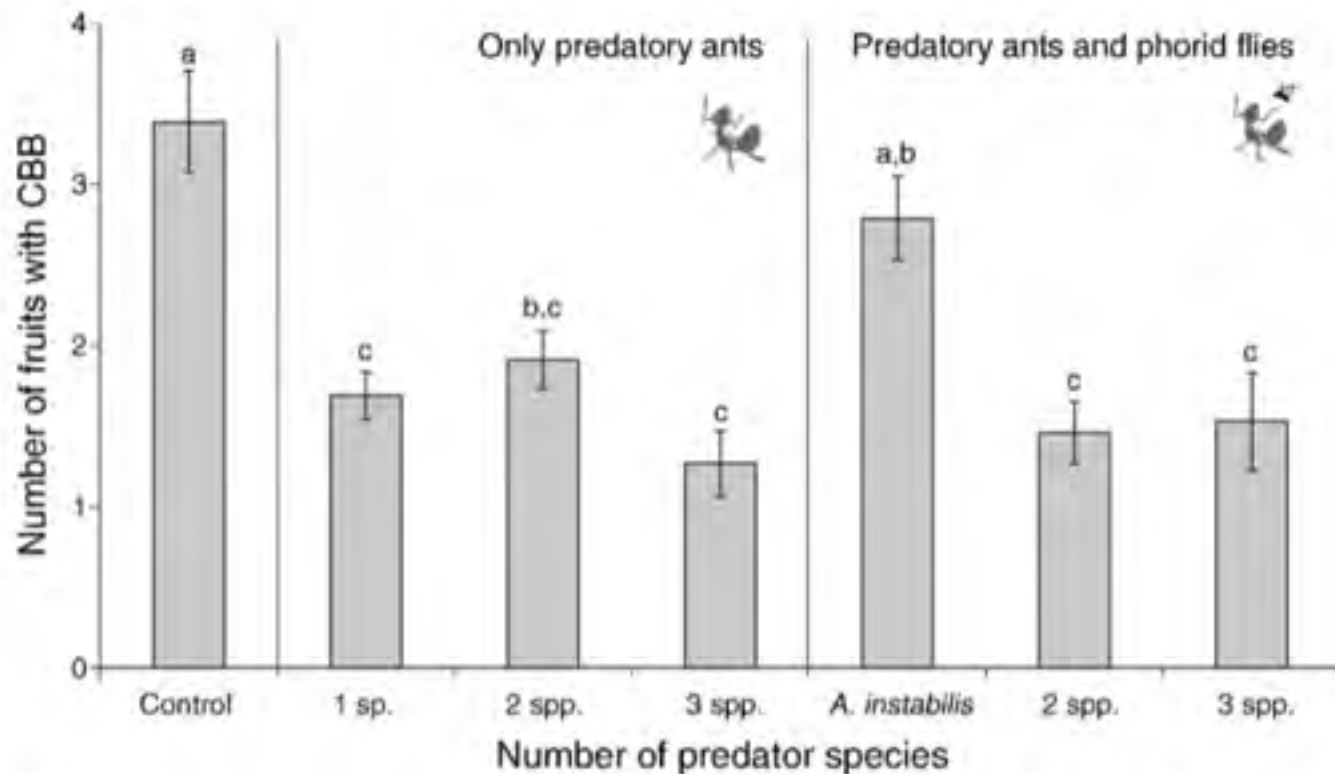
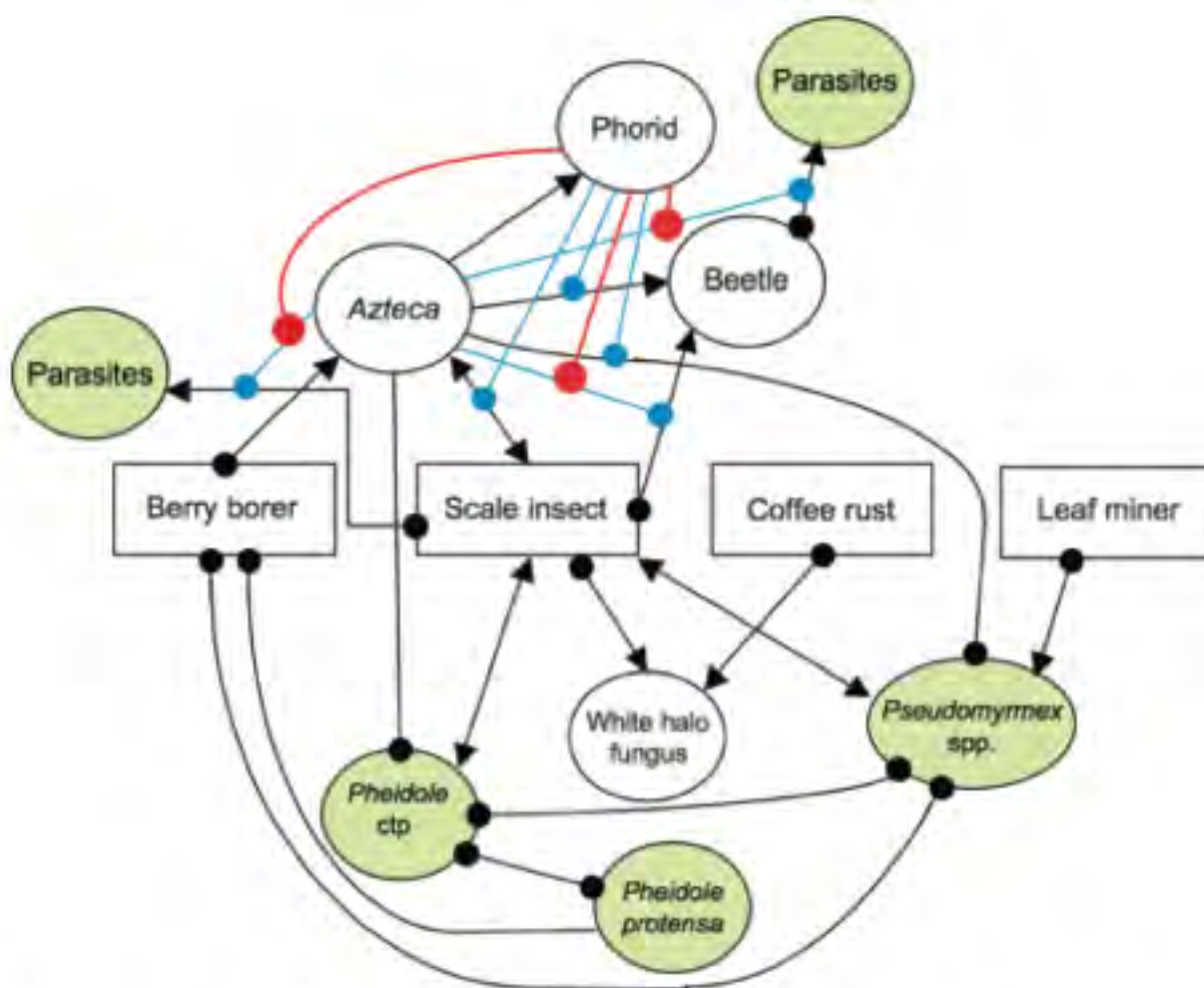


FIG. 2. Mean number of fruits attacked by the coffee berry borer (CBB) in insect arenas with one, two, or three species of predatory ant in the presence or absence of specialist *Pseudacteon* spp. phorid flies. The three predator species examined were *Azteca instabilis*, *Pseudomyrmex simplex*, and *Procryptocerus hylaeus*. Data for individual single-, two-, and three-species treatments were pooled for analysis. The column for one species with phorid only shows data from treatments with *A. instabilis* with phorids. Error bars show  $\pm$ SE, and lowercase letters indicate significant differences ( $P < 0.05$ ) between treatments.



**Figure 7. The lady beetle predator (*Azya orbigera*) of the green coffee scale. (a) adult, (b) larva eating a scale insect, (c) adult beetle being attacked by Azteca ants, (d) Azteca ant with mandibles filled with the waxy filaments of the beetle larvae. Photographs: Shinsuke Uno (a and c), Ivette Perfecto (b and d).**



**Figure 12.** Simplified version of the interaction network that results in autonomous pest control. The four pests are shown in rectangles and the elements involved in their control in ovals (shaded ovals indicate a species group rather than a single species). Negative effects are shown with a small circle at the end of the connector and positive effects with an arrowhead. Indirect effects are shown as small circles (negative effect) affecting a different connector (an effect on an effect). Indirect effects of order one are indicated in blue. Indirect effects of order two are indicated in red.



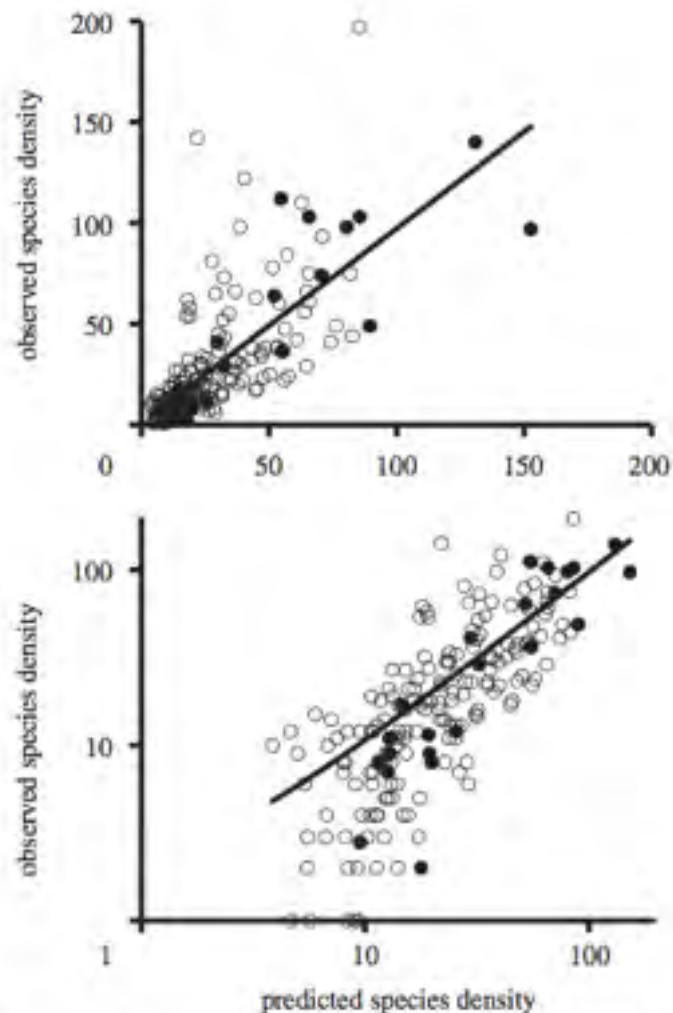


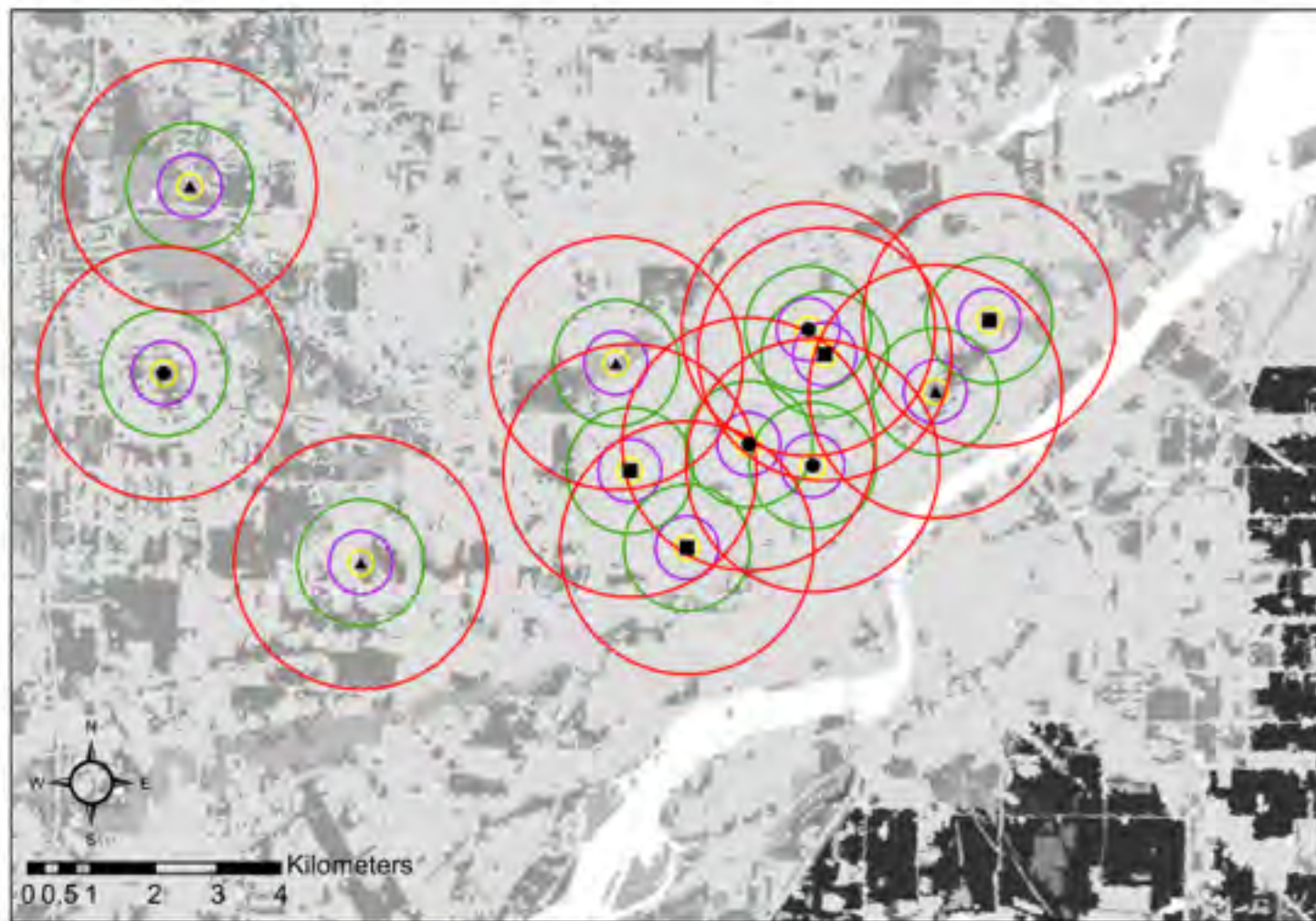
Figure 1. Ant species density predicted by our model (i.e. the '+abundance' model in table 1) compared with the observed ant species density. Open circles represent litter samples, closed circles represent canopy fogging samples. Both panels present the same information, with the bottom panel scaled with  $\log_{10}$ -transformed axes (to allow visualization). The line represents the ordinary least-squares regression on the combined dataset with  $\text{observed} = 1.1 + (0.96 \times \text{predicted})$ ,  $p < 0.0001$ ,  $r^2 = 0.52$ ,  $n = 192$ . The relationship for the canopy data is  $\text{observed} = 1.8 + (0.93 \times \text{predicted})$ ,  $p < 0.0001$ ,  $r^2 = 0.73$ ,  $n = 23$ .

**Table 2**  
Vegetation characteristics of the coffee farm before the management shift, and shaded and cut areas after the management shift.<sup>a</sup>

	Shade before	Shade after	Cut	df	F	p
Canopy cover (%)	36.67 ± 1.96b	43.44 ± 0.64a	13.47 ± 0.54c	2, 572	563.452	<0.001
Coffee cover (%)	73.62 ± 2.85a	71.94 ± 0.79a,b	67.19 ± 0.85b	2, 572	10.286	<0.001
Epiphyte rank	0.79 ± 0.06a	0.42 ± 0.33b	0.03 ± 0.01c	2, 572	76.389	<0.001
Tree height (m)	8.23 ± 0.17b	9.51 ± 0.11a	6.85 ± 0.07c	2, 572	238.339	<0.001
Canopy depth (m)	9.82 ± 0.51c	18.0 ± 0.33a	12.36 ± 0.23b		155.343	
No. trees	31.56 ± 1.07c	50.64 ± 0.89a	39.03 ± 0.61b	2, 572	99.311	<0.001
No. tree species	8.27 ± 0.34c	15.27 ± 0.27a	12.11 ± 0.18b	2, 572	116.888	<0.001
Inga spp. trees (%)	53.24 ± 2.24c	67.5 ± 0.87b	73.5 ± 0.75a	2, 572	21.244	0.001
VCI <sup>b</sup>	0.37 ± 0.01b	0.48 ± 0.01a	0.37 ± 0.01b	2, 572	306.475	<0.001
<i>Ground cover</i>						
Dead vegetation (%)	na	6.81 ± 0.55b	11.16 ± 0.32a	1, 525	26.22	<0.001
Bare ground (%)	14.23 ± 3.79a	4.79 ± 0.40b	9.1 ± 0.51a	2, 572	19.652	<0.001
Leaf litter (%)	na	29.41 ± 1.34a	21.33 ± 0.79b	1, 525	23.44	<0.001
Herbaceous veg. (%)	na	59.29 ± 1.78	58.24 ± 1.49	1, 525	0.442	0.507
Coffee height (m)	na	2.13 ± 0.02	1.96 ± 0.01	1, 525	62.813	<0.001

<sup>a</sup> Statistical results are from ANOVA followed by Tukey's tests to compare differences between treatments. Small letters show differences (*p* < 0.05) between treatments for individual vegetation characteristics.

<sup>b</sup> Vegetation complexity index where 1 shows complex vegetation and 0 shows simple vegetation.



### Habitat types

- ▲ forest
- garden
- lot

### Landscape buffers

- 200 m buffer
- 500 m buffer
- 1 km buffer
- 2 km buffer

### Land cover types

- |                 |           |
|-----------------|-----------|
| Water           | Barren    |
| Developed       | Grassland |
| Natural habitat | Pasture   |
| Open area       | Crops     |

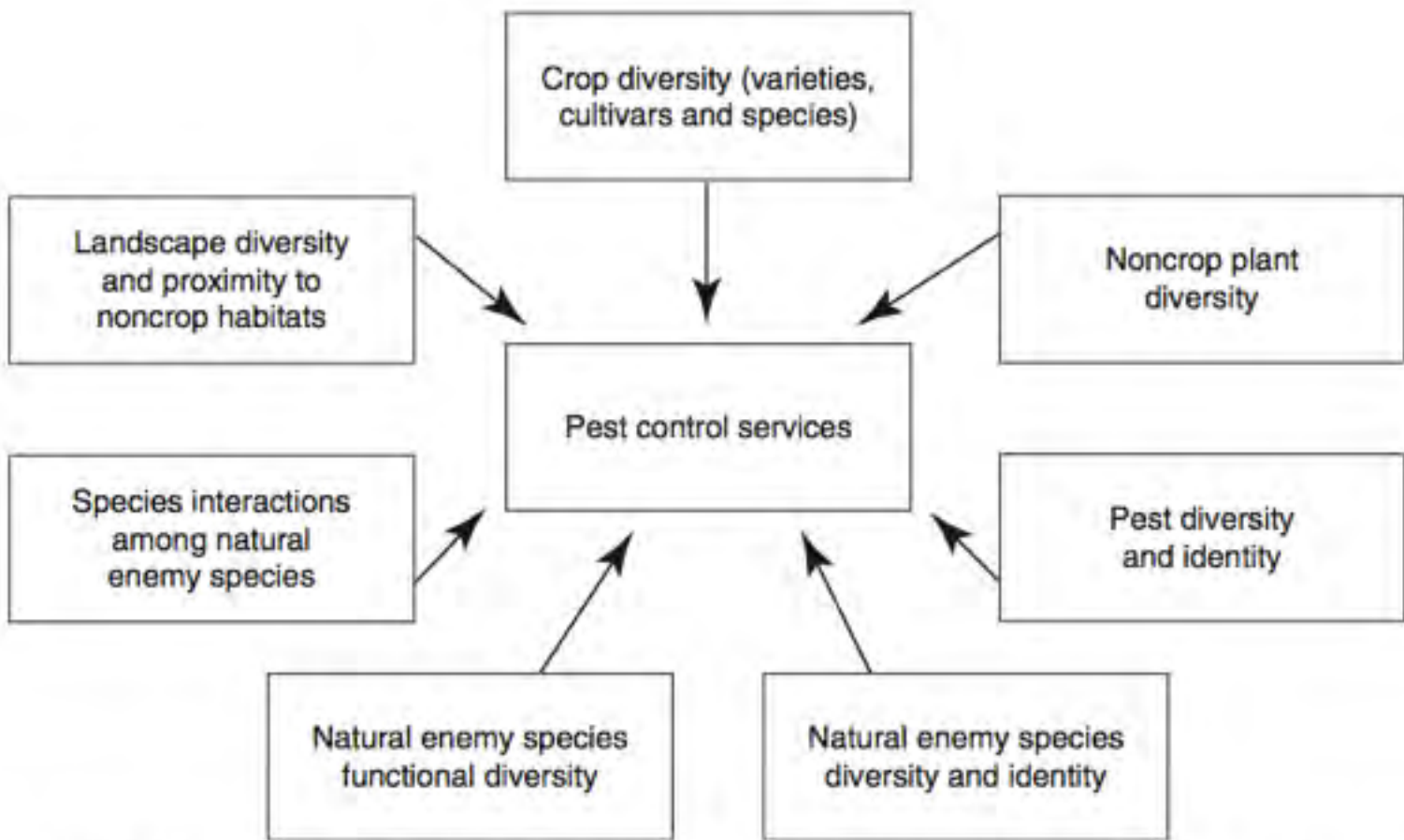
Fig 1 Map of the study sites in Toledo, Ohio



**Table 3** Products other than coffee grown in farms inside and outside of Bukit Barisan Selatan National Park in Lampung, Sumatra, Indonesia

	No. of farmers inside BBS	No. of farmers outside BBS	Total
<i>Grow alternative products</i>			
No	21	8	29
Yes	9	22	31
<i>Number of products grown</i>			
One	5	6	11
Two or more	4	15	19
<i>Name of products grown</i>			
Avocado ( <i>Persea americana</i> )	0	3	3
Banana ( <i>Musa</i> spp.)	1	8	9
Black Pepper ( <i>Piper nigrum</i> )	2	11	13
Cacao ( <i>Theobroma cacao</i> )	5	8	13
Candlenut ( <i>Aleurites moluccana</i> )	0	2	2
Cinnamon ( <i>Cinnamomum</i> spp.)	0	1	1
Clove ( <i>Syzygium aromaticum</i> )	0	1	1
Coconut ( <i>Cocos nucifera</i> )	0	1	1
Duku ( <i>Lansium domesticum</i> )	1	8	9
Durian ( <i>Durio</i> spp.)	0	2	2
Jackfruit ( <i>Artocarpus heterophyllus</i> )	1	0	1
Mango ( <i>Manguifera indica</i> )	0	1	1
Orange ( <i>Citrus</i> spp.)	0	3	3
Petai ( <i>Parkia</i> sp.)	3	8	11
Rambutan ( <i>Nephelium lappaceum</i> )	1	0	1
Jengkol ( <i>Pithecellobium jiringa</i> )	1	3	4
Teak ( <i>Tectona grandis</i> )	0	1	1

Numbers are based on survey responses of individual farmers regarding crops they reported growing. There were significantly more farmers outside of the Park growing non-coffee products than inside the park (Fisher's exact test,  $P < 0.001$ )

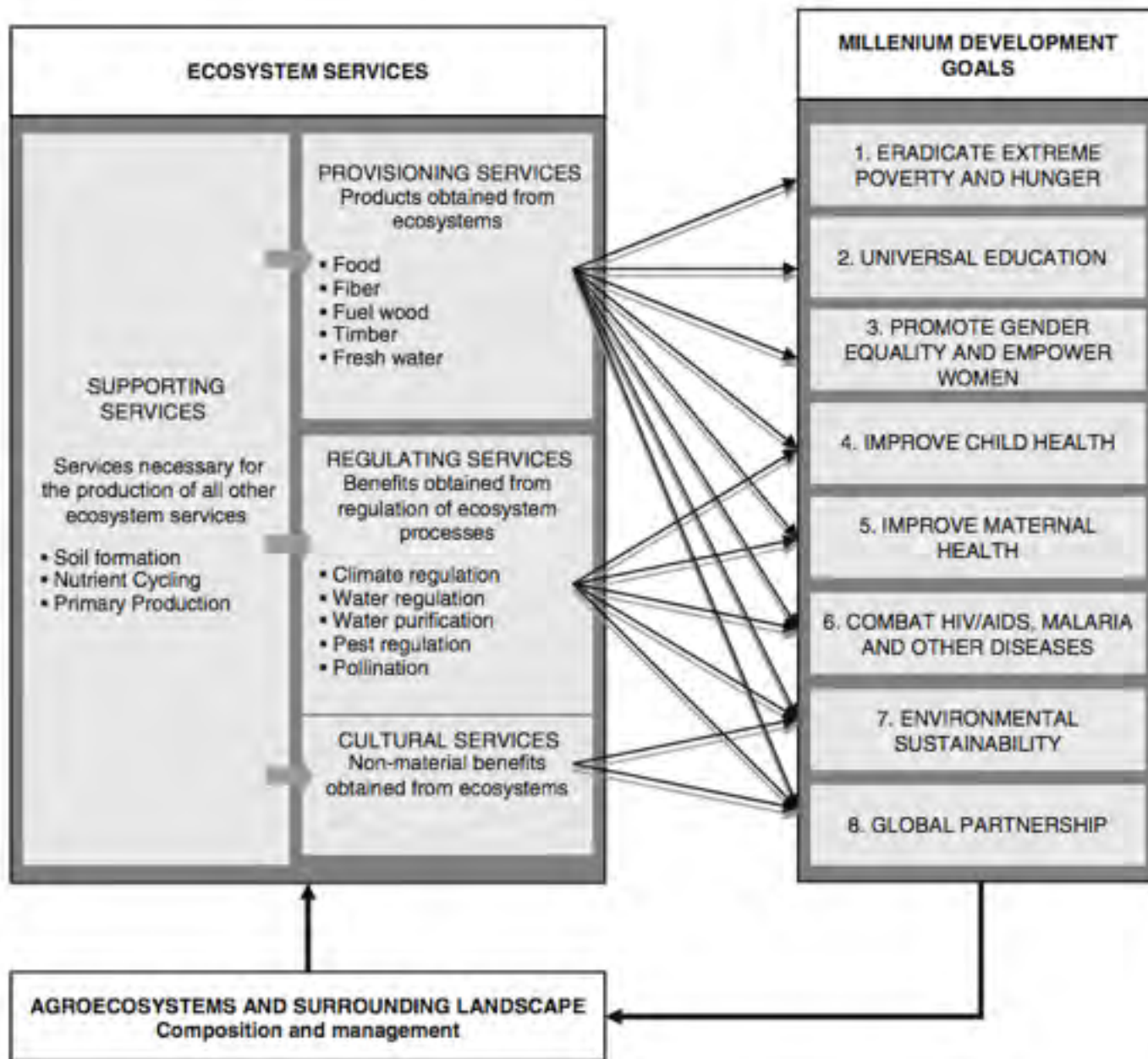


**Figure 1** Major influences of biodiversity (at several levels of biological organization and distinct spatial scales) on pest control. Each of the levels of diversity influence pest control in several ways and interact resulting in complex multitrophic interactions.





**Figure 4** Two contrasting agricultural landscapes differing in habitat heterogeneity. The high heterogeneity landscape from Sumatra, Indonesia (a) contains a high diversity of both crops (banana, mango, coffee, and rice) and includes forest trees and weed patches. The low heterogeneity landscape (b) near Toledo, Ohio, shows large corn and soybean monocultures and a very small forest fragment. Most evidence indicates pest control is more effective in high diversity landscapes.



**Fig. 3.1** Ecosystem services provided by agricultural landscapes and their connection to the Millennium Development Goals (Modified from the MA 2005a, b)

<p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>• Logistics and check-ins (~10-15)</li> <li>• Presentation of Short Papers (~30-45)</li> <li>• Recap of Documentation (~20)</li> <li>• WA2 Group Meeting- Policy Memo focus (~30-45)</li> </ul> <p><b>Projectable Resources</b></p> <ul style="list-style-type: none"> <li>• syllabus</li> <li>• WA2-group assignment</li> <li>• PurdueOWL documentation guide, student models or your own work</li> </ul>	<p><b>TA Prep</b></p> <ul style="list-style-type: none"> <li>• decide top three documentation errors and how to approach this keeping in mind WA2-IND</li> <li>• examine high and low scoring models of WA2-Group to better answer student qs</li> </ul> <p><b>Bring to Lab</b></p> <ul style="list-style-type: none"> <li>• WA2-Ind ?</li> </ul>
--	---

### 1. Logistics and Check-Ins (~10-15)

*Before you begin today, it's a good idea to check in with your students about some things, since you haven't met as a lab for a few weeks:*

- project syllabus to over due dates for **WA 1R, WA2-Group** components
- ask students about questions on WA1R
- check in with students about questions on WA2-group components

### 2. Presentation of Short Papers (~30-45)

*This shouldn't be too much different than last time, but **emphasize how the lecture materials connect to the issues students are working on for WA2-group**. The point here is generate a lively and useful discussion of materials from lecture. One good way of doing this is starting off in small groups and then moving to a larger lab-wide discussion. There are two ways to do this-*

- Divide students up into small groups (3-4) and have them read their short essays to each other. Then have a conversation about some of the main issues, problems or debates that intersect or come up across multiple essays.

*-or-*

- Go around to each student and have them discuss some of the issues in their short paper (without reading it). This allows everyone to participate and hear topics. As students are going around talking about their short paper, develop a list of questions to generate discussion among the entire lab group.

*Both of these should lead you into a good 10-15 minute discussion of recent lecture topics, questions, etc. This is a good chance to be a bit more loose and casual and have students engage with each other.*

*After the discussion, have students write for 5 minutes: **"What theoretical frameworks or concepts from the lectures and readings are most useful in framing your own responses in WA2?"***

After this have a short conversation where students report back to each other in groups or as a whole section.

### 3. Documentation Recap (~20)

*if you have WA2-Ind ready, hand it back, if not use the short paper for this activity*

(a) Ask students what questions they have about different types of sources. I have encountered a lot of confusion about what a "peer reviewed" source is and how it is different than "gray literature" or a non-scholarly source. If

you haven't already in lab, recap what makes a peer reviewed source a different type of source than a gray lit (explain how the peer review process works).

(b) Focus on **formatting**. Recap the three most common errors in sources and in-text citation (try 2 for reference list and 1 for in-text) that you have seen in your lab's essays. Some common ones I have seen:

- for in-text-missing citations- recap what needs to be cited, formatting errors
- for reference list- missing the title of journals (!), URL issues, formatting issues \*see below

Show *good* examples of these. Perhaps you want to use a student model from this term (I've put two in today's lab folder), PurdueOWL, or your own work.

(c) **Activity:** Have students work within their WA2-group for this activity and exchange their essay with one person in their group. Examine the reference list and proofread for formatting. This will lead to some questions- have students generate a list on their own, which you can then address.

\* On DOIs, URLs- Basically, in the absence of a DOI, students should put the *stable* URL of the database or homepage. I think the way to explain it to students is that the whole point of a citation is to make it easy to find, so the very long URL, which is not stable, is not going to be helpful. *Note that both models I have provided don't do that but this would be a good opportunity to talk about this.* see here:

<http://blog.apastyle.org/apastyle/2009/09/a-doi-and-url-flowchart.html>

#### 4. WA2 Group Meeting (rest of class)

Students should already be in the group. Give them 5 minutes to check-in with each other for logistics (task list, responsibilities, scheduling)

- briefly share with students this clarification on **WA2-group**:

*In the assignment, the policy memo asks for a "position or proposed solution" to the problem but also "make each one clear, compelling, and distinct!". The language does seem frustratingly vague, but it's also very similar language and a similar task to the WA1s. Your group shouldn't do too much differently in their argumentation than you do for that, although obviously it will be more complex and in-depth.*

*In short, it's up to you as a group to formulate your own purpose and your own conclusion (after all you're the experts who have done all of that research!). Is it to propose a specific policy or to make an argument for more or less of something and the means to get there? A good way to think of it would be: what do you think should happen based on your research? That may be a specific policy (e.g. a bill for more money for new nuclear plants) or something more like a position (e.g. nuclear is an effective alternative energy source because...). However, a good argument and conclusion will be as specific and clear in either case.*

- Give students 5 minutes or so to discuss the main argument (position/proposed solution) for their policy memo
- Have them talk about their research=> **put then into 4-5 categories.**
- Once they do this, have each group write an **outline** for their policy memos. (*you might briefly show them the high scoring WA2 model, but we don't want to influence them that much. However, a quick scroll-through can show them how they might lay out their memo*)
- Circulate among the groups helping them out and be sure to check back with each group at the end, giving advice on their outlines.
- Create a task list for the group. Think about some putting the policy memo together and some working on the presentation/roundtable.



***That's it! Remind students that next week, they will be presenting it! - what should they expect?***

We'll start with the presentations and each group will present. Then we'll do the roundtables in the same order.

*Some answers to possible student questions:*

**1) Does everyone have to participate in the presentation?**

No. It's better if it is 1-2 people, but remember, this is a *group* project.

**2) How long should the presentation be?**

7-10 minutes. Closer to 7 is better. Practice so you don't go over.

**3) Does everyone have to participate in the roundtable?**

Yes. The whole group should sit together, but 1-2 people should lead the group with the opening statement and conclusion.

**How should we prepare for the roundtable?**

*Brief opening statement:* What is main argument and reasons for it?

Back and forth with questions and response. Students should prepare: arguments they anticipate and how they would respond to that argument?

*Concluding Statement:* How does your argument change in light of the opposing position?

The goal is to get to something like "what is at stake in this issue?" or "what is this really about?" and how the two positions come at it differently.

The Benefits of Plastic

NAME HIDDEN

University of California Santa Cruz

ENVS 100/L

Prof. Philpott

WA1.2

2/3/15

In this paper I briefly outline the benefits of plastic, including its many uses, low cost, energy efficiency, and biodegradability with regards to waste management.

The peer review process helped more this time than last time and I got more feedback on my paper. I think the general suggestions in lab helped with my paper, as well as the feedback from WA1.1. I would like suggestions on my argument, as I still had a hard time writing on the opposing side of my topic and revising it to be more clear. I couldn't find many references on my topic as well, so I hope using them in my paper wasn't redundant. Also I would like ideas on writing more concisely. For WA1 I will revise my first paper's argument to be on the general harmful effects of plastic instead of specifically on marine life, because it wasn't possible to make an opposing argument on the benefits of plastic to marine life.

### **The Benefits of Plastic**

Most overlook the benefits gained from plastic production, but it has changed modern activities. From clothing to food packaging, plastics have a multitude of benefits that improve human life. They are energy efficient, cost effective, and biodegradable plastics reduce impacts to the environment.

#### **Uses**

Plastics are durable, lightweight, and are highly versatile (Thompson, 2009). Its properties enable it to be shaped into many forms, yet still be strong enough for many uses (Andrady, 2009). They are found in most products used daily on a global scale. Plastics create textile material for clothing, such as high-performance apparel and footwear. Also, due to their lightweight properties, they can be transported easily with reduced emissions. According to Andrady (2009) the most commonly used plastic, Polypropylene, is used for containers in the food industry and many household and personal goods. In addition, food packaging contributes to the health safety of consumers by providing more sanitary storage and fresh produce.

#### **Energy**

One huge benefit of plastic production is its energy efficiency. According to a study mentioned in Keiner (2010) comparing the environmental effect of plastic vs. paper bags, the production of plastic bags involves 96 percent less water, 40 percent less energy, and generates 80 percent less waste than paper bags. Also, compared to glass and aluminum, producing plastic requires less energy overall (Keiner, 2010). In another study, when paper cartons were replaced with plastic packaging, the production energy savings was 72% (Andrady, 2009). Plastics are produced as a more efficient alternative to other resources to save energy and create less waste.

#### **Cost**

Replacements for more costly materials such as metal, wood, and glass tend to be plastic, due to its lightweight quality. This can also lower the costs resulting from those alternatives. For example, Andrady (2009) states that metal components were substituted for plastic in commercial airplanes, allowing for a 20% fuel cost savings. This is a considerable advantage in manufacturing when producers search for the least expensive option over the long term. Similarly, this lower cost parallels with many components in buildings, cars, sports equipment, and packaging. Plastic also allows for minimal material use in packaging, which is more cost effective than paper, aluminum, or glass (Andrady, 2009).

### **Biodegradability**

The high demand for plastic products due to its versatility is increasing, and will continue to in the future. Reliability on plastics creates waste problems, but can be managed with biodegradable forms (Thompson, 2009). Biodegradable plastics can be broken down with the help of bacteria, sunlight, or oxygen. Most disposable shopping bags are made to be oxo-biodegradable, reducing landfill waste and environmental degradation (Lerner, 2012). Corn based bio-plastics have additional advantages: according to Lerner (2012), 70 percent less energy is used and 68 percent fewer greenhouse gases are created during manufacturing than conventional plastic production. Biodegradable plastics improve waste management along with environmental benefits.

### **Conclusions**

Plastic is in many items purchased globally and has transformed our modern world. Humans are dependent on plastic materials to live at such a high standard. With the appropriate technology, plastic production can alleviate environmental and economic issues such as cost, energy, and waste to keep up with consumer desire for convenient and useful products.



### References

- Andrady, A. L., & Neal, M. A. (2009). Applications and societal benefits of plastics. *Philosophical Transactions of the Royal Society B-Biological Sciences*, 364(1526), 1977–1984. doi:10.1098/rstb.2008.0304
- Kiener, R. (2010, July 1). Plastic pollution. *CQ Global Researcher*, 4, 157-184. Retrieved from <http://library.cqpress.com/cqresearcher/cqrglobal2010070000>
- Lerner, A. W. (2012). Biodegradable Products and Packaging. In B. W. Lerner & K. L. Lerner (Eds.), *Biotechnology: In Context* (Vol. 1, pp. 67–69). Detroit: Gale. Retrieved from <http://go.galegroup.com/ps/i.do?id=GALE%7CCX4020200034&v=2.1&u=ucsantacruz&it=r&p=GVRL&sw=w&asid=d4a93821db19af706c74f9baa03ad950>
- Thompson, R. C., Swan, S. H., Moore, C. J., & vom Saal, F. S. (2009). Our plastic age. *Philosophical Transactions of the Royal Society B-Biological Sciences*, 364(1526), 1973–1976. doi:10.1098/rstb.2009.0054

Groundwater Contamination due to Agricultural Nitrogen Leaching

NAME HIDDEN

University of California Santa Cruz

ENVS100/L Section 6 WA1.2

Cover Letter

The peer review process was very beneficial in terms of feedback about citation and APA formatting. The main revisions were separating the paragraph about best management practices and a more defined concluding paragraph. This allowed the reader to see the importance of best management practices as a possible solution to nitrate leaching and summed up the paper into a conclusion at the end. Another major change was taking out a direct quote about groundwater contamination from USGS surveys and paraphrasing the point instead. The quote seemed unnecessary, so paraphrasing allowed me to use the information in my own words whilst still giving credit to the author. The peer review process itself was very helpful. Although we all agreed that some of the questions were pretty redundant and should be omitted in order to save time. Next time we should start the peer review process earlier because our specific lab ran out of time and rushing to peer review someone's paper is not beneficial to you or the group. With this draft, I would like to make sure the APA format stays on track. I know most people will struggle with this until we have more practice, but that is the main issue. I'd also want feedback on the use of my evidence...is it strong enough? Do I need more/less?

Groundwater Contamination due to Agricultural Nitrogen Leaching

New advances in technology, bio-chemical inputs, high-yielding varieties, and government subsidies have given farmers and the agricultural community massive opportunities to expand land-use and production. However, these new agricultural tools, such as pesticides and highly concentrated nitrogen fertilizers, have become a beacon for groundwater contamination through the process of leaching and run-offs, especially in the Salinas and San Joaquin Valley's of California (Monsen 2008). Over-intensification on farmlands has lead to nitrate leaching into nearby water sources and ecosystems. Environmental and economic incentives should be applied in order to decrease nitrate leaching and promote drinkable water within California.

In order to keep up with population needs, agriculture in the past 50 years has relied heavily on the use of chemical fertilizers rich in synthetic nitrogen (Sharkey 2013). The application of fertilizers has amplified overall crop yields, but has also resulted in excess nitrate and other nutrients to be lost to run-off, erosion, and leaching, as well as numerous other environmental issues. According to the Kulongoski and Belitz (2011) USGS survey in the greater Santa Cruz area, nitrate contamination in water systems can be directly correlated to agriculture practices and account for about 8% of primary trace elements found in the public supply. Anthropogenic contribution to nitrate and nutrient contamination of groundwater is in direct correlation with the agro-economic value of high production within a limited time frame, thus the need to over fertilize, till, irrigate, and apply pesticides.

Best Management Practices may aid in reducing the amounts of nitrogen lost through leaching and over-intensification of fertilizer. Cover crops, minimum/no tillage practices, crop rotations, and buffer areas offer farmers efficient means for nutrient cycling and minimal contamination by leaching (Sharkey 2013). For example, the use of hedgerows could increase

plant and animal biodiversity that may lead to a decrease in pests and need for pesticides (Sharkey 2013). Management practices that emphasize environmental health and quality can be a resourceful tool for farmers to move away from traditional farming practices that degrade soil quality, decrease biodiversity, contaminate water sources, and over-intensify production. Monsen (2008) found, “Monitoring soil inorganic N, cover crop growth and precipitation from fall through spring can show periods of potential N loss and possible loci for management changes to minimize that loss” (11). Incorporating cooperative techniques may allow for more productive government subsidies and aid in the development for best management practices that focus on the agroecosystem as a whole.

Through governmental subsidies, tax breaks, and incentives to minimize nitrogen over-intensification, traditional farming practices should start incorporating best management techniques in order to eradicate potential degradation of ecological systems on and off the farm. The contamination of groundwater by non-ecological farming practices is perpetuated through lack of governmental support and incentives that are not easily attainable and sought after. By providing opportunities to apply best management practices, new and reformed policies should be able to decrease the leaching of nitrates and other harmful elements into nearby ecosystems and groundwater aquifers.

### References

- Monsen, K. L. (2008). *Managing nitrogen in organic vegetable agroecosystems on california's central coast* (Order No. 3338594). Available from Dissertations & Theses @ University of California; ProQuest Dissertations & Theses A&I. (304662674). Retrieved from <http://search.proquest.com/docview/304662674?accountid=14523>
- Sharkey, J. A. (2013). *Evaluating production, economic and environmental impacts of high-value crop production on nitrate leaching potential in the salinas valley, california* (Order No. 1560208). Available from Dissertations & Theses @ University of California; ProQuest Dissertations & Theses A&I. (1557813697). Retrieved from <http://search.proquest.com/docview/1557813697?accountid=14523>
- Kulongoski, J.T., and Belitz, Kenneth. (2011). *Status and understanding of groundwater quality in the Monterey Bay and Salinas Valley Basins*. 2005—California GAMA Priority Basin Project: U.S. Geological Survey Scientific Investigations Report 2011–5058, 84 p.

## Lesson Plan

<b>Objectives</b> <ul style="list-style-type: none"> <li>• Group Presentations</li> <li>• Roundtable</li> </ul> <b>Projectable Resources</b> <ul style="list-style-type: none"> <li>• student presentations</li> </ul>	<b>TA Prep</b> <ul style="list-style-type: none"> <li>• organize time depending on number groups</li> </ul> <b>Bring to Lab</b> <ul style="list-style-type: none"> <li>• Group Presentation Form (for students) with enough copies for each student/presentation</li> <li>• Group Eval (to eval own group)</li> <li>• 1 TA grading paper per group</li> </ul>
---	--

**1. Group Presentations (~1 hour, <10 min each)**

1. Hand out enough evaluation forms to each student for the number of groups.
2. Each group goes through their presentation. It would be a good idea to time them and let them know when they have 2 minutes left. Try to cut them off as gently, but firm as possible when the 10 minutes is up.

**2. Roundtable (~30-45, <10 min each)**

**Pre:** Remind students that this isn't a debate! The goal isn't to "win" with their argument but , *"to reach a consensus position on the best course of policy action for your issue."* You might explain it to students as if they are gathered experts on the issue, trying to get down to business to make a decision about what should be done- what is the real issue here and how can they come to some type of agreement? This may not be possible, but they should at least get to what is "at issue" here.

**How it will work:**

All the members from each "issue" come to the front of the room. Each side restates their argument and pose questions to each other. You should facilitate/moderate as lightly as possible, to keep the discussion going. At the 6-7 minute mark, gently guide them to reach a consensus or explain their disagreement. You might even propose a solution if they're having a difficult time getting to one. (e.g. "Well, would you all agree that what is needed is a better regulatory structure for nuclear power?" or "It seems like that issues with fracking really come down to the overconsumption of energy by Americans, do you agree?" or "The disagreement here seems to be about whether fish are sentient beings, no?"). This of yourself as Ira Flatow or Diane Rehm.

**ENVS 100, Winter 2015**  
**Journal Assignments #1-#4**

**JOURNAL ASSIGNMENTS: WRITING ASSIGNMENT 1 SCAFFOLDING EXERCISES**

*These journal exercises are to help you remember—or learn—some of the basic elements of research and citation. They correspond directly to the work you'll do for WA1.1 and WA1.2.*

**Journal Assignment #1:** Finding a topic—background sources

First, develop and articulate a problem statement around your environmental issue. Then find three background sources about your topic using the following search tools --- Gale Virtual Reference, Lexis-Nexis, Proquest Newspapers, CQ Researcher, and EENews. For each article that you choose, create an APA reference list entry, as you would at the end of a paper. In addition, write a 2-3 sentence summation of each article that you choose.

Due in lab during week 2 (week of Jan. 12). (*Assignments will be checked in lab. Students will keep journals so they can complete assignments #3 and #4.*)

**Journal Assignment #2:** Scholarly sources

Find at least three scholarly sources for WA1.1. For each scholarly source that you choose, create an APA reference list entry. In addition, write a 2-3 sentence summation covering what the article argues, what evidence it uses and the policy implications.

Due in lab week 2 (week of Jan. 12), but obviously you'll need to complete it before drafting WA1.1. (*Assignments will be checked in lab. Students will keep journals so they can complete assignments #3 and #4.*)

**Journal Assignment #3:** Based on James P. Davis, "The Rowman & Littlefield Guide to Writing with Sources"

- a. Write a summary of "When do you need to acknowledge a source?"
- b. Write a summary of "When should you paraphrase and when should you quote?"
- c. Write a summary of "How should you quote material from a source?"

Due in lecture on Tues, Jan. 20

**Journal Assignment #4:** Learning APA citation style

- a. Using the OWL APA style guide (<https://owl.english.purdue.edu/owl/section/2/10/>) create a reference list for both your three background sources and three scholarly sources.
- b. Create two different quote introductions for passages you are likely to cite; include in-text citation.
- c. Create at least two different paraphrased sentences; include citations.

Due in lecture on Tues, Jan. 20



**ENVS 100, Winter 2015**

**Short Paper #1**

**Due in lab during week 5 (Feb 2-5)**

### **EXAMINING READINGS AND LECTURES**

Your first short paper (#1) is an opportunity for you to examine some of the ideas in the readings and lectures through less formal writing than WA1 and WA2. It still needs to feature complete thoughts and overall coherency, but need not conform to APA format and style, except for citations. Rather, you're invited to either explore one of the key ideas or debates from the first third of the course as it is discussed in at least two of the readings and, if you choose, the lectures. Or you can look at an issue through two different readings and respond to them in depth examining what you found interesting, challenging, or how it changes the ways you think about environmental studies. Consider putting one of the more historical texts in conversation with a contemporary one, or a more theoretical text with a more concrete text. If you'd like to propose something more personal or reflective you're encouraged to check in with your TA, but make sure it will deal with a reading in some depth. Be sure to look over the journal entries and review your lecture notes. These are often good places to start. While this paper is less formal, it should feature a main idea.

Formatting: Your paper should be 2-3 paragraphs, and no longer than 1 page, typed, single-spaced, with 1" margins all around and Times New Roman 12 point font. Make sure your name, TA's name and lab section appear in the upper left-hand corner. You should include at least two sources, with proper in-text citation and a reference list at the end. The reference list need not fit in the 1 page limit.

Evaluation: 5 points possible for the lab grade (reading response)

Readings from which you can select:

Kraft 2014

Fleischman et al. 2013

Kennedy 2014

Mace et al. 2014

Carson, Silent Spring

Gilbert & Webb 2007

Noss et al. 2006

Van Andel et al. 2012

Lectures from which you can select:

Introduction to ENVS

Environmental Policy

Environmental Ethics and Values

Biodiversity and Conservation

The Rise of Evolutionary Ecology and Applications in Conservation and Agriculture

Conservation Biology and Restoration

ENVS 100, Winter 2015

Short Paper #2

Due in lab during week 8 (Feb 23-26)

### EXAMINING READINGS AND LECTURES

Your second short paper (#2) is an opportunity for you to examine some of the ideas in the readings and lectures through less formal writing than WA1 and WA2. It still needs to feature complete thoughts and overall coherency, but need not conform to APA format and style, except for citations. Rather, you're invited to either explore one of the key ideas or debates from the first third of the course as it is discussed in at least two of the readings and, if you choose, the lectures. Or you can look at an issue through two different readings and respond to them in depth examining what you found interesting, challenging, or how it changes the ways you think about environmental studies. Consider putting one of the more historical texts in conversation with a contemporary one, or a more theoretical text with a more concrete text. If you'd like to propose something more personal or reflective you're encouraged to check in with your TA, but make sure it will deal with a reading in some depth. Be sure to look over the journal entries and review your lecture notes. These are often good places to start. While this paper is less formal, it should feature a main idea.

Formatting: Your paper should be 2-3 paragraphs, and no longer than 1 page, typed, single-spaced, with 1" margins all around and Times New Roman 12 point font. Make sure your name, TA's name and lab section appear in the upper left-hand corner. You should include at least two sources, with proper in-text citation and a reference list at the end. The reference list need not fit in the 1 page limit.

Evaluation: 5 points possible for the lab grade (reading response)

Readings from which you can select:

Crooks & Soule 1999

Blumstein & Fernandez-Juricic 2004

Estes et al. 2011

Lu Holt 2005

Gliessman 2007

Carson "Silent Spring"

National Geographic -- Special Food Compilation Article

Vandermeer & Perfecto 2008

Tscharntke et al. 2012

Lectures from which you can select:

Carnivore Conservation and Trophic Cascades (*Justine Smith*)

Conservation as a Social Process (*Flora Lu*)

Introduction to Agroecology (*Stacy Philpott*)

Introduction to Food Systems (*Margaret Fitzsimmons*)

Conservation and Agroecology (*Stacy Philpott*)

ENVS 100, Winter 2015

**First Written Assignment (WA1.1 and WA1.2)**

**CRAFTING ENVIRONMENTAL ARGUMENTS**

The **purposes of this assignment** are (1) to practice crafting strong, evidence-based arguments, (2) to better learn how to incorporate research into your argumentation, (3) to learn how to write in APA style (both in terms of citation and rhetorically), (4) to engage with perspectives other than your own, and (5) to practice both giving and incorporating critical feedback to improve written work—essential skills in any area of environmental work or study.

This assignment will include writing two 1.5 - 2 page papers about an environmental issue of your choice, participating in a peer review process for each paper, revising each paper, and preparing cover letters for your drafts. The assignment is broken into two parts -- WA1.1 and WA1.2.

**WA1.1 (Part 1):** Choose one, clearly defined environmental issue that you have a strong position on (local, regional, national, or global). Formulate and articulate a problem statement and your position on this environmental issue in a concise manner. Then, do some background research to get up to date and more fully informed about the issue. Start with the following databases for your background research: Gale Virtual Reference, Lexis-Nexis, Proquest Newspapers, CQ Researcher, and EENews.

If you're feeling a bit rusty in your research skills take a few minutes and do the tutorial for Writing 2 and Core 80B - Sciences on the following web site. It's not exactly what you'll be doing for this paper, but it will help immensely:

<http://guides.library.ucsc.edu.oa.ucsc.edu/content.php?pid=415680&sid=3398205>

Be sure to pay close attention to keywords and special terms used in the media coverage that you read. The next step is to use these keywords to find authoritative scholarly research on your topic. You'll need to search the databases listed in the ENVS research guide: <http://guides.library.ucsc.edu/envs>. Note the different tabs across the top for different types of sources (articles, books, background, policy, statistics, etc.). Be sure to use *at least* 3-5 different sources to construct your arguments.

Then formulate and articulate your position in a concise manner (specifically 1.5 to 2 pages max). You'll need to use scholarly sources to build a list of reasons and to provide evidence to explain and support your position. Ultimately you should be able to point towards a policy that would address and ameliorate the environmental issue. While mentioning a

respectable news source is permissible (major newspapers and periodicals for instance), websites that aren't vetted and the like are not. *Remember to vary the language in your introduction and conclusion.*

This assignment will involve peer review. Peer review is a process during which other students in the class will review your work during lab, and provide constructive feedback on your first draft. A more complete explanation of the process will be introduced during lab. You are required to include a brief cover letter to your peers noting what you'd like feedback on, what you think works well and what you're concerned about.

**Due Dates:**

First draft -- The first draft of WA 1.1 is due in lab during Week 2 (Jan 12-15). Turn in FOUR copies of your completed essay, with four copies of a cover letter to your peers attached.

Final draft -- The final draft of WA 1.1 is due to your TA in lecture on Tuesday, Jan. 20. Turn in the final draft, the first drafts that were peer-reviewed, and feedback worksheets. Include a cover letter to your TA noting how the peer review process worked for you, what you liked about it, what you found difficult, as well as what you'd like feedback on, what you're satisfied with and what you aren't (if applicable).

Please see the formatting instructions below.

**WA1.2 (Part Two):** Under a separate title, and utilizing the same process, write an argument in support of the *opposing* position. Make it as compelling and convincing as you can; avoid caricature or sarcasm. Mobilize a variety of evidence and reasoning—ethical, practical, economic, and/or scientific—to support it (again in 1-1.5 pages). It should specifically argue against the proposed policy in part 1. Again, use 3-5 different sources to formulate your argument relying primarily on scholarly sources. Also, include the cover letter to your peers noting what you'd like feedback on, what you think works well and what you're concerned about.

**Due Dates:**

First draft -- The first draft of WA1.2 is due in lab Week 4 (Jan 26-29). Turn in FOUR copies of your completed essay, with four copies of a cover letter to your peers attached.

Final draft -- WA1.2 is due to your TA in lecture on Tuesday, February 3. Turn in the final draft, the first drafts that were peer-reviewed, and feedback worksheets. Include a cover letter to your TA noting how the peer review process worked for you, what you liked about it, what you found difficult, as well as what you'd like feedback on, what you're satisfied with and what you aren't (if applicable).

### **Formatting instructions and notes:**

- Use subheadings to clarify the paper's organization. Somebody unfamiliar with the assignment should be able, with little effort, to grasp your paper's purpose and plan.
- Format your paper and cite sources in APA style. You can list your "Reference List" (APA style) at the end of the entire assignment (it need not be on a separate page).
- Please type your paper. Double space your paper, use 1" margins on all sides, and use Times New Roman 12 point font.
- The final draft of your paper must be presented professionally – stapled or clipped, proofread and corrected for spelling and grammatical errors, pages numbered, and formatted as requested, including correctly formatted in-text citations and reference list – or they will be returned to you for revision and considered late.
- Be sure your name is on all peer-reviewed drafts and worksheets.

### **WA1 Point Breakdown (for both WA1.1 and WA1.2)**

#### **Lecture Grade -**

- 15 points for WA1 -- 7.5 points for WA1.1, 7.5 points for WA1.2
- TA/Instructor will assess student writing, revisions, formatting, and references

#### **Lab Grade -**

- 10 points for WA1 -- 5 points each for WA1.1, WA1.2
- TA/Instructor will assess student participation in peer review process based on cover letters, feedback provided to other students on drafts and worksheets, and revisions completed by students on their own drafts.

ENVS 100, Winter 2015

**Third Written Assignment (WA1-Revision)**

**THE REVISION: CRAFTING ARGUMENTS**

DUE: Thursday, February 26 at the beginning of lecture (8 AM, sharp).

Format: Typed, Times New Roman, 12 pt. font, 1" margins, double spaced

**Instructions:** Expectations for WA1-R are high. In this paper, you will revise, rewrite, and combine your papers from WA1.1 and WA1.2 making major improvements and producing two complete, convincing, and well-constructed arguments. You will add a final paragraph that analyzes your two arguments in a dialectical way, (holding a dialogue between your two arguments) and concludes with a convincing clincher to your final position. We refer to this final paragraph as a "conclusion," but really it is a rational discussion between the positions ending in a resolution, or final position. Each of your two positions should have their own subheadings, as should the final half-page conclusion. This means that each section is a stand-alone argument.

IMPORTANT: Your final paper will be NO MORE THAN 2.5 pages long, one page each for the two positions, plus an additional half-page for the final paragraph that clearly states what you want your audience to think or do. Working on the structure of your argument and on making revisions to sentence style, including for concision, are expected tasks.

Please make an appointment with the writing tutor (Schuyler), the writing instructor (Philip), or your TA if you would like assistance with this assignment.

**What to turn in:** You should turn in the following documents, STAPLED OR CLIPPED, and stacked in the order as listed here:

- (1) A new final cover letter summarizing and detailing the changes you made from the first revision
- (2) Final draft of the WA1-R paper
- (3) Final versions of WA1.1 and WA1.2 with comments from your TA or the writing instructor, including the attached grading sheet.

*A reminder that papers must be presented professionally –proofread and corrected for spelling and grammatical errors, and formatted as requested (see checklist below), including correctly formatted in-text citations and reference list– or they will be returned to you for revision and considered late.*

**Checklist:** The following checklist is meant to help ensure you have responded as completely as possible to the assignment handout and all additional instructions:

1. Title is specific
2. Your issue and argument are specific enough for a single page
3. There is a clear thesis articulated for each position
4. Points are explained fully, all claims are stated clearly and qualified carefully
5. All claims are supported by evidence and, as necessary, sources with citations. There should be reasonable and sufficient evidence to support the argument
6. The assignment requires *at least 3-5 quality sources (i.e., peer reviewed or gray literature)*, with appropriate sources listed in the assignment handout
7. In general, each sentence follows from the preceding sentence and leads logically to the next sentence (cohesiveness, logical joining relationships)
8. The arguments are well-structured, with reasoning that follows a logical order (e.g., inductive or deductive chains) and deal with definition, context, assumptions, evidence, opposing arguments, and so on
9. Writing has been revised for concision
10. Work is carefully proofread
11. Sources are signaled and citations are provided in APA style for every reference
12. Literature cited is complete (author, date, paper title, volume/ issue numbers, page numbers, and publication information, and URLs for on-line sources) and **correctly formatted**
13. Text is thoroughly proofread
14. Text is double-spaced
15. Pages are numbered

ENVS 100, Winter 2015  
Second Written Assignment (WA2)

RESEARCH & SYNTHESIS TO ARGUE A POLICY POSITION

Assignment objectives

The goals of this assignment are twofold. First, you will hone research and analytical skills, especially: 1) ability to identify relevant literature, and select the most appropriate (e.g. most relevant, credible, well-supported by evidence) parts from a larger body of relevant literature for your research use, 2) ability to read the relevant literature critically, understanding the nature, structure, premises, main points, principal strengths, and principal weaknesses of scientific arguments, 3) understanding of the way various types of scientific arguments fit—or don't fit—into a larger policy debate, and 4) ability to craft a policy argument based on your understanding (and critique) of research findings. Second, and very importantly, you will learn how to effectively represent *any* policy position, and not necessarily your own position and belief. To that end, in your individual research, and also during the policy round table presentations, you should make a note of data, analyses, or broader analytical frameworks that contradict and/or have the potential to weaken (or undermine) your policy position; and you should endeavor to address those—tacitly or explicitly—in your individual research summaries and in the group memo and presentation.

In this assignment, we ask you to become an informed and persuasive voice in one of six major debates in contemporary environmental policy related to the following three themes: energy generation and energy policy, food production and food security, and climate policy.

The project involves both an individual component (**WA2-indiv**) and a group component (**WA2-group**). Each of these will require you to deploy – and continue honing – your research and writing skills and your analytical and argument-building skills. **WA2-group** includes a presentation that will also help you advance your public speaking skills, as well as a group paper; both of the **WA2-group** components give you an excellent opportunity to build your collaboration skills.

Assignment structure

In **WA2-indiv**, each of you will conduct research and analysis in support of a policy position on one of the six issues listed below. In **WA2-group**, you will work in groups to combine your individual research findings, and the arguments you have built based on those findings, into a policy memo and a policy presentation that forcefully advance your policy position.

Lecture Grade -- 20 points for written portions (10 points for WA2-indiv, 10 points for WA2-group)

Lab Grade -- 10 points for group work, 15 points for WA2-group presentations

The six issues:

1. **Biofuels** - a viable solution to the climate change problem?
2. **Nuclear energy** - part of the solution to the climate change problem?



3. **Agricultural biotechnology** - the solution to food shortages & world hunger?
4. **Aquaculture** - a solution to the fisheries crisis?
5. **Hydraulic fracturing** (aka fracking) – a necessary component of U.S. energy generation in the short to medium term?
6. **Geoengineering** – an important component of climate change mitigation strategy?

There will be *two policy positions to be argued for each of these issues* (see details in the issue-specific tables below). *Each of you will be randomly assigned to an issue, and to one of the two policy positions to be argued on that issue.* You will have to conduct some individual research and writing to prepare to support your assigned policy position. Students assigned to argue the same policy positions on an issue will form groups (of four or five people, i.e., you are randomly assigned to groups). The groups will combine everyone's individual research into 1) a compelling policy presentation in support of your group's policy position and 2) a forceful policy memo in support of your group's policy position.

A maximum of three issues will be represented in each lab. That is, there will a maximum of three policy issues, and six policy positions (two on each issue) that will be argued at policy roundtables in your labs during week 9 (week of March 2).

Once the individual component (**WA2-indiv**) of the assignment is completed (due in class on Tuesday, February 17, 8 am), you will start working in your groups, putting together your individual findings, arguments, and ideas to craft and present a comprehensive argument in support of your team's policy position. Your group will put together a group policy memo (due by Thursday, March 5, 8am). Your group will then present its argument at a policy round table taking place in lab during the week 9 (week of March 2). These group presentations will be followed by a discussion with the entire lab section.

In sum, both the presentation and the policy memo will draw on every group member's individual research, with group work (**WA2-group**) consisting of:

- a. Crafting an accompanying written memo, that is well-argued and persuasive.
- b. Critically evaluating, organizing, and synthesizing everyone's research findings into one thorough, compelling, and persuasive oral presentation.

#### **Assignment logistics & due dates at-a-glance**

1. **WA2-indiv** (individual component) is due in class, Tuesday, Feb. 17, 8am SHARP. **Have your name, TA, Lab number on the top of p. 1.**
2. Email WA2-indiv to your fellow Group members before lecture on Tuesday, Feb. 17, with a cc to your TA.
3. When you email your WA2-indiv fellow group members, indicate the times you are available to meet with your group during the week February 17 and February 24. (We suggest meeting with your group at your usual lab time since there is no scheduled lab for this week)
4. **WA2-group policy memo (group paper) is due by Thursday, March 5, 8am SHARP. Have the names of all group members, TA name, and lab number on top of p. 1.**
5. Group presentations and panels will take place in lab during week 9 (week of March 3).

### WA2-indiv: "Literature Review"

1) Each group member will find, read, and analyze four documents relevant to your group's topic and position (your selection must include at least two peer-reviewed articles, and one gray literature document). Note that you will be expected to conduct some serious research, and look at a number of peer-reviewed articles and gray literature documents (see tables below for details) before you settle on the four documents that you will use to support your policy position. There is a lot of literature covering each of the topics and positions we have assigned, and some is much more relevant, thorough, and/or credible than the rest, so don't settle for the first few pieces you find—try to find the ones that are best for building your argument!

2) You will then prepare a 2-page document that

- States how the data and arguments of each source reviewed will be used to support your group's policy position;
- Briefly discusses the strengths of each source in supporting your assigned policy position—WHY are these the best papers and data to draw on?  
(See tables below for more specifics.)
- Specifically talks about how the articles help advance your assigned position/provide arguments for that position (e.g. present particular policy or technical approaches that show how geoengineering, for example, can be done in a socially or environmentally beneficial manner);
- Is particularly careful to avoid the twin perils of plagiarism, on the one hand, and excessive block quotes on the other. In other words, your literature review needs to demonstrate you've read up on your issue and have a degree of authority or authorial control when discussing your sources.
- Your literature review should be in APA format with a Reference List at the end (it doesn't count in the page total), include in-text citations when necessary, and follow APA conventions except for inclusion of the title page and an abstract.
- Should be typed, double spaced, with 1" margins on all sides, and Times New Roman 12 point font.

3) You will hand in your individual component on *Tuesday, February 17, by 8 am*, **and** email it to your TA and the other members of your group before lecture on the same day.

## **WA2-group: "Policy Memo"**

### 1) Outside of lab, you will:

- Exchange, via email, your individual paper/report with each of the members of your group (cc to your TA).
- Meet and work together to prepare a group paper (the policy memo) and a 10-minute presentation of your memo's position and arguments
- Write a 5-page group policy memo that includes these sections and formatting:
  - Introduction: what is the problem your policy memo aims to address? Why is the problem important? And, what is your position or proposed solution to that problem?
  - Main argument: Explain and justify your position and/or proposed action through appropriate, data-supported arguments; be sure to distinguish the different arguments and different categories of arguments – make each one clear, compelling, and distinct!
  - Include at least one supporting original figure (see details on p. 6 of instructions)
  - Summary and conclusion
  - Cite at least 10-12 sources, include a Reference list (not included in 5 pages).
  - Again, prepare in APA style
  - Should be typed, double spaced, with 1" margins on all sides, and Times New Roman 12 point font.

Divide the presentation and group memo writing tasks equally among members of the group. (For example, one or two group members presenting while the other two or three group members take a more active part in the full-round-table discussion, responding to questions from other panel members.)

### 2) In lab, you will:

- Present your group's policy position (and your arguments in support of this position) as part of a roundtable that includes both of the groups working on the same topic
- Use three or four prepared PowerPoint slides (*no more than four!*) that reflect the main points of your policy argument. Be creative and make the most of the limited space you have on the slides. *At least one of the slides should include an original figure (not table) that you have prepared in support of your policy position (see below)*
- Participate in the round-table discussion that follows the group presentations; and work with your fellow round-table participants to reach a consensus position on the best course of policy action for your issue. If you cannot, you will have to agree to disagree. Remember: a consensus is to be reached only if members of a group that represents a particular policy position manage to persuade their fellow round-table participants of the logic and value of their position (i.e. you should not simply jump ship if you were assigned to represent a policy position you may not personally agree with!).

*This is obviously a multi-faceted set of tasks, so please be prepared to receive further guidance from your TAs during lab.*

## Summary figure

Visual summaries of your key findings or the information you have synthesized are critical. Many readers begin a report by leafing through it to look at the figures and their captions, and many time-pressured readers go no further. As part of the WA2-group “Policy Memo”, you should provide at least one such visual summary, strategically chosen to convey the main or most important points, conclusions, or findings from your group’s work. This figure does *not* count in the page length total and can appear nested in the report or on a separate page at the back. In either case, it should be cited/referred at least once in the text with a parenthetical reference at the end of the relevant sentence like this: (Figure 1). It should have a brief, descriptive caption that provides the reader with enough information to interpret it without reading any of the other text in the report. In most cases it will represent some data in your own original representation. Be sure to cite the source(s) from which you obtained your data.

### Figure checklist:

- Original figure, not reproduced or re-rendered
- Produced on your computer, not hand-drawn
- Referenced in a logical place in the text as a parenthetical, e.g. “Blah blah blah (Figure 1).”
- With a stand-alone caption below the figure that includes citations if needed, e.g. “**Figure 1.** The relationship between oil production and rates of forest loss in Parana, Brazil, 1970-2002 (Myers et al. 2007, Jones 2012)”
- In more cases, displaying data rather than a conceptual set of relationships.
- Using a data display type appropriate to the data type you have chosen
- Providing information that is central to your paper’s argument – if a reader picked this up and read the title and the subheadings and looked at the figure, would (s)he get the overall idea of what it’s about?
- Clean and professionally displayed – no extra grid lines, shadows, 3-D boxes, titles, etc. – only the caption, and possibly labeled data values depending on the figure type.

### BIOFUELS GROUP

	<b>Group 1</b>	<b>Group 2</b>
<b>Research &amp; advocacy/persuasion objective</b>	Argue the merits (ecological & social) of biofuels as an alternative energy source	Research & present the drawbacks (ecological & social) of biofuels as an alternative energy source
<b>Directions</b> For <b>Part 1</b> (the individual component)	<p>Find a relevant article from each of the 4 categories of sources below. Read and analyze each of the 4 articles. For each source, write ~ 1/2 page that states how you will use the data and/or arguments in that paper to support your policy position, as well as 1-3 sentences discussing the strengths &amp; shortfalls of each article when it comes to supporting your policy position. Include a list of references at the end of the write-up document.</p> <ol style="list-style-type: none"> <li>1. A peer-reviewed, natural science paper presenting energy, ecological, modeling, or other types of scientific &amp; technical data discussing the environmental and energy implications of a particular type of biofuel or a range of biofuels</li> <li>2. A social science or policy article (peer reviewed) discussing broader societal implications of biofuels – anything from income &amp; job consequences in biofuel &amp; non-biofuel producing regions to the implications for landowners/land values in biofuel producing regions, the implications for food prices and food security, etc.</li> <li>3. A press release, position paper, brochure, or related document from an interest group (e.g. an ag industry association, an energy company, an NGO etc.) supporting biofuels.</li> <li>4. Your choice of an applicable article.</li> </ol>	SAME INSTRUCTIONS AS Group 1, except look for materials that focus primarily on the downsides of biofuels
<b>Audience</b>	<ol style="list-style-type: none"> <li>1. Federal &amp; state decisionmakers, esp. legislators, who are developing renewable energy standards &amp; portfolios for their states</li> <li>2. Venture capital considering biofuels as a possible investment (&amp; desiring your advice on whether or not it makes a good investment, and why)</li> </ol>	SAME AS FOR GROUP 1

## NUCLEAR ENERGY

	Group 1	Group 2
<b>Research &amp; advocacy/ persuasion objective</b>	Argue the merits of nuclear power as a climate-safe energy source	Argue against nuclear power becoming part of a carbon-free energy portfolio
<b>Directions</b> for <b>Part 1</b> (the individual component)	<p>Find a relevant article from each of the 4 categories of sources below. Read and analyze each of the 4 articles. For each source, write ~ 1/2 page that states how you will use the data and/or arguments in that paper to support your policy position, as well as 1-3 sentences discussing the strengths &amp; shortfalls of each article when it comes to supporting your policy position. Include a list of references at the end of the document.</p> <ol style="list-style-type: none"> <li>1. A peer-reviewed, natural science or engineering paper that provides data relevant to building your argument – e.g. scientific &amp; technical data on the effectiveness of nuclear power as an energy source, or the environmental and human health risks associated with generating nuclear power &amp; storing spent nuclear fuel, etc.</li> <li>2. A social science or policy article (peer reviewed) discussing broader societal context of nuclear generation (e.g. it may serve your argument to find papers that discuss why the French accepting of the risks of having a nuclear plants near their towns, or discussing the actual and perceived nature of these risks, etc.)</li> <li>3. A press release, position paper, brochure, or related document from an interest group (e.g. an ag industry association, an energy company, an NGO etc.) supporting nuclear power (it will be helpful to note that some of the major US environmental NGOs are in support of nuclear energy – i.e. of building up nuclear capacity in the US, while others vehemently oppose the idea)</li> <li>4. Your choice of an applicable article.</li> </ol>	SAME INSTRUCTIONS AS Group 1, except look for materials that emphasize the drawbacks of nuclear power as an energy alternative
<b>Audience</b>	<ol style="list-style-type: none"> <li>1. Federal &amp; state decisionmakers, esp. legislators, who will soon be re-evaluating the role of nuclear power in the broader US energy portfolio</li> <li>2. Fellow citizens, who will be called on to provide their views and preferences with respect to the potential expansion of US nuclear power capacity</li> </ol>	SAME AS FOR GROUP 1

## AGRICULTURAL BIOTECHNOLOGY

	<b>Group 1</b>	<b>Group 2</b>
<b>Research &amp; advocacy/ persuasion objective</b>	Argue in favor of agricultural biotechnology (as a solution to food shortages, soil-erosion, etc.)	Argue against agricultural biotechnology (on the basis of environmental & human health risks, and/or by questioning its capacity to address issues of world hunger, etc.)
<b>Directions</b> <b>Directions</b> for <b>Part 1</b> (the individual component)	<p>Find a relevant article from each of the 4 categories of sources below. Read and analyze each of the 4 articles. For each source, write ~ 1/2 page that states how you will use the data and/or arguments in that paper to support your policy position, as well as 1-3 sentences discussing the strengths &amp; shortfalls of each article when it comes to supporting your policy position. Include a list of references at the end of the document.</p> <ol style="list-style-type: none"> <li>1. A peer-reviewed, natural science paper presenting the food production, food security, economic, ecological, health or any other advantages of agricultural biotechnology (GM crops &amp;/or animals)</li> <li>2. A social science or policy article (peer reviewed) discussing broader societal implications of agricultural biotechnology - e.g. implications for indigenous farming practices, small farmers, organic farmers, etc.; implications for overcoming persistent malnutrition in communities chronically suffering from such malnutrition, etc.</li> <li>3. A press release, position paper, brochure, or related document from an interest group and/or a governmental or non-governmental organization supporting ag biotech for a particular reason or a range of reasons</li> <li>4. Your choice of an applicable article.</li> </ol>	SAME INSTRUCTIONS AS Group 1, except look for articles emphasizing the ecological, social, and other costs and risks of agricultural biotechnology
<b>Audience</b>	<ol style="list-style-type: none"> <li>1. Federal &amp; state decisionmakers who will be making choices about regulation of, and funding for, agricultural biotech</li> <li>2. Third-world governments who will be making decisions about allowing and/or promoting ag biotech in their countries</li> <li>3. International development agencies and major foundations that are making decisions about whether to support the spread of agricultural biotech through funding for research, scientific exchanges, etc.</li> </ol>	SAME AS FOR GROUP 1

## AQUACULTURE

	<b>Group 1</b>	<b>Group 2</b>
<b>Research &amp; advocacy/ persuasion objective</b>	Argue in favor of aquaculture (as a solution to the global fisheries crisis, a provider of heart-healthy protein for developed & developing country people & healthy, a sustainable food production alternative, etc.)	Argue against aquaculture (emphasizing environmental/ecological risks, questioning its capacity to help alleviate overfishing & the global fisheries crisis, etc.)
<b>Directions for Part 1</b> (the individual component)	<p>Find at least one relevant article from each of the 4 categories of sources below. Read and analyze each of the 4 articles. For each source, write ~ 1/2 page that states how you will use the data and/or arguments in that paper to support your policy position, as well as 1-3 sentences discussing the strengths &amp; shortfalls of each article when it comes to supporting your policy position. Include a list of references at the end of the document.</p> <ol style="list-style-type: none"> <li>1. A peer-reviewed, natural science paper presenting the conservation, fisheries, human health, of other types of implications (esp. benefits) of aquaculture.</li> <li>2. A social science or policy article (peer reviewed) discussing the social – economic, community, etc. implications (esp. benefits) of aquaculture.</li> <li>3. A press release, position paper, brochure, or related document from an interest group and/or a governmental or non-governmental organization advancing a reason (or a range of reasons) supporting the development and expansion of aquaculture production</li> <li>4. Your choice of an applicable article.</li> </ol>	SAME INSTRUCTIONS AS Group 1, except look for articles emphasizing the ecological, social, and other risks and downsides of aquaculture, and gray literature documents arguing against the expansion &/or government support for aquaculture (aquaculture in general, or particular types of aquaculture more specifically)
<b>Audience</b>	<ol style="list-style-type: none"> <li>1. US (Federal, state) and other national and international decisionmakers who will be making choices about regulation of, and funding for, aquaculture development &amp;/or expansion</li> <li>2. Citizens of coastal countries, who should be informed about, and be able to comment, vote, and otherwise weigh in on the regulation, development, and/or further expansion of aquaculture in their countries</li> </ol>	SAME AS FOR GROUP 1



### HYDRAULIC FRACTURING (fracking)

	<b>Group 1</b>	<b>Group 2</b>
<b>Research &amp; advocacy/ persuasion objective</b>	Argue in favor of fracking (as an important component of US energy security, as a source of cleaner fuel, a cheaper and/or more efficient way of domestic energy production, a rational way to optimize the US energy portfolio etc. – it is a key part of your task to identify a range of possible arguments – and types of arguments - in favor of fracking, then decide on the ones you consider most likely to be persuasive and develop those – i.e. be selective – do not try to go for every single possible argument in the space of a 5-page policy memo!)	Argue against fracking (on environmental impact, environmental justice, energy security, energy efficiency, etc. grounds – again, it is your job to define the full range of relevant arguments and types of arguments against fracking, then develop a few of those; develop those that you, based on your research and group analysis, have come to believe are most important).
<b>Directions for Part 1</b> (the individual component)	<p>Find at least one relevant article from each of the categories of sources below. Read and analyze each of the 4 articles. For each source, write ~ 1/2 page that states how you will use the data and/or arguments in that paper to support your policy position, as well as 1-3 sentences discussing the strengths &amp; shortfalls of each article when it comes to supporting your policy position. Include a list of references at the end of the document.</p> <ol style="list-style-type: none"> <li>1. A peer-reviewed natural science paper presenting arguments on the need and importance of using fracking to further develop the US supplies of oil and gas.</li> <li>2. A peer-reviewed social science (e.g. economics, political science, foreign policy) paper discussing the importance and benefits of tapping US oil &amp; gas supplies through fracking</li> <li>3. A press release, position paper, brochure, or related document from an interest group and/or a governmental or non-governmental organization arguing in favor of fracking, or discussing how fracking can be made safe with adequate technological and regulatory controls in place, etc. – be creative &amp; judicious in what you pick – there is a lot of press coverage on fracking</li> <li>4. Your choice of an applicable article.</li> </ol>	SAME INSTRUCTIONS AS Group 1, except look for articles emphasizing the ecological, social risks and/or downsides of fracking
<b>Audience</b>	<ol style="list-style-type: none"> <li>1. US (Federal, state) and other US decisionmakers who will be making choices about the permitting and regulation of fracking</li> <li>2. Citizens and communities of areas where fracking is taking place</li> </ol>	SAME INSTRUCTIONS AS Group 1

## GEOENGINEERING

	Group 1	Group 2
<b>Research &amp; advocacy/persuasion objective</b>	Argue in favor of geoengineering as a critical component of climate change mitigation, as a promising solution to what has otherwise proven to be the less-than-tractable problem of climate change. NOTE that geoengineering is an umbrella concept that encompasses a wide range of activities with widely varying environmental etc. implications, AND BE SURE TO DECIDE which geoengineering approaches you will advance; the decision on which geoengineering approaches to advocate is up to you, and you can make it based on what you consider most promising, most feasible, most palatable to a broad swath of the public and/or decisionmakers, etc.	Argue against geoengineering on any grounds that you consider relevant. NOTE that geoengineering is an umbrella concept that encompasses a wide range of activities with widely varying environmental etc. implications, and BE SURE TO specify which geoengineering approaches you are arguing against, or, if you are arguing against geoengineering as a whole – be sure to have arguments that specifically address different geoengineering approaches & their consequences.
<b>Directions for Part 1</b> (the individual component)	Find at least one relevant article from each of the categories of sources below. Read and analyze each of the 4 articles. For each source, write ~ 1/2 page that states how you will use the data and/or arguments in that paper to support your policy position, as well as 1-3 sentences discussing the strengths & shortfalls of each article when it comes to supporting your policy position. Include a list of references at the end of the document.  1. A peer-reviewed natural science paper presenting arguments on the need and importance of using geoengineering to address climate change 2. A peer-reviewed social science (e.g. economics, political science, foreign policy) paper discussing the pros of geoengineering as a climate change mitigation strategy 3. A press release, position paper, brochure, or related document from an interest group and/or a governmental or non-governmental organization arguing in favor of geoengineering 4. Your choice of an applicable article.	SAME INSTRUCTIONS AS Group 1, except look for articles emphasizing the risks and/or other downsides of geoengineering (again, be sure to pay attention to the types of geoengineering approaches that different articles are analyzing and questioning).
<b>Audience</b>	1. US (Federal, state) and other US decisionmakers who will be making choices about the permitting and regulation of geoengineering 2. Citizens and communities affected by geoengineering	SAME INSTRUCTIONS AS Group 1

ENVS 100L: Ecology and Society, Winter 2015

UCSC Campus Natural Reserve Field Trip (Salamander Observations) Writing Assignment

Grading Rubric (worth 10 points)

1. **Describe and reflect on your observations of salamanders and their micro- and macrohabitats.**  
*Student describes in detail what they saw, the different habitats sampled, etc. (1.7 pts)*  
*Student vaguely describes what they saw, the different habitats sampled, etc. (1.3 pts)*  
*Student does not describe observations well, or fails to mention habitats (1 pt)*  
*Student does not provide any answer (0 pts)*
2. **State the hypothesis tested by your section, describe the basic sampling design used to test it.**  
*Student correctly states a hypothesis and the sampling design that was used (1.7 pts)*  
*Student sort of states a hypothesis and has some vague ideas about sample design (1 pt)*  
*Student mentions hypothesis, but no sample design (0.5 pts)*  
*Student does not provide any answer (0 pts)*
3. **Did the data you collected during your sampling effort (your quantitative observations) support your hypothesis? Was there a statistical difference between the two habitat types? Why, why not?**  
*Student summarizes data, statistical difference, and support of hypothesis, details (1.7 pts)*  
*Student vaguely talks about data, forgets statistics, doesn't clearly return to hypothesis (1 pt)*  
*Student doesn't accurately mention anything about data, statistics, hypothesis (0 pt)*
4. **Reflect on the process of using scientific methodology to answer questions you have about nature—did the process of quantifying your observations give you any insight into how you look at nature and how you answer the questions that you pose to yourself about it? What are the values of both systematic and observational/qualitative approaches to learning about nature?**  
*Provides detailed, thoughtful answer (1.7 pts)*  
*Provides vague answer (1 pt)*  
*Does not answer (0 pt)*
5. **If you were to do the salamander sampling again, how might you change the methodology? Are there other questions you would ask and other data that you would gather and analyze?**  
*Provides detailed, thoughtful answer (1.7 pts)*  
*Provides vague answer (1 pt)*  
*Does not answer (0 pt)*
6. **Did you find it valuable to conduct this discussion section in the field rather than learning about salamander natural history and sampling methodologies in a classroom setting? Please explain your answer.**  
*Provides detailed, thoughtful answer (1.7 pts)*  
*Provides vague answer (1 pt)*  
*Does not answer (0 pt)*

*Note to students -Please save this sheet. You will to turn it in later with WA1-R*

ENVS 100, Winter 2015

First Written Assignment (WA1)

WA1.1 Lecture Grade (worth 7.5 points)

Writer \_\_\_\_\_ TA \_\_\_\_\_ Grader \_\_\_\_\_

( / 1.0) Author's position clearly articulated with adequate specificity

( / 1.0) Argument logically constructed and convincingly written

( / 2.0) Primarily peer-reviewed evidence used well to support the argument

( / 1.0) Clarity, conciseness, readability, proofreading, appropriate style and tone

( / 1.0) Format & visual impact (including subheadings), sound use of sources (proper APA style, in-text citations, reference list, quotations if present), and cover letter included. Take off 0.25 points for single spacing, 0.25 points for minor APA convention errors.

( / 1.0) Completeness and quality of initial draft missing: 0; major weaknesses 0.5; strong (student's best effort at a complete paper) 1.0; everyone else: 0.75.

LECTURE TOTAL ( / 7.5)

---

ENVS 100, Winter 2015  
First Written Assignment (WA1)  
WA1.1 Lab Grade (worth 5 points)

Writer \_\_\_\_\_ TA \_\_\_\_\_ Grader \_\_\_\_\_

- (   / 0.5)     **Inclusion of initial cover letter to peers** *missing: 0; minimal: 0.25; adequate or better: 0.5*
- (   / 1.25)     **Effort and thoughtfulness in revision process** *no revision (unless first draft was perfect!): 0; minimal 0.5; standout 1.25; everyone else 1.0.*
- (   / 1.25)     **Thorough and thoughtful final cover letter** *missing:0; major weaknesses: 0.5; adequate 1.0; standout 1.25*
- (   / 2.0)     **Peer Review—author’s review of peers’ work** *if the student attended lab, and participated, they get 2 points.*

LAB TOTAL (   / 5)

---

Responses to any questions/concerns in writer’s cover letter not addressed above:

Summary comments:

How the paper can be improved in revision:

*Note to students -Please save this sheet. You will to turn it in later with WA1-R*

ENVS 100, Winter 2015

First Written Assignment (WA1)

WA1.2 Lecture Grade (worth 7.5 points)

Writer \_\_\_\_\_ TA \_\_\_\_\_ Grader \_\_\_\_\_

( / 1.0) Author's position clearly articulated with adequate specificity

( / 1.0) Argument logically constructed and convincingly written

( / 2.0) Primarily peer-reviewed evidence used well to support the argument

( / 1.0) Clarity, conciseness, readability, proofreading, appropriate style and tone

( / 1.5) Format & visual impact (including subheadings), sound use of sources (proper APA style, in-text citations, reference list, quotations if present), and cover letter included. Take off 0.25 points for single spacing, 0.25 points for minor APA convention errors.

( / 1.0) Completeness and quality of initial draft missing: 0; major weaknesses 0.5; strong (student's best effort at a complete paper) 1.0; everyone else: 0.75.

LECTURE TOTAL ( / 7.5)

---

ENVS 100, Winter 2015  
First Written Assignment (WA1)  
WA1.2 Lab Grade (worth 5 points)

Writer \_\_\_\_\_ TA \_\_\_\_\_ Grader \_\_\_\_\_

- (   / 0.5)    **Inclusion of initial cover letter to peers** *missing: 0; minimal: 0.25; adequate or better: 0.5*
- (   / 1.25)    **Effort and thoughtfulness in revision process** *no revision (unless first draft was perfect!): 0; minimal 0.5; standout 1.25; everyone else 1.0.*
- (   / 1.25)    **Thorough and thoughtful final cover letter** *missing:0; major weaknesses: 0.5; adequate 1.0; standout 1.25*
- (   / 2.0)    **Peer Review—author’s review of peers’ work** *if the student attended lab, and participated, they get 2 points.*

LAB TOTAL (   / 5)

---

Responses to any questions/concerns in writer’s cover letter not addressed above:

Summary comments:

How the paper can be improved in revision:

*Note to students -Please save this sheet.*

ENVS 100, Winter 2015

Third Written Assignment (WA1-Revision)

WA1-R Lecture Grade (worth 15 points)

Writer \_\_\_\_\_ TA \_\_\_\_\_ Grader \_\_\_\_\_

- ( / 3.0 ) Positions clearly formed and articulated, must correspond with each other with adequate specificity—should include revisions if noted on first drafts.
- ( / 2.25 ) Argument logically constructed and convincingly written—revised for continuity and persuasiveness if applicable.
- ( / 3.0 ) Primarily peer-reviewed evidence used well to support the argument—new sources if necessary.
- ( / 2.25 ) New conclusion (1/2 page) persuasively engaging both sides while arguing for one position or a synthesis of the two.
- ( / 2.25 ) Clarity, conciseness, readability, proofreading, appropriate style and tone. Evidence of substantial revision, polished prose.
- ( / 2.25 ) Format & visual impact (including subheadings), sound use of sources (proper APA style, in-text citations, reference list, quotations if present), and cover letter included.

LECTURE TOTAL ( / 15 )

---



ENVS 100, Winter 2015

**Second Written Assignment (WA2-group, Policy Memo)**

**WA2-group Lecture Grade (worth 10 points)**

Writer \_\_\_\_\_ TA \_\_\_\_\_ Grader \_\_\_\_\_

**( / 2.0) Substance of the argument.**

- Each argument is clear and appropriate for the memo's policy purpose
- Individually and collectively, arguments are compelling
- Arguments are sufficient (and sufficiently diverse) to support the policy

**( / 2.0) Writing style and clarity**

- Prose is consistent in terms of voice and style
- Writing is concise and edited effectively
- Memo is polished

**( / 2.0) Organization**

- Clear statement of objectives & / or policy position early on in the paper
- Section break-down is logical (in terms of the memo's substance) and appropriate in terms of the argument flow. Subsections are clear.
- Information presented in each section clearly belongs to that section

**( / 2.0) Quality (& Quantity) of evidence used**

- Each argument (or class of arguments) is appropriate supported by evidence
- Diversity and appropriateness of sources
- Citation style is correct and citations are complete
- Reference List conforms to APA style and is uniform

**( / 2.0) Figure**

- Original figure
- Figure is illustrative of, and/or supports a key part of the overall argument
- Quality of the figure (Axes are labeled, legend is included, figure is appropriate)

Overall Comments:

**LECTURE TOTAL ( / 10)**

**ENVS 100, Winter 2015**

**WA2- Ind, Literature Review, Lecturer Grade (10 points)**

**Writer \_\_\_\_\_ TA \_\_\_\_\_ Grader \_\_\_\_\_**

**( / 2.0 ) Choice of four sources, including two peer reviewed sources and one gray literature source**

**( / 2.0 ) Explanation of the strengths of each source in relationship to policy position**

**( / 2.0 ) Coherence of how the sources as a whole help advance policy position**

**( / 2.0 ) Clarity, conciseness, readability, proofreading, appropriate style and tone**

**( / 2.0 ) Format & visual impact, sound use of sources (proper APA style, in-text citations, reference list, quotations if present)**

**LECTURE TOTAL ( / 10)**

---

**Summary Comments:**

**How this work can be improved for WA2-Group:**

# **ENVS 100 Handbook**

## **Alphabetical Index**

### **A**

Abundance (General Ecology)  
Acid rain (Physical & Chemical Envt)  
Adaptation (General Ecology)  
Adiabatic precipitation (Physical & Chemical Envt)  
Albedo effect (Physical & Chemical Envt)  
Alpha diversity (General Ecology)  
Analysis of variance (ANOVA) (Statistics)  
Anthropocentrism (Environmental Philosophy and Ethics)  
Anthropogenic N deposition (Physical & Chemical Envt)  
Asymptote (Mathematics)

### **B**

Beta diversity (General Ecology)  
Biomagnification (General Ecology)  
Biomes (General Ecology)  
Bottom-up control (General Ecology)

### **C**

Cap-and-trade (Environmental Policy and Economics)  
Capitalism (Sociology)  
Carbon cycle (Physical & Chemical Envt)  
Carrying capacity (Physical & Chemical Envt + General Ecology)  
Categorical data (Statistics, Data Types)  
Chi-square tests (Statistics)  
Chicago school (Environmental Policy and Economics)  
Class inequality (Sociology)  
Clean Air Act (Environmental Policy and Economics)  
Clean Water Act (Environmental Policy and Economics)  
Coefficient of determination R-square (Statistics)  
Colonialism (Sociology)  
Command and control (Environmental Policy and Economics)  
Commodities (Sociology)  
Commodity chains (Sociology)  
Common pool resources (Environmental Policy and Economics)  
Competition (General Ecology)  
Competitive exclusion (General Ecology)  
Compound interest (Mathematics)  
Confidence intervals (Statistics)  
Consumerism (Sociology)

Consumers (General Ecology)  
Continuous data (Statistics)  
Conventional agriculture (Physical & Chemical Env't)  
Convergent evolution (General Ecology)  
Corporate sustainability (Environmental Policy and Economics)  
Corporations and corporate personhood (Sociology)  
Correlation (Statistics)  
Corridors (General Ecology)  
Cost-benefit analysis (Environmental Policy and Economics)  
Cultural diversity (Anthropology)  
Cultural relativism (Anthropology)

## **D**

Decomposition/decomposers (General Ecology)  
Deep ecology (Environmental Philosophy and Ethics)  
Deforestation (Physical & Chemical Env't)  
Density-dependent and density-independent population growth (General Ecology)  
Dependent and independent variables (Mathematics)  
Deregulation (Sociology)  
Desertification/dust generation (Physical & Chemical Env't)  
Development (Sociology)  
Disaster capitalism and shock doctrine (Sociology)  
Discounting (Environmental Policy and Economics)  
Discourse and narratives (Anthropology)  
Discrete data (Statistics)  
Dispersal (General Ecology)  
Disturbance (General Ecology)  
Division and alienation of labor (Sociology)  
Domestication (Physical & Chemical Env't)  
Doubling time (Mathematics)  
Dualism (Environmental Philosophy and Ethics)

## **E**

Ecocentrism (Environmental Philosophy and Ethics)  
Ecofeminism (Environmental Philosophy and Ethics)  
Ecological footprint (Environmental Policy and Economics)  
Ecological scales (General Ecology)  
Egocentrism (Environmental Philosophy and Ethics)  
El Niño (Physical & Chemical Env't)  
Elevation, pressure and temperature (Physical & Chemical Env't)  
Emigration (General Ecology)  
Empathy (Environmental Philosophy and Ethics)  
Endangered Species Act (Environmental Policy and Economics)  
Environmental justice (Environmental Philosophy and Ethics)  
Ethnography (Anthropology)

Eutrophication (Physical & Chemical Env't)  
Excel statistics and graphing (General Ecology)  
Executive branch (Environmental Policy and Economics)  
Exponential functions (Mathematics)  
Exponential function with natural base  $e$  (Mathematics)  
Exponential growth and decay (Mathematics)  
Externalities (Environmental Policy and Economics)

## **F**

Fetishism of commodities (Sociology)  
First law of thermodynamics (Physical & Chemical Env't)  
Food chains and webs (General Ecology)  
Free trade (Environmental Policy and Economics)  
Freedom and liberty (Sociology)  
Function (Mathematics)  
Fundamental niche (General Ecology)

## **G**

Gamma diversity (General Ecology)  
Gene flow (General Ecology)  
Generalists (General Ecology)  
Genetic bottleneck (General Ecology)  
Genetic diversity (General Ecology)  
Genetic drift (General Ecology)  
Genetically modified organisms (Physical & Chemical Env't)  
Globalization (Environmental Policy and Economics + Sociology)  
Governance (Environmental Policy and Economics)  
Government (Environmental Policy and Economics)  
Graphs of exponential and logarithmic functions (Mathematics)  
Graphs of functions (Mathematics)  
Graphs of polynomial functions (Mathematics)  
Greenhouse effect (Physical & Chemical Env't)

## **H**

Half lives (Physical & Chemical Env't)  
Hetch Hetchy dam controversy (Environmental Policy and Economics)  
Holism (Environmental Philosophy and Ethics)  
How do courts and litigation influence environmental policy? (Environmental Policy and Economics)  
Human exceptionalism (Environmental Philosophy and Ethics)  
Human responsibility to nature (Environmental Philosophy and Ethics)  
Human rights (Sociology)  
Human vs. nature distinction (Environmental Philosophy and Ethics)  
Hydrological cycle (Physical & Chemical Env't)

Hypothesis testing (General Ecology)  
Hypothesis testing (Statistics)

## **I**

Individualism (Environmental Philosophy and Ethics)  
Individualism and collectivism (Sociology)  
Industrialization (Sociology)  
Inverse functions (Mathematics)  
Invisible hand (Sociology)  
Immigration (General Ecology)  
Imperialism (Sociology)  
Information society (Sociology)  
Instrumental and intrinsic values (Environmental Philosophy and Ethics)  
Interaction between abiotic and biotic components (General Ecology)  
International Monetary Fund (Environmental Policy and Economics + Sociology)  
Invasive species (General Ecology)

## **J**

Judicial branch (Environmental Policy and Economics)

## **K**

K-strategists (General Ecology)  
Keynesian school (Environmental Policy and Economics)  
Keystone species (General Ecology)  
Kuznets curve (Environmental Policy and Economics)

## **L**

La Niña (Physical & Chemical Env't)  
Legislative branch (Environmental Policy and Economics)  
Legislative process (Environmental Policy and Economics)  
Life history (General Ecology)  
Linear functions (Mathematics)  
Linear regression (Statistics)  
Logarithmic functions (Mathematics)  
Lotka-Volterra models (General Ecology)

## **M**

Malthusian theory (Environmental Policy and Economics)  
Market-based regulation (Environmental Policy and Economics)  
Market equilibrium (Environmental Policy and Economics)  
Market valuation vs. non-market valuation (Environmental Policy and Economics)  
Maximum sustained yields (Environmental Policy and Economics)

Mean (Statistics)  
Median (Statistics)  
Metapopulation (General Ecology)  
Migration and internal displacement (Sociology)  
Mode (Statistics)  
Modernity (Sociology)  
Moral considerability (Environmental Philosophy and Ethics)  
Mutations (General Ecology)

## **N**

National Environmental Policy Act (Environmental Policy and Economics)  
Nation-states and imagined communities (Sociology)  
Natural selection (General Ecology)  
Neoliberal capitalism (Sociology)  
Neo-malthusians (Environmental Policy and Economics)  
Nitrogen cycle (Physical & Chemical Envt)  
Nominal data (Statistics)  
Normal distribution (Statistics)

## **O**

Ocean acidification (Physical & Chemical Envt)  
Ocean-atmosphere teleconnections (Physical & Chemical Envt)  
Ocean circulation disruptions (Physical & Chemical Envt)  
Open-access resources (Environmental Policy and Economics)  
Ordinal data (Statistics)  
Ozone layer depletion by CFCs (Physical & Chemical Envt)

## **P**

P-value (Statistics)  
Phosphorus (Physical & Chemical Envt)  
Photosynthesis (Physical & Chemical Envt & General Ecology)  
Political ecology (Environmental Policy and Economics)  
Political economy (Sociology)  
Polynomial functions (Mathematics)  
Precautionary principle (Environmental Policy and Economics)  
Predation (General Ecology)  
Primitive and pre-modern (Anthropology)  
Privatization (Environmental Policy and Economics)  
Privatization (Sociology)  
Producers (General Ecology)  
Property rights (Sociology))

## Q

Quadratic functions (Mathematics)

## R

R-strategists (General Ecology)

Radioactive isotopes (Physical & Chemical Envt)

Range (Statistics)

Realized niche (General Ecology)

Renewable vs. non-renewable energy resources (Environmental Policy and Economics)

Resilience (General Ecology)

Resistance (General Ecology)

Rise of social movements in the U.S. in the 60s (Sociology)

## S

Sampling (Statistics)

Second law of thermodynamics (Physical & Chemical Envt)

Shifting agriculture (Physical & Chemical Envt)

Slash-and-burn/swidden agriculture (Physical & Chemical Envt)

Slope/average rate of change (Mathematics)

Social ecology (Environmental Philosophy and Ethics)

Soil erosion (Physical & Chemical Envt)

Soil formation (Physical & Chemical Envt)

Soil functions (Physical & Chemical Envt)

Soil properties (Physical & Chemical Envt)

Specialists (General Ecology)

Speciation (General Ecology)

Species-area relationship (General Ecology)

Stages of invasion (General Ecology)

Standard deviation (Statistics)

Structures and dynamics of a community (General Ecology)

Structuring of power and privileges (Sociology)

Subsidies (Environmental Policy and Economics)

Succession (General Ecology)

Supply and demand (Environmental Policy and Economics)

Sustainable development (Sociology)

Symbiosis (General Ecology)

## T

Theory of island biogeography (General Ecology)

Thermal expansion of oceans (Physical & Chemical Envt)

Tillage (Physical & Chemical Envt)

Third law of thermodynamics (Physical & Chemical Envt)

Top-down control (General Ecology)



Tragedy of the commons (Environmental Policy and Economics& Environmental  
Philosophy and Ethics)

Trophic structure (General Ecology)

Type I errors (Statistics)

Type II errors (Statistics)

## **U**

Uneven development (Sociology)

Urbanization (Sociology)

U.S. Hegemony (Sociology)

## **V**

Vanishing cultures and emerging worlds (Anthropology)

Variance (Statistics)

Variations (General Ecology)

Voluntary regulation (Environmental Policy and Economics)

## **W**

World Bank (Environmental Policy and Economics, Globalization + Sociology)

World Trade Organization (Environmental Policy and Economics + Sociology)

## CULTURAL ANTHROPOLOGY

*Terms every ENVS student should be familiar with - links provide more complete information and figures illustrating key features.*

TERMS	DEFINITIONS	LINKS
Cultural diversity	Cultural diversity refers to the differences in language, social structures, belief systems, art, law, morals and customs that exist in a group, organization or region. The study of cultural diversity is one of the hallmarks of social and cultural anthropology.	<a href="http://www.aaanet.org/about/whatisanthropology.cfm">http://www.aaanet.org/about/whatisanthropology.cfm</a>
Cultural relativism	Cultural relativism is the idea that no one culture can define right and wrong for all other cultures, therefore behaviors and beliefs must be judged based on each culture's standards, not one's own criteria. The concept was introduced in 1887 by Franz Boas in response to Western ethnocentrism, and transformed anthropological theory and methods. Critics warn that cultural relativism leads to excusing behaviors and practices that should be condemned regardless of culture.	<a href="http://www.wisegeek.com/what-is-cultural-relativism.htm">http://www.wisegeek.com/what-is-cultural-relativism.htm</a>
Vanishing cultures and emerging worlds	Anthropologists have long been concerned with 'vanishing' worlds and cultures. They warn that unique indigenous cultures and languages are disappearing at the hand of dominant industrialized cultures, and more rapidly so in recent decades as a result of	

	<p>globalization and integration into the free-market economy. Recently however, the nostalgic concept of vanishing cultures has been challenged by anthropologists that have pointed out the new hybrid societies and cultures that are also appearing all the time due to the interconnectedness of flows of trade, information, and people.</p>	
Primitive and pre-modern	<p>The terms 'primitive' and 'pre-modern' have often been used to describe societies or persons belonging to a simpler, non-industrial, tribal way of life characterized by low levels of economic complexity, simple technologies, strong kinship ties, and a lack of literacy and political centralization. However, these terms have been criticized for implying that non-industrial societies are stuck at an earlier stage of human evolution, rather than recognizing that some groups have chosen a different way of life away from market capitalism and economic globalization. As a result, many scholars have now abandoned the use of the terms 'primitive' and 'pre-modern.'</p>	
Ethnography	<p>Ethnography is the principal qualitative data-gathering method used in cultural and social anthropology. It is also employed in several other disciplines in the social sciences. While doing an ethnography, the researcher studies a group's culture by spending long periods</p>	<p><a href="http://www.barbaraperryassociates.com/pub_ethnowhitepaper.htm">http://www.barbaraperryassociates.com/pub_ethnowhitepaper.htm</a>  <a href="https://www.youtube.com/watch?v=PTyBowGKb0Q">https://www.youtube.com/watch?v=PTyBowGKb0Q</a></p>

	<p>of time living within that culture. Multiple methods can be used as part of an ethnography including participant observation, interviews, focus groups, and analysis of texts and audio-visual records. The intent of an ethnography is to provide an in-depth description of people's values, customs, beliefs and behaviors from the point of view of an insider and in the context in which they occur.</p>	
Discourse and narratives	<p>People have a tendency to simplify complex experiences by creating narratives. A narrative is a story that helps people make sense of phenomena and events by putting them in a sequence and giving them a meaning. Discourse refers to the ways in which narratives and other forms of representations are used together and by a multitude of actors to produce cultural meanings and social realities. In other words, a discourse is a way of discussing and framing a subject that contains particular ideological beliefs shared by groups of people or by a particular culture. For example, climate change skepticism is a type of discourse, which cautions of flaws and corruption in the scientific process, and argues that climate regulations are a strategic way for liberals and the government to interfere in the market. It is not possible to avoid discourse, and discourse is</p>	<p><a href="http://wiki.answers.com/Q/What_is_'dominant_discourse'">http://wiki.answers.com/Q/What is 'dominant discourse'</a>  <a href="http://www.wisegeek.com/what-is-social-discourse.htm">http://www.wisegeek.com/what-is-social-discourse.htm</a></p>

	<p>closely linked to power and politics since the discourse, which gains the most authority, gets to define what is considered true and desirable. The study of narrative and discourse is used in a variety of disciplines in the social sciences to understand how knowledge is produced and communicated, and reveal how structures of power influence dominant discourses.</p>	
--	--	--

ENVIRONMENTAL POLICY AND ECONOMICS			
<i>Terms every ENVS student should be familiar with - links provide more complete information and figures illustrating key features.</i>			
SUBJECT	TERMS	DEFINITIONS	LINKS
<b>Policy</b>	Command and control	Command and control policies require uniform emissions standards across sources, and mandate the adoption of particular technologies to meet these standards. U.S. environmental laws from the 60s and 70s, such as the Clean Air and Clean Water Act, largely used the command and control approach to curtail environmental pollution. Command and control regulations have been criticized for ignoring cost-effectiveness and weakening business confidence.	<a href="http://www.enviroliteracy.org/article.php/1329.html">http://www.enviroliteracy.org/article.php/1329.html</a>
	Voluntary regulation	Voluntary regulation is non-binding and allows considerable flexibility for industry and businesses to regulate their own behavior and reduce environmental externalities. Voluntary regulation instruments include eco-labels, eco-audits, voluntary agreements and declarations of intent.	
	Market-based regulation	Market-based regulations use markets, price, and other economic variables to make polluters reduce or eliminate negative environmental externalities. Market-based instruments include taxes, subsidies, cap-and-trade, creating property rights, and facilitating the establishment of a market for environmental services. Instead of mandating the adoption of specific technologies, market-based regulations allow companies the choice on how to meet specific standards.	<a href="http://en.wikipedia.org/wiki/Market-based_environmental_policy_instruments">http://en.wikipedia.org/wiki/Market-based_environmental_policy_instruments</a>
	Cap-and-trade	Cap-and-trade is a market-based policy tool for regulating emissions. First, an overall cap is set on the maximum amount of emissions for a given period. Secondly, sources of emissions receive permits to emit based on their historic emission rate, with the total number of permits limited by the set cap. Permits can then be bought and sold, so that sources emitting less than their allotted amount can sell their emission permits to others. Cap-and-trade allows companies flexibility on how to comply with emission standards.	<a href="http://www.epa.gov/captrade/index.html">http://www.epa.gov/captrade/index.html</a>
<b>U.S. Government</b>	Executive Branch	The U.S. federal government is divided into three branches : the executive branch, the legislative branch, and the judicial branch. The executive branch is headed by the President, who carries out federal laws and recommends new ones, appoints the heads of federal agencies, directs national defense and foreign policy, and performs ceremonial duties. Each branch of government is balanced by powers in the other two branches.	Further readings: <a href="http://www.whitehouse.gov/our-government/executive-branch">http://www.whitehouse.gov/our-government/executive-branch</a>

	Legislative Branch	The U.S. federal government is divided into three branches : the executive branch, the legislative branch, and the judicial branch. The legislative branch consists of Congress, which includes the House of Representatives and the Senate. The main tasks and powers of Congress are to make the laws, declare war, confirm or reject Presidential appointments, and impeach officials. Each branch of government is balanced by powers in the other two branches.	Further readings: <a href="http://www.whitehouse.gov/our-government/legislative-branch">http://www.whitehouse.gov/our-government/legislative-branch</a>
	Judicial branch	The U.S. federal government is divided into three branches : the executive branch, the legislative branch, and the judicial branch. The judicial branch is headed by the Supreme Court, which is the highest court in the land. Its powers include interpreting the Constitution, determining the constitutionality of new laws, and deciding cases involving states' rights. Inferior courts are constrained by the decisions of the Supreme Court . Each branch of government is balanced by powers in the other two branches.	Further readings: <a href="http://www.whitehouse.gov/our-government/judicial-branch">http://www.whitehouse.gov/our-government/judicial-branch</a>
<b>Environmental Law</b>	Legislative process (federal)	The first step in the legislative process is the introduction of a bill to Congress by a member in the House of Representatives. Sometimes bills can be introduced at the request of the President. The bill is then assigned to a committee for study, and if the bill passes by simple majority (218 of 435) in the House of Representatives, the bill moves to the Senate. In the Senate, the bill is assigned to another committee for study and, if the bill passes by a simple majority (51 of 100) in the Senate, the bill passes to the President for final approval. The President has 10 days to sign or veto the enrolled bill. Federal environmental laws passed by Congress, such as the Clean Air and Clean Water Act, provide the authority for the Environmental Protection Agency to write regulations to implement them.	<a href="http://www.house.gov/content/learn/legislative_processes/">http://www.house.gov/content/learn/legislative_processes/</a>
	How do courts and litigation influence environmental policy? <b>Common Law and Environmental Policy</b>	Comparisons with other countries suggest that the U.S. method of policy implementation is distinctive for being more adversarial and legalistic, what Robert Kagan has labelled 'adversarial legalism.' In other words, people and groups in the U.S. more often rely on legal threats and lawsuits to demand policy action such as the regulation of hazardous materials. This particular style of policy reflects the U.S. political tradition of mistrusting big government and regulatory capture. Environmental regulations are a prime example of adversarial legalism in the U.S.: both environmental groups and industry have used litigation to challenge and influence a majority of the Environmental Protection Agency's major decisions.	<a href="http://www.law360.com/environmental">http://www.law360.com/environmental</a>

	Clean Air Act	The Clean Air Act (CAA) was passed by Congress in 1963, and then expanded in 1970 and 1990, to ensure basic health and environmental protection from air pollution in the U.S.. The Environmental Protection Agency (EPA) has the role of carrying out the law by setting limits on emissions of air pollutants coming from sources like power plants, factories and cars. Under the CAA, the EPA has set air quality standards for six common pollutants: particulate matter, ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, and lead. The CAA also contains provisions designed to minimize hazardous or toxic air pollutants, acid rain, ozone layer depletion, and regional haze. States or tribes may have stronger air pollution laws, but they may not have weaker pollution limits than those set by EPA under the CAA.	<a href="http://www.epa.gov/air/caa/requirements.html">http://www.epa.gov/air/caa/requirements.html</a>
	Clean Water Act	The Clean Water Act (CWA) was passed by Congress in 1972 to regulate water pollution from discharges, and ensure that U.S. surface waters meet quality standards necessary for human use. Under the CWA, the Environmental Protection Agency has implemented wastewater standards for industry, water quality standards for all contaminants in surface waters, and it has made it unlawful to discharge any pollutant from a point source into surface waters without a prior permit. Water pollution from non-point sources such as individual homes and agricultural runoff are not regulated under CWA.	<a href="http://www2.epa.gov/laws-regulations/summary-clean-water-act">http://www2.epa.gov/laws-regulations/summary-clean-water-act</a>
	Endangered Species Act	The Endangered Species Act (ESA) was passed by Congress in 1973 to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. Under the ESA, species can be listed as 'endangered' or 'threatened,' at which point it becomes unlawful for anyone to harass, harm or kill an individual of that species, federal agencies are required to use their authorities to conserve the species, and they are prohibited from authorizing, funding or carrying out any action that would jeopardize the species or degrade its habitat.	<a href="http://www.fws.gov/endangered/laws-policies/">http://www.fws.gov/endangered/laws-policies/</a>
	National Environmental Policy Act	The National Environmental Policy Act (NEPA) was passed in 1970 and requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions. Specifically, all federal agencies are required to prepare detailed reports assessing the environmental impacts of and alternatives to major federal actions that significantly affect the environment. These reports are commonly known as environmental impact statements.	<a href="http://www.epa.gov/compliance/basics/nepa.html">http://www.epa.gov/compliance/basics/nepa.html</a>



	Hetch Hetchy dam controversy	The O'Shaughnessy dam in the Hetch Hetchy Valley of California became a prominent environmental controversy in the U.S. during 1908-1913. In the aftermath of the 1906 earthquake, the city of San Francisco sought permission to build a dam on the Tuolumne River in the Hetch Hetchy Valley in Yosemite National Park. One of the strongest supporters of the Hetch Hetchy project was Gifford Pinchot, Chief Forester of the U.S. Forest Service, who advocated conservation through use. For the first time in U.S. history, a significant grassroots national environmental movement arose to oppose the project, led by John Muir and the Sierra Club. Ultimately, San Francisco was granted permission to build the dam in 1913, but controversy over the dam continues today. Additionally, John Muir's campaign awakened a national conservation movement in defense of national parks.	<a href="http://www.sierraclub.org/ca/hetchhetchy/history.asp">http://www.sierraclub.org/ca/hetchhetchy/history.asp</a>
<b>Basic Macro Economics</b>	Keynesian school	Keynesian economics were developed by the British economist John Maynard Keynes during the 1930s in an attempt to understand the Great Depression. Keynes advocated increased government expenditures and lower taxes to stimulate demand. Keynesian economics conflict with the Austrian school of economic thought led by Friedrich Hayek, and later the Chicago school. Keynesian economics served as the standard economic model in the developed nations during the later part of the Great Depression, World War II, and post-war till the 70s.	<a href="http://www.investopedia.com/video/play/keynesian-economics/">http://www.investopedia.com/video/play/keynesian-economics/</a>
	Chicago school	The Chicago school is a school of economic thought that originated in the Department of Economics at the University of Chicago in the 1970s. The main tenets of the school are that free markets best allocate resources in an economy (liberalism), and that minimal government intervention is best. One of the leaders of the Chicago school is Nobel laureate Milton Friedman, who challenged Keynesian economics, the prevailing school at the time. The tenets of the Chicago school have become the mainstream of economics worldwide since the 1990s. Friedrich Hayek, an Austrian economist and Nobel prize winner who taught at Chicago, had similar ideas but was not part of the "school."	<a href="http://hoohila.stanford.edu/friedman/chicago-SoE.php">http://hoohila.stanford.edu/friedman/chicago-SoE.php</a>
	Supply and demand	Supply and demand is a fundamental concepts in economics: It is used for understanding fluctuations in prices and the allocation of resources in a market economy. The basic principles of the supply and demand model are that 1) people buy more at lower prices and less at higher prices, and 2) sellers want to sell more at higher prices and less at lower prices. When supply and demand are equal, the market is said to be at equilibrium. At this point, the allocation of goods is the most efficient because the amount of goods supplied equals the amount of goods demanded.	Further readings: <a href="http://www.env-econ.net/supply_demand.html">http://www.env-econ.net/supply_demand.html</a>

	Market equilibrium	In a market economy, when supply and demand are equal, the market is said to be at equilibrium. At this point, the allocation of goods is the most efficient because the amount of goods supplied equals the amount of goods demanded. This is the optimal economic condition, where both consumers and producers are satisfied. Market disequilibrium occurs when demand increases, demand decreases, supply increases or supply decreases.	Further readings: <a href="http://www.economicsonline.co.uk/Competitive_markets/Market_equilibrium.html">http://www.economicsonline.co.uk/Competitive_markets/Market_equilibrium.html</a>
<b>Markets</b>	Externalities	Externalities are the costs of a transaction that are not borne by the buyer or seller. These costs are imposed on others who are external to the producer and consumer of the polluting product. As a consequence of negative externalities, private costs of production tend to be lower than its "social" costs. Externalities are considered to be examples of market failures. The pollution of clean water and air by industries is a common negative externality.	Further readings: <a href="http://are.berkeley.edu/courses/EEP101/spring03/AIIT/hatSmog/extern.html">http://are.berkeley.edu/courses/EEP101/spring03/AIIT/hatSmog/extern.html</a>
	Subsidies	Subsidies are government policies that benefit particular sectors of the economy. They are a type of market intervention and can take the form of tax-credits, low-interest loans or grants. Environmental externalities such as pollution or habitat damage also constitute a form of subsidies to polluting industries. Environmentalists have argued that removing subsidies in industries such as timber, energy and agriculture is a crucial step toward promoting environmental sustainability.	Further readings: <a href="http://www.eoearth.org/view/article/156301/">http://www.eoearth.org/view/article/156301/</a>
	Cost-benefit analysis	Cost-benefit analysis provides a framework for quantifying, and comparing the costs and benefits of a proposed regulation, to determine if it is cost-effective and compare it to other alternative policies.	Further readings: <a href="http://www.tutor2u.net/economics/revision-notes/a2-micro-cost-benefit-analysis.html">http://www.tutor2u.net/economics/revision-notes/a2-micro-cost-benefit-analysis.html</a>
	Market valuation vs. non-market valuation	Valuation, the process of placing monetary values on environmental impacts, is an essential element in the cost-benefit analysis of environmental effects and policies. The value of some environmental goods and services can be found by examining current market prices for natural resources, others are difficult to quantify because there are no conventional markets on which they can be traded, therefore how much people would be willing to pay for them is not revealed in market prices. For these latter, non-market valuation techniques such as use value, contingent valuation, and travel cost can be used.	<a href="http://www.oceaneconomics.org/nonmarket/NMFAQs.asp">http://www.oceaneconomics.org/nonmarket/NMFAQs.asp</a>
	Discounting	To do a cost-benefit analysis across different time scales, discounting is needed to weigh future benefits against current benefits and costs. Environmental regulation often involves costs now and benefits later. As a result, the manner in which the benefits and costs are discounted is a contentious issue in the economic analysis of an environmental policy, since high discount rates are less favorable for environmental regulations.	Further readings: <a href="http://www.rff.org/Publications/WPC/Pages/Ethics-and-Discounting-Global-Warming-Damages.aspx">http://www.rff.org/Publications/WPC/Pages/Ethics-and-Discounting-Global-Warming-Damages.aspx</a>

<b>Common Pool Resources</b>	Tragedy of the commons	Popularized by Garret Hardin in the 1960s the 'tragedy of the commons' occurs when people weigh private benefits against private costs, as opposed to private benefits against social costs, and therefore overexploit common resources when given open access to them. Hardin uses the example of herders foraging on common open-access land, where each is compelled to increase their herd without limit, causing the ultimate exhaustion of grazing land for all. This concept is often used to explain environmental issues such as the depletion of fisheries, air pollution, and climate change, and promote the privatization and/or regulation of natural resources. Additionally, the concept of 'tragedy of the commons' is used to warn against an ethic of individualism in the context of increasingly large populations using finite natural resources.	<a href="http://www.dummies.com/how-to/content/ten-reallife-examples-of-the-tragedy-of-the-common.html">http://www.dummies.com/how-to/content/ten-reallife-examples-of-the-tragedy-of-the-common.html</a> Further info: <a href="http://sustainabilityethics.com/tag/common-pool-resource/">http://sustainabilityethics.com/tag/common-pool-resource/</a>
	Open-access resources	Open-access resources are similar to common pool resources in that the consumption of the resources by one person diminishes the amount that another person can consume. Unlike many common pool resources, it is impossible to control the access to open-access resources: They can be accessed by anyone at any time without restraint. Resources such as the air and oceans are example of open-access resources.	Further info: <a href="http://sustainabilityethics.com/tag/common-pool-resource/">http://sustainabilityethics.com/tag/common-pool-resource/</a>
	Common pool resources	Resources whose size or characteristics makes it costly, but not impossible, to exclude potential users. The consumption of common pool resources by one person diminishes the amount that another person can consume. As a result they may be subject to the 'tragedy of the commons.' Common-pool resources may be owned by national, regional or local governments as public goods, by communal groups in common property regimes, or by private individuals or corporations as private goods, and governed by rules that restrict access to the resources. When they are owned by no one and access is unrestricted, they are called 'open-access' resources.	Further info: <a href="http://sustainabilityethics.com/tag/common-pool-resource/">http://sustainabilityethics.com/tag/common-pool-resource/</a>
	Privatization	Privatization of common pool resources implies creating property rights that confer private ownership and control of common resources, and hence make possible the exclusion of access to others. Privatization is one of the preferred neoclassical economic solutions to the 'tragedy of the commons'. Others, such as Elinor Ostrom, have pointed out that, through history, several groups have successfully managed common pool resources for generations without privatization or formal regulations.	Further info: <a href="http://sustainabilityethics.com/tag/common-pool-resource/">http://sustainabilityethics.com/tag/common-pool-resource/</a>

<b>Globalization</b>	Globalization	Globalization is a process of interaction and integration among the people, companies, and governments of different nations. It involves the stretching of social, political and economic activities, as well as the reorganization of social relations, networks of activities, and power hierarchies across frontiers, regions and continents. Globalization is not new, but technological developments and policies promoting free-market economics of the past few decades have intensified and sped up the interconnectedness of flows of trade, information, investment, migration, culture, etc. Globalization is controversial, however. Proponents of globalization argue that it allows poor countries and their citizens to develop economically, while opponents claim that it benefits multinational corporations in the Western world at the expense of local enterprises, cultures, and people.	<a href="http://www.globalization101.org/what-is-globalization">http://www.globalization101.org/what-is-globalization</a>
	World Bank	The World Bank is an international financial institution, headquartered in Washington, D.C., that provides loans and technical assistance to developing countries to promote their economic development. It was created in 1944 at the Bretton Woods Conference, along with the International Monetary Fund, to assist in the reconstruction of the world's global monetary system after World War II. The World Bank's official goals are the reduction of poverty and the promotion of shared prosperity. The World Bank and its programs have come under severe criticisms by the anti-globalization and environmental movements.	<a href="http://www.brettonwoodsproject.org/item.shtml?x=320869">http://www.brettonwoodsproject.org/item.shtml?x=320869</a> < <a href="http://www.worldbank.org/en/about/what-we-do">http://www.worldbank.org/en/about/what-we-do</a> > < <a href="http://www.globalization101.org/why-is-the-world-bank-controversial">http://www.globalization101.org/why-is-the-world-bank-controversial</a> >
	International Monetary Fund	The IMF is an international organization headquartered in Washington, D.C. that was initiated in 1944 at the Bretton Woods Conference, at the same time as the World Bank, to assist in the reconstruction of the world's global monetary system after World War II. The IMF lends to countries in difficulty, and provides technical assistance and training to help countries transition to market-driven economies and integrate into the global economy. IMF loans are conditional on the adoption of specific neoliberal policies, as in the case of structural adjustments programs implemented in many developing countries in the 80s and 90s. The IMF has played an important role in shaping the global economy since the end of World War II, and has come under severe criticisms by the anti-globalization movement and others.	<a href="http://lexicon.ft.com/term?term=imf">http://lexicon.ft.com/term?term=imf</a> < <a href="http://www.imf.org/external/about.htm">http://www.imf.org/external/about.htm</a> > < <a href="http://www.brettonwoodsproject.org/item.shtml?x=320869">http://www.brettonwoodsproject.org/item.shtml?x=320869</a> >
	World Trade Organization	Founded in 1995, the World Trade Organization (WTO) is an international organization dealing with the global rules of trade between nations. Its main function is to ensure that trade flows as smoothly and freely as possible, and that the rules of international trade are correctly applied and enforced. The WTO is heavily criticized by opponents of free trade and globalization.	<a href="http://news.bbc.co.uk/2/hi/europe/country_profiles/2429503.stm">http://news.bbc.co.uk/2/hi/europe/country_profiles/2429503.stm</a> < <a href="http://www.wto.org/english/thewto_e/whatis_e/whatis_e.htm">http://www.wto.org/english/thewto_e/whatis_e/whatis_e.htm</a> >

	Governance	Governance refers to the act of governing. Environmental governance, for example, refers to the manner of governing access and use of common natural resources. The term is also used more broadly to refer to the sum of formal and informal institutions, rules, mechanisms and processes of collective decision-making used in the process of governing resources. Governance involves multiple actors, including government and civil society, and happens across several scales from local to global.	
	Government	The governing body of a state or community that exercises authority over the rules, regulations, and interactions of the people who live under them.	
	Renewable vs. non-renewable energy resources	Energy sources are of two types: nonrenewable and renewable. Energy sources are considered non-renewable if they cannot be replenished in a short period of time. Oil, natural gas, coal and uranium for nuclear energy are examples of non-renewable energy sources. Renewable energy sources like biomass, hydropower, geothermal, wind, and solar are naturally replenished over a short time scale.	<a href="http://www.eia.gov/kids/energy.cfm?page=2">http://www.eia.gov/kids/energy.cfm?page=2</a>
	Maximum sustained yields	Maximum Sustained Yields (MSY) is the largest yield/catch that can be taken from a species' stock over an indefinite period. MSY is used extensively by fisheries managers to determine the maximum sustainable catch for a particular species. At the MSY, the fishers are in theory catching just the growth in the fish stock, and leaving the breeding stock at its optimal size. However, management regimes based on single-species MSY are widely criticized for ignoring species' life histories, reproductive status, issues of bycatch, and species interactions.	<a href="http://www.pewenvironment.org/news-room/fact-sheets/fishing-to-the-limits-the-trouble-with-maximum-sustainable-yield-and-the-need-for-target-and-limit-reference-points-85899452066">http://www.pewenvironment.org/news-room/fact-sheets/fishing-to-the-limits-the-trouble-with-maximum-sustainable-yield-and-the-need-for-target-and-limit-reference-points-85899452066</a>
	Malthusian theory	In 1798, Thomas Malthus in his book <i>Essay on the Principle of Population</i> warned that human population growth would eventually outstrip global food supply, sparking debates over the earth's global carrying capacity. Malthus argued that the linear growth of food supply could not possibly support the exponential growth of human population, thereby human population would either be controlled voluntarily or would crash by wars, starvation, or diseases. Malthus' theory has been widely influential in economics, environmental studies and other discipline concerned with human population growth.	<a href="https://www.khanacademy.org/science/cosmology-and-astronomy/life-earth-universe/humanity-on-earth-tutorial/v/thomas-malthus-and-population-growth">https://www.khanacademy.org/science/cosmology-and-astronomy/life-earth-universe/humanity-on-earth-tutorial/v/thomas-malthus-and-population-growth</a> <a href="http://www.ic.ucsc.edu/~wxcheng/envs23/lecture19/Malthus.pdf">http://www.ic.ucsc.edu/~wxcheng/envs23/lecture19/Malthus.pdf</a>
	Neo-malthusians	Neo-malthusian theorists share Thomas Malthus' concern that human population is exceeding the earth's carrying capacity, and promote population control methods such as planned parenthood as a solution for avoiding a Malthusian catastrophe. Paul Ehrlich, author of <i>Population Bomb</i> , is a prominent neo-malthusian.	

	Ecological footprint	Ecological footprint refers to the amount of land and ocean area required to sustain one's consumption patterns and absorb one's waste.	<a href="http://www.treehugger.com/culture/your-ecological-footprint-defining-calculating-and-reducing-your-environmental-footprint.html">http://www.treehugger.com/culture/your-ecological-footprint-defining-calculating-and-reducing-your-environmental-footprint.html</a> < <a href="http://www.epa.vic.gov.au/ecologicalfootprint/about/whatdoesitmean.asp">http://www.epa.vic.gov.au/ecologicalfootprint/about/whatdoesitmean.asp</a> >
	Free trade	The trade of goods and services between one or more countries free of government interference in the form of tariffs, subsidies, quotas, or other restrictions. In theory, under free trade each country can focus on producing the goods and services where it has comparative advantage, and the price and quantity of imports and exports is determined solely by supply and demand. Free trade is the opposite of protectionism, and one of the defining characteristic of neoliberal capitalism. Critics of free trade argue that it leads to increased environmental degradation in trading countries, and the loss of livelihood for small farmers and businesses in poorer countries.	<a href="http://www.auburn.edu/~johnspm/gloss/free_trade">http://www.auburn.edu/~johnspm/gloss/free_trade</a>
	Precautionary principle	The precautionary principle is a guiding standard for policy-makers stating that knowledge gaps and scientific uncertainty should not be used as reasons for postponing the regulation of potentially harmful substances and technologies. The precautionary principle emerged out of critiques of standard risk assessment methods, and the realization that regulators often have to make policy decisions without full scientific certainty. It attempts to shift the burden of proof onto the actors causing the hazard and promotes a 'better safe than sorry' approach. It also puts a greater emphasis on prevention and alternatives assessment, and calls for increased public participation in risk decision-making. The precautionary principle is also used to promote the conservation of biodiversity and the sustainable management of natural resources.	<a href="http://www.silentspring.org/faqs/precautionary-principle">http://www.silentspring.org/faqs/precautionary-principle</a> further readings: <a href="http://www.sehn.org/pollan.html">http://www.sehn.org/pollan.html</a>
	Corporate sustainability	Corporate sustainability refers to the implementation by businesses of strategies, operations and a work culture that promote sustainability at the level of the corporation. Corporate sustainability is concerned with the economic, social and environmental impacts of a company, also known as a company's Triple Bottom Line.	<a href="http://www.bl3strategies.com/Sustainability/corporate.htm">http://www.bl3strategies.com/Sustainability/corporate.htm</a>

	Political ecology	<p>Political ecology is the interdisciplinary investigation of the role of the broader political economy in shaping the control, management, use and often degradation of natural resources. Political ecologists seek to shed light on chains of explanations for human-environment phenomena that span multiple temporal and spatial scales. Central topics in political ecology include environmental degradation, risk and vulnerability, scarcity, the production of nature, the critique of conservation efforts, the politics of environmental science, capitalism and the commodification of natural resources, the use of market mechanisms to preserve ecosystems and their functioning, the devolution of responsibilities from the state, to private actors and communities, the emergence of movements of resistance, and development.</p>	<a href="http://en.wikipedia.org/wiki/Political_ecology">http://en.wikipedia.org/wiki/Political_ecology</a>
	Kuznets curve	<p>The environmental Kuznets curve holds that, while many environmental problems get worse as a country first industrializes, over the long term, economic development and growth lead to stronger environmental regulations and less environmental degradation. The theory has proven true for some air and water pollutants, but many environmental indicators such as biodiversity, energy consumption and greenhouse gases emissions do not seem to follow the Kuznets curve. Other critics have pointed out that the Kuznets curve does not hold at a global scale, since wealthy nations tend to outsource their most polluting economic activities to poorer countries.</p>	<a href="http://tierneylab.blogs.nytimes.com/2009/04/20/the-richer-is-greener-curve/">http://tierneylab.blogs.nytimes.com/2009/04/20/the-richer-is-greener-curve/</a>

GENERAL ECOLOGY			
Terms every ENVs student should be familiar with - links provide more complete information and figures illustrating key features			
SUBJECT	TERMS	DEFINITIONS	LINKS
Evolution	Natural selection	The process of natural selection is central to the theory of evolution. The premise is that more individuals are produced that can survive, therefore we see a struggle for existence between individuals of the same species, between different species and with the physical conditions of life. Natural selection is the process by which traits are accumulated ('selected') from one generation to the other that are favorable in the struggle for existence, in a process also commonly referred to as the 'survival of the fittest.' Natural selection is the product of two conditions 1) variation among individuals within a population in some characteristics that 2) results in differences among individuals fitness. The fitness of an individual is measured by the proportionate contribution it makes to future generations (survival and reproduction) . Natural selection results in the adaptation of an organism to its environment	<a href="http://evolution.berkeley.edu/evolibrary/article/0_0_0/evo_25">http://evolution.berkeley.edu/evolibrary/article/0_0_0/evo_25</a>
	Adaptation	Any heritable behavioral, morphological, or physiological trait that maintains or increases the fitness of an organism under a given set of environmental conditions. An adaptation is a feature produced by natural selection for its current function.	<a href="http://evolution.berkeley.edu/evosite/evo101/IIIIE5Adaptation.shtml">http://evolution.berkeley.edu/evosite/evo101/IIIIE5Adaptation.shtml</a> <a href="http://www.youtube.com/watch?v=HxVD4i7N5w8&amp;list=SP9262CF2DC192E090">http://www.youtube.com/watch?v=HxVD4i7N5w8&amp;list=SP9262CF2DC192E090</a>
	Speciation	Speciation is a lineage-splitting process that produces two or more separate species. New species arise by the interaction of heritable variations, by natural selection, and by barriers to gene flow between populations. The most widely accepted mechanism of speciation is allopatric/geographic speciation: A single interbreeding population splits into spatially isolated populations due to a physical barrier, which then diverge into distinct species.	<a href="http://evolution.berkeley.edu/evosite/evo101/VBDefiningSpeciation.shtml">http://evolution.berkeley.edu/evosite/evo101/VBDefiningSpeciation.shtml</a> <a href="http://evolution.berkeley.edu/evosite/evo101/VCCausesSpeciation.shtml">http://evolution.berkeley.edu/evosite/evo101/VCCausesSpeciation.shtml</a>
	Convergent evolution	The process whereby organisms not closely related, independently evolve similar traits as a result of having to adapt to similar environments.	<a href="http://www.zo.utexas.edu/courses/THOC/Convergence.html">http://www.zo.utexas.edu/courses/THOC/Convergence.html</a> <a href="http://www.biology-online.org/dictionary/Convergent_evolution">http://www.biology-online.org/dictionary/Convergent_evolution</a>



Variations	Any difference between cells, individual organisms, or groups of organisms of any species caused either by genetic differences (genotypic variation) or by the effect of environmental factors on the expression of the genetic potentials (phenotypic variation). Variation may be shown in physical appearance, metabolism, fertility, mode of reproduction, behaviour, learning and mental ability, and other obvious or measurable characters. Variation is the essential ingredient of natural selection: If variations are in any degree profitable to the individual of a species in their complex relationships to other species and to their physical conditions of life, they will lead to the preservation of such individuals and will generally be inherited by their offspring. Major sources of variation are mutation and genetic recombination in sexual reproduction. Variations serves as a tool for populations to adapt to changing environments.	<a href="http://evolution.berkeley.edu/evosite/evo101/II/ICGeneticvariation.shtml">http://evolution.berkeley.edu/evosite/evo101/II/ICGeneticvariation.shtml</a>
Mutations	Mutations are inheritable changes in a gene or a chromosome resulting in the creation of a new character or trait not found in the parental type but that can be passed on to the next generation. Mutations are random: they can be beneficial, neutral, or harmful for the organism. Mutations are essential to evolution because they cause genetic variation.	<a href="http://evolution.berkeley.edu/evolibrary/article/mutations_01">http://evolution.berkeley.edu/evolibrary/article/mutations_01</a>
Gene flow	Movement of genes between populations caused by migration and subsequent mating. This process is also known as gene migration and can be an important source of genetic variation.	<a href="http://evolution.berkeley.edu/evosite/evo101/II/IC4Geneflow.shtml">http://evolution.berkeley.edu/evosite/evo101/II/IC4Geneflow.shtml</a>
Genetic drift	Genetic drift refers to the random changes in gene frequencies in a population over time due to random sampling effects in the formation of successive generations. Genetic drift affects the genetic makeup of the population but, unlike natural selection, through an entirely random process. So although genetic drift is a source of variation and a mechanism of evolution, it doesn't work to produce adaptations.	<a href="http://evolution.berkeley.edu/evosite/evo101/II/IDGeneticdrift.shtml">http://evolution.berkeley.edu/evosite/evo101/II/IDGeneticdrift.shtml</a>
Genetic bottleneck	Population bottlenecks occur when a population's size is reduced for at least one generation due to environmental events or human activities. The remaining population has reduced levels of genetic diversity, because many gene variants that were present in the original population are lost. Even if the population numbers increase again, the ability of that population to adapt to changes in its environment is reduced due to the loss of genetic variation.	<a href="http://evolution.berkeley.edu/evosite/evo101/II/ID3Bottlenecks.shtml">http://evolution.berkeley.edu/evosite/evo101/II/ID3Bottlenecks.shtml</a>

<b>Ecosystem Energetics</b>	Photosynthesis	<p>The biological process of synthesis of organic materials from carbon dioxide and water utilizing sunlight as the energy source and with the aid of chlorophyll and other associated biological structures. Photosynthesis is one of the ways in which carbon leaves the atmosphere and enters the terrestrial and oceanic biospheres. Photosynthesis also generates the oxygen that animals need to survive.</p> $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{sunlight} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ <p>(carbon dioxide + water + light energy → glucose + oxygen)</p>	<a href="http://www.cliffsnotes.com/sciences/biology/biology/photosynthesis/photosynthesis-defined">http://www.cliffsnotes.com/sciences/biology/biology/photosynthesis/photosynthesis-defined</a> <a href="https://www.khanacademy.org/science/biology/photosynthesis/v/photosynthesis">https://www.khanacademy.org/science/biology/photosynthesis/v/photosynthesis</a>
	Food chains and webs	<p>Within any given ecosystem, organisms feed on one another passing energy from organism to organism. A food chain consists of a series of relationships between organisms through which food energy is passed. For the most part, energy in a food chain flows from producers to consumers to decomposers. Each component of the food chain depends on another component of the food chain. Each level of consumption in a food chain is called a trophic level. Animals typically consume a varied diet and, in turn, serve as food for a variety of other creatures that prey on them. Because of this, simple food chains are often interconnected to form more complex food webs.</p>	<a href="http://www.ecologyedu.com/education_resources/what_is_a_food_chain_what_is_a_food_web.html">http://www.ecologyedu.com/education_resources/what_is_a_food_chain_what_is_a_food_web.html</a>
	Trophic structure	<p>All organisms in an ecosystem can be placed in trophic levels depending on what energy source they rely upon and how they provide energy for other organisms in the food web. The lowest trophic level contains primary producers, followed by herbivores, which consume primary producers. Carnivores are secondary, tertiary, and quaternary consumers. Decomposers feed on all trophic levels. Energy, in the form of heat, is lost at each trophic level.</p>	<a href="http://www.coralscience.org/main/articles/climate-a-ecology-16/coral-reef-ecology">http://www.coralscience.org/main/articles/climate-a-ecology-16/coral-reef-ecology</a> <a href="http://www.youtube.com/watch?v=mCHdhXM FhcU">http://www.youtube.com/watch?v=mCHdhXM FhcU</a>

	Producers	<p>Energy from the sun flows through an ecosystem and gets passed around through the food chain, when one organism eats another organism. When it comes to the flow of energy in ecosystems there are two types of organisms: producers and consumers. Plants are the most common example of producers: They are able to convert carbon dioxide into oxygen and glucose, a common sugar consumed by most organisms, through photosynthesis. In other words, producers are capable of producing their own food and biomass from inorganic compounds. Algae and phytoplankton are other examples of ecosystem producers. Almost all life on earth is directly or indirectly reliant on primary production. Primary production is also often used in ecology and agroecology for understanding the health of an ecosystem and the impact of various ecosystem changes.</p>	<a href="http://www.globalchange.umich.edu/globalchange1/current/lectures/klings/energyflow/energyflow.html">http://www.globalchange.umich.edu/globalchange1/current/lectures/klings/energyflow/energyflow.html</a> <a href="http://sciencebitz.com/?page_id=1202">http://sciencebitz.com/?page_id=1202</a>
	Consumers	<p>Energy from the sun flows through an ecosystem and gets passed around through the food chain, when one organism eats another organism. When it comes to the flow of energy in ecosystems there are two types of organisms: producers and consumers. Consumers can only obtain their energy by feeding on other organisms, producers. Consumers include herbivores, carnivores and decomposers.</p>	<a href="http://www.globalchange.umich.edu/globalchange1/current/lectures/klings/energyflow/energyflow.html">http://www.globalchange.umich.edu/globalchange1/current/lectures/klings/energyflow/energyflow.html</a> <a href="http://sciencebitz.com/?page_id=1202">http://sciencebitz.com/?page_id=1202</a>
	Decomposition/ Decomposers	<p>Decomposers are organisms that break down dead or decaying organisms, and in doing so carry out the natural process of decomposition. Like herbivores and predators, decomposers must feed on other organisms for energy. Some examples of decomposers are molds, mushrooms, worms and some bacteria. Decomposers are very important to an ecosystem because they break down dead organisms into simpler substances, and through this process they return nutrients that are essential for plant growth to the soil and water, hence continuing the life cycle.</p>	<a href="http://www.globalchange.umich.edu/globalchange1/current/lectures/klings/energyflow/energyflow.html">http://www.globalchange.umich.edu/globalchange1/current/lectures/klings/energyflow/energyflow.html</a> <a href="http://sciencebitz.com/?page_id=1202">http://sciencebitz.com/?page_id=1202</a>
<b>Population Ecology</b>	Density-dependent and density-independent population growth	<p>Factors limiting population growth are either density-dependent - the proportion of individuals affected increases as population density increases - or density-independent - the proportion of individuals affected is the same at any density. Density refers to the number of individuals per unit area (e.g. square mile, square kilometer, etc.). Density-dependent factors include disease, competition for resources, and predation. Density-independent factors include nutrient limitation, pollutants in the environment, and climate extremes, including fires and hurricanes.</p>	<a href="http://www.nature.com/scitable/knowledge/library/population-limiting-factors-17059572">http://www.nature.com/scitable/knowledge/library/population-limiting-factors-17059572</a>

Abundance	<p>Species abundance refers to the number of individuals of a species in a particular ecosystem. Relative species abundance refers to how common or rare a species is relative to other species in an ecosystem. Measures of abundance, which are approximated by counting the number of individuals in a sample area, are used to indicate population health and well-being. Environmental researchers also use studies on relative species abundance to help build a picture of overall biodiversity in an area.</p>	<a href="http://www.nature.com/scitable/knowledge/library/explaining-general-patterns-in-species-abundance-and-23162842">http://www.nature.com/scitable/knowledge/library/explaining-general-patterns-in-species-abundance-and-23162842</a>
Metapopulation	<p>While a population is a group of interacting individuals of the same species occupying a given area, the metapopulation is a collective of local populations living in discrete patches and interacting within the larger area through dispersal and colonization. When a species habitat is fragmented into discrete patches and all local populations have a probability of extinction, the regional persistence of such species is dependent on the existence of a metapopulation which enables the recolonization of abandoned patches. Within a metapopulation, the ability of individuals to disperse and colonize other patches is directly dependent on their distance from other adjacent patches. The existence of human-made corridors can also facilitate the movement of individuals between discrete patches.</p>	<a href="http://www.britannica.com/EBchecked/topic/377988/metapopulation">http://www.britannica.com/EBchecked/topic/377988/metapopulation</a> <a href="http://www.eoearth.org/view/article/171093/">http://www.eoearth.org/view/article/171093/</a>
Carrying capacity	<p>'Carrying capacity' refers to the theoretical maximum population density/size that an ecosystem can sustain indefinitely (the environment's maximum load). Below carrying capacity (K), populations typically increase, while above, they typically decrease curtailed by factors such as limitations in food, competition for other resources, or disease, keeping population size at equilibrium.</p>	<a href="http://www.britannica.com/EBchecked/topic/97118/carrying-capacity">http://www.britannica.com/EBchecked/topic/97118/carrying-capacity</a>
Bottom-up control	<p>Populations often have been assumed to be controlled and limited from the bottom-up, wherein nutrients and light limit primary production by plants, which in turn limit animal production. In other words, bottom-up controls arise from near the bottom of the trophic structure. On large scales, there is clear evidence of bottom-up control of ecosystem biomass and productivity, but at the local scales it is not uncommon for populations to be influenced by both bottom-up and top-down control.</p>	<a href="http://www.eoearth.org/view/article/150743/">http://www.eoearth.org/view/article/150743/</a>

	Top-down control	While bottom-up controls on ecosystem dynamics and structure have to do with resource availability, top-down controls are exerted by top predators at the top of the food chain, and cascade down the trophic structure to impact primary productivity by producers. For example in kelp forest ecosystems, sea otters are a keystone predator that prey on urchins, which in turn eat kelp. When the otters population declines, urchin populations grow and reduces the kelp forest. Understanding the role of top predators in exerting top-down controls that maintain certain ecosystem dynamics is key for examining how human activities may adversely impact ecosystems by removing important species.	<a href="http://www.eoearth.org/view/article/156656/">http://www.eoearth.org/view/article/156656/</a> > <a href="http://www.nature.com/scitable/knowledge/library/species-with-a-large-impact-on-community-13240710">http://www.nature.com/scitable/knowledge/library/species-with-a-large-impact-on-community-13240710</a> >
	Corridors	Corridors are strips of similar habitat connecting separate patches and thereby allowing movement of organisms between them. Usually corridors are of human origins, like hedgerows, lines of trees, bridges, and highways. Corridors can encourage the re-establishment of a species in a habitat patch that experienced local extinction, and hence play a role in the persistence of a metapopulation. Corridors are often used for mitigating the impacts of habitat fragmentation as a result of human activity by providing landscape connectivity.	<a href="http://sustainablecitiescollective.com/kelly-brenner/18365/corridor-ecology-and-planning">http://sustainablecitiescollective.com/kelly-brenner/18365/corridor-ecology-and-planning</a>
	Species-area relationship	The relationship between the area of a habitat and the number of species found within that area. Larger areas tend to contain larger numbers of species and therefore have higher levels of biodiversity. Ecologists have proposed several explanations for this including that large areas have a greater variety of habitats, that they are likely to receive more colonists, and that they contain a larger concentration of resources. This relationship is linked to the theory of island biogeography. Conservation biologists often use the species-area relationship to measure the possible effects of habitat loss on species diversity.	
<b>Ecological Interactions</b>	Competition (interspecific and intraspecific)	There are several classes of interactions among organisms. Competition refers to any interaction that is mutually detrimental to both participants. Interspecific competition involves individuals of two or more species sharing limited resources, while intraspecific competition refers to the members of the same species vying for the same resource in an ecosystem. When discussing competition, one of the most important, basic concepts is that of the niche. Whenever two niches overlap, competition ensues between organisms.	<a href="http://www.nature.com/scitable/knowledge/library/species-interactions-and-competition-102131429">http://www.nature.com/scitable/knowledge/library/species-interactions-and-competition-102131429</a>

	Predation	Relationship in which one living organism serves as a food source for another. Predation is more than just a transfer of energy, it is a complex interaction between predator and prey, where both regulate each others' growth and behavior. Types of predation include parasitism, parasitoidism, herbivory, carnivory and cannibalism.	<a href="http://www.nature.com/scitable/knowledge/library/species-interactions-and-competition-102131429">http://www.nature.com/scitable/knowledge/library/species-interactions-and-competition-102131429</a>
	Symbiosis (commensalism, mutualism, parasitism)	Symbiosis refers to the situation in which two dissimilar organisms live purposefully together in close association. The term "symbiosis" includes a broad range of species interactions but typically refers to three major types: mutualism, commensalism and parasitism. Mutualism is a relationship between two species in which both benefit. An important example of mutualism are plant-pollinator interactions. Commensalism is a relationship between species that is beneficial to one, and neither helps nor harms the other. Parasitism occurs when one individual, the parasite, benefits from another individual, the host, while harming the host in the process.	<a href="http://www.nature.com/scitable/knowledge/library/species-interactions-and-competition-102131429">http://www.nature.com/scitable/knowledge/library/species-interactions-and-competition-102131429</a>
	Lotka-Volterra models	Exponential and logistic growth models fail to capture the fact that species interact with each other, and that those interactions can affect their population growth. The Lotka-Volterra models modify previous population dynamics models to take into account the effects of interspecific competition and predation on growth. In the interspecific competition model, the Lotka-Volterra equation modifies the logistic growth equation to take into consideration that competing species depress each other's growth as they both increase population size to reach their differential carrying capacities. In the predation model, the Lotka-Volterra equation modifies the exponential growth equation to take into consideration the fact that the prey population is diminished by predation, and the predator population also fluctuates based on the size of the prey population.	Interspecific competition: < <a href="http://www.blackwellpublishing.com/townsend/models/model05_1.html">http://www.blackwellpublishing.com/townsend/models/model05_1.html</a> > Predation: < <a href="http://amrita.vlab.co.in/?sub=3&amp;brch=67&amp;sim=185&amp;cnt=1">http://amrita.vlab.co.in/?sub=3&amp;brch=67&amp;sim=185&amp;cnt=1</a> >
	Competitive exclusion	Hypothesis that when two or more species co-exist using the same resource, one must displace or exclude the other. In other words, 'complete competitors' cannot coexist, which implies that two species cannot share the exact same niche.	<a href="http://www.saburchill.com/IBbiology/chapters02/035.html">http://www.saburchill.com/IBbiology/chapters02/035.html</a>
Species Distribution	Dispersal	The movement of individuals in space/away from each other. Dispersal can occur for a variety of reasons, including the search for mates and unoccupied habitat. Dispersal is a key process in the dynamics of metapopulations and in allowing gene flow between subpopulations of a species.	Further readings: <a href="http://www.nature.com/scitable/knowledge/library/causes-and-consequences-of-dispersal-in-plants-15927714">http://www.nature.com/scitable/knowledge/library/causes-and-consequences-of-dispersal-in-plants-15927714</a>

	Immigration	When an individual moves from another location into a subpopulation as part of the process of dispersal.	
	Emigration	When individuals move out of a subpopulation as part of the process of dispersal.	
	Theory of island biogeography	The theory developed by Wilson and MacArthur builds on the first principles of population ecology and genetics to explain how distance and area combine to determine island population dynamics by regulating the balance between immigration and extinction. Larger islands and islands closer to the mainland will support a greater number of species.	<a href="http://wiki.gis.com/wiki/index.php/Island_biogeography">http://wiki.gis.com/wiki/index.php/Island_biogeography</a>
<b>Biodiversity</b>	Alpha diversity	Alpha diversity, or within-habitat diversity, refers to the number of species found in a particular habitat.	<a href="http://cnx.org/content/m12147/latest/">http://cnx.org/content/m12147/latest/</a>
	Beta diversity	Beta diversity, or between-habitat diversity, compares species diversity between habitats.	<a href="http://cnx.org/content/m12147/latest/">http://cnx.org/content/m12147/latest/</a>
	Gamma diversity	Gamma diversity refers to the total species diversity for all the different habitats within a region. Gamma diversity is determined by alpha and beta diversity.	<a href="http://cnx.org/content/m12147/latest/">http://cnx.org/content/m12147/latest/</a>
	Genetic diversity	Genetic diversity refers to the total number of genetic characteristics found within a species. Genetic diversity is the result of genetic drift and limited gene flow between subpopulations of a species that are exposed to different selective pressures. Genetic diversity helps species cope with and adapt to environmental changes.	<a href="http://learn.genetics.utah.edu/archive/conservation/whatisit.html">http://learn.genetics.utah.edu/archive/conservation/whatisit.html</a> <a href="http://www.wisegeek.com/what-is-genetic-diversity.htm">http://www.wisegeek.com/what-is-genetic-diversity.htm</a>
<b>Niches &amp; resource partitioning</b>	Fundamental niche	An ecological niche refers to the sum of all activities and relationships a species has while obtaining and using the resources needed to survive and reproduce. The fundamental niche describes the potential ecological niche a species could occupy in the absence of limiting factors such as predation, competition or climatic changes. Some species are only able to occupy parts of their fundamental niche, referred to as the realized niche.	<a href="http://evolution.about.com/od/Evolution-Glossary/a/What-Is-A-Niche.htm">http://evolution.about.com/od/Evolution-Glossary/a/What-Is-A-Niche.htm</a> <a href="http://www.youtube.com/watch?v=xIVixvcR4Jc&amp;list=SP9262CF2DC192E090&amp;index=8">http://www.youtube.com/watch?v=xIVixvcR4Jc&amp;list=SP9262CF2DC192E090&amp;index=8</a>
	Realized niche	The realized niche of a species is the portion of the fundamental niche that an organism actually exploits as a result of limiting pressures such as predation, competition for resources, and climatic changes. The realized niche is always smaller than the fundamental niche.	<a href="http://evolution.about.com/od/Evolution-Glossary/a/What-Is-A-Niche.htm">http://evolution.about.com/od/Evolution-Glossary/a/What-Is-A-Niche.htm</a> <a href="http://www.youtube.com/watch?v=xIVixvcR4Jc&amp;list=SP9262CF2DC192E090&amp;index=8">http://www.youtube.com/watch?v=xIVixvcR4Jc&amp;list=SP9262CF2DC192E090&amp;index=8</a>
	Generalists	A generalist is a species that can live in a wide variety of conditions and use a wide range of resources, they have a broad ecological niche. Generalist species can tolerate environmental changes but can be easily outcompeted.	<a href="http://www.youtube.com/watch?v=bswS-Ooe4iQ">http://www.youtube.com/watch?v=bswS-Ooe4iQ</a>

	Specialists	A specialist species is highly specialized to a narrow set of conditions, it has a tightly defined ecological niche. Specialists generally have low levels of competition, but they are more vulnerable to environmental change.	<a href="http://www.youtube.com/watch?v=bswS-Ooe4iQ">http://www.youtube.com/watch?v=bswS-Ooe4iQ</a>
Community	Structures and dynamics	The group of species that occupy a given area, interacting either directly or indirectly, is called a community. The structure of communities is characterized by their physical features as well as their biological features (the mix of species and the interaction among them). Community structure changes through space, in a process known as zonation, and across time in a process known as succession.	
	Key stone species	A species that has a disproportionate impact on the community dynamics and structures relative to its abundance in the community. Their removal leads to large changes in the community and often results in significant loss of diversity.	<a href="http://education.nationalgeographic.com/education/encyclopedia/keystone-species/?ar_a=1">http://education.nationalgeographic.com/education/encyclopedia/keystone-species/?ar_a=1</a>
	Succession	Succession refers to the gradual and directional change in the structure of an ecological community through time, for example from cultivated field to forest. Succession takes place in new habitats that have never previously supported an ecological community, or after a disturbance. It begins with a few early successional species (pioneer species), which are usually r-strategists, that are then displaced by the arrival of late successional species, which are usually k-strategists. Early successional species may increase favorable conditions for later species, inhibit their establishment, or the arrival of early and later successional species may be independent.	<a href="http://www.physicalgeography.net/fundamentals/9i.html">http://www.physicalgeography.net/fundamentals/9i.html</a> <a href="http://www.nature.com/scitable/knowledge/library/succession-a-closer-look-13256638">http://www.nature.com/scitable/knowledge/library/succession-a-closer-look-13256638</a>
	R-strategists	R-strategists are species whose populations are governed by their reproductive capacity, r. Defining characteristics of r-strategists include high reproductive rate, numerous offsprings, rapid development, early reproduction, short life cycles, small body size, and little parental care. Populations of r-species usually remain below the carrying capacity and are regulated by density-independent factors. In the process of succession, pioneer species are usually r-strategists. This is because in unstable and unpredictable environments, the ability to reproduce quickly is crucial. Many of our agricultural pests are r-strategists. Most organisms have attributes that fit both r-strategists and k-strategists.	<a href="http://jaredreser.com/Background/Biology/randomstrategies.html">http://jaredreser.com/Background/Biology/randomstrategies.html</a> <a href="http://www.cs.montana.edu/webworks/projects/stevesbook/contents/chapters/chapter002/section004/blue/page003.html">http://www.cs.montana.edu/webworks/projects/stevesbook/contents/chapters/chapter002/section004/blue/page003.html</a>



	K-strategists	K-strategists are species whose population is regulated by their habitat's carrying capacity, K. Defining characteristics of k-strategists include long lived species with slow growth rate, relatively small number of offspring, larger body size, and extensive parental care. K-species are usually maintained near the carrying capacity and regulated by density-dependent factors. In the process of succession, late successional species are usually k-strategists. Humans are an example of a k-strategist. Most organisms have attributes that fit both r-strategists and k-strategists.	<a href="http://jaredreser.com/Background/Biology/rndkstrategies.html">http://jaredreser.com/Background/Biology/rndkstrategies.html</a> <a href="http://www.cs.montana.edu/webworks/projects/stevesbook/contents/chapters/chapter002/section004/blue/page003.html">http://www.cs.montana.edu/webworks/projects/stevesbook/contents/chapters/chapter002/section004/blue/page003.html</a>
<b>Invasion Ecology</b>	Invasive species	A problematic species that is not native to an ecosystem, and whose introduction is likely to cause economic, human health, or environmental damage in that ecosystem. Invasive species generally have an expanding range because they are freed from constraint by native predators, competitors and parasite. This makes them hard to eradicate and control once established. Invasive species can cause the extinction of vulnerable native species through predation, competition and habitat alteration. Humans have, intentionally or unintentionally, introduced many invasive species, for example through commercial shipping.	<a href="http://www.agri.state.id.us/Categories/Environment/InvasiveSpeciesCouncil/InvasiveSpProblem.php">http://www.agri.state.id.us/Categories/Environment/InvasiveSpeciesCouncil/InvasiveSpProblem.php</a> <a href="http://www.invasivespecies.gov/main_nav/mnfaq.html#what_is">http://www.invasivespecies.gov/main_nav/mnfaq.html#what_is</a> <a href="http://www.epa.gov/glnpo/invasive/">http://www.epa.gov/glnpo/invasive/</a>
	Stages of invasion (Tens rule)	There are several stages of invasion by non-native species: transport, establishment, spread and impact. On average 10% of invading species succeed at each step, this is also known as the Tens Rule.	
these terms were grouped together but w/o a theme. What should the theme be?	Disturbance	A disturbance is any relatively discrete event such as fire, windstorm, flood, extremely cold temperatures, drought, epidemic, and human development that disrupts the structure and function of an ecological community, and initiates succession. By modifying an ecosystem in ways that favor the survival of some species and eliminate others, disturbance can either reduce or foster species diversity. Human disturbances such as logging, mining, agriculture and development create some of the most profound and long-lasting impacts.	<a href="http://www.stanford.edu/group/microdocs/disturbance.html">http://www.stanford.edu/group/microdocs/disturbance.html</a> Further readings: <a href="http://www.nature.com/scitable/knowledge/library/disturbance-and-diversity-an-ecological-chicken-and-13256228">http://www.nature.com/scitable/knowledge/library/disturbance-and-diversity-an-ecological-chicken-and-13256228</a>
	Resilience	Resilience refers to the speed at which an ecological community recovers its structure and function after a disturbance event. A community is resilient when succession leads to a recovery of its original structure and function. Species diversity increases resistance and resilience to disturbances.	<a href="http://www.stanford.edu/group/microdocs/resilience.html">http://www.stanford.edu/group/microdocs/resilience.html</a> Further readings: <a href="http://soilquality.org/basics/stability.html">http://soilquality.org/basics/stability.html</a>

	Resistance	Resistance refers to the amount of disturbance an ecological community can tolerate while remaining 'unchanged', i.e. without changing structure and function. Species diversity increases resistance and resilience to disturbances.	Further readings: <a href="http://soilquality.org/basics/stability.html">http://soilquality.org/basics/stability.html</a>
	Ecological scales	Ecological processes occur over a broad range of spatial and temporal scales. The ecological patterns and relationships we discern, are determined by the scale at which we observe. As a result, ecologists must select a scale of observation that is appropriate to the phenomenon studied. Human and ecological scales do not always match, and problems can arise in the management of natural resources because of a mismatch between the scale of management and the scale(s) of the ecological processes being managed.	
	Interaction between abiotic and biotic components	An ecosystem is made up of biotic (living) and abiotic (non-living) components. Ecology mainly consists of the study of the processes that link the biotic and abiotic components of an ecosystem, for example biogeochemical cycling and energy flows, and determine the structure and dynamics of ecological communities	
	Hypothesis testing	Hypothesis testing is the use of statistics to determine the probability that a given hypothesis is true. The process of hypothesis usually includes 1) Formulating a null hypothesis (that the observations are the result of pure chance) and an alternative hypothesis (that the observations show an effect). 2) Identifying a statistical test for rejecting the null hypothesis using the p-value.	<a href="http://mathworld.wolfram.com/HypothesisTesting.html">http://mathworld.wolfram.com/HypothesisTesting.html</a>
	Biomes	A broad-scale classification of ecological communities based on water availability and temperature. The major terrestrial biomes type include tropical forest, temperate forest, conifer forest, tropical savanna, temperate grasslands, chaparral, tundra, and desert.	<a href="http://www.ucmp.berkeley.edu/glossary/gloss5/biome/">http://www.ucmp.berkeley.edu/glossary/gloss5/biome/</a>
	Life history	An organism's life history is the sum of the events related to its survival and reproduction that occur during its lifetime including growth, development and reproduction. The life history characteristics exhibited by an organism are the product of evolution and should reflect adaptation to the prevailing environmental conditions under which natural selection occurred. Much of the life history of an organism can be understood in terms of r-strategy or k-strategy.	
	Biomagnification	The increase in the concentration of a contaminant (e.g. DDT, PCBs, mercury) as it passes up the food chain through a series of prey-predator relationships due to persistence and fat solubility.	<a href="http://www.montereyinstitute.org/noaa/lesson13/l13la1.html">http://www.montereyinstitute.org/noaa/lesson13/l13la1.html</a>

# **ENVS 100 Handbook**

## **List of Contents**

### **The Physical and Chemical Environment**

#### **Climate Change**

Greenhouse effect  
Albedo effect  
Thermal expansion of oceans  
Ocean acidification  
Desertification/dust generation  
Ocean circulation disruptions

#### **Carbon Cycle**

Carbon cycle  
Deforestation impact on carbon cycle  
Photosynthesis

#### **Nitrogen Cycle**

Nitrogen cycle  
Anthropogenic N deposition  
Eutrophication

#### **Agriculture**

Domestication  
Slash-and-burn/swidden agriculture  
Shifting agriculture  
Conventional agriculture  
Tillage  
Phosphorus

#### **Radioactive Isotopes**

Radioactive isotopes definition  
Half lives

#### **Basic physical geography and weather**

Elevation, pressure and temperature  
(relationship between-)  
Adiabatic precipitation  
El Niño  
La Niña  
Ocean-atmosphere teleconnections

#### **Soils**

Soil function  
Soil formation  
Soil properties  
Soil erosion

#### **Laws of Thermodynamics**

First law of thermodynamics  
Second law of thermodynamics  
Third Law of Thermodynamics

#### **Misc.**

Acid rain/point and non-point source  
pollution  
Ozone layer depletion by CFCs  
Hydrological cycle  
Carrying capacity (and Malthusian  
implications)

# General Ecology

## **Evolution**

Natural selection  
Adaptation  
Speciation  
Convergent evolution  
Variations  
Mutations  
Gene flow  
Genetic drift  
Genetic bottleneck

## **Ecosystem Energetics**

Photosynthesis  
Food chains and webs  
Trophic structure  
Producers  
Consumers  
Decomposition/decomposers

## **Population Ecology**

Density-dependent and density-independent population growth  
Abundance  
Metapopulation  
Carrying capacity  
Bottom-up control  
Top-down control  
Corridors  
Species-area relationship

## **Ecological Interactions**

Competition (interspecific and intraspecific)  
Predation  
Symbiosis (commensalism, mutualism, parasitism)  
Lotka-Volterra models  
Competitive exclusion

## **Species Distribution**

Dispersal  
Immigration

Emigration  
Theory of island biogeography

## **Biodiversity**

Alpha diversity  
Beta diversity  
Gamma diversity  
Genetic diversity

## **Niches & Resource Partitioning**

Fundamental niche  
Realized niche  
Generalists  
Specialists

## **Community**

Structures and dynamics of a community  
Keystone species  
Succession  
R-strategists  
K-strategists

## **Invasion Ecology**

Invasive species  
Stages of invasion (Tens rule)

## **Disturbance Ecology**

Disturbance  
Resilience  
Resistance

## **Misc.**

Ecological scales  
Interaction between abiotic and biotic components  
Excel statistics and graphing  
Hypothesis testing  
Biomes  
Life history  
Biomagnification

# Environmental Policy and Economics

## Policy

Command and control  
Voluntary regulation  
Market-based regulation  
Cap-and-trade

## U.S. Government

Government  
Executive branch  
Legislative branch  
Judicial branch

## Environmental Law

Legislative process  
How do courts and litigation influence environmental policy  
Clean Air Act  
Clean Water Act  
Endangered Species Act  
National Environmental Policy Act  
Hetch Hetchy dam controversy  
Precautionary Principle

## Basic Macroeconomics

Keynesian school  
Chicago school  
Supply and demand  
Market equilibrium

## Markets

Externalities

Subsidies

Cost-benefit analysis

Market valuation vs. non-market valuation

Discounting

## Common Pool Resources

Tragedy of the commons  
Open-access resources  
Common pool resources  
Privatization

## Globalization

Globalization  
World Bank  
International Monetary Fund  
World Trade Organization

## Misc.

Governance  
Renewable vs. non-renewable energy resources  
Maximum sustained yields  
Malthusian theory  
Neo-malthusians  
Ecological footprint  
Free trade (under markets)  
Corporate sustainability  
Political ecology  
Kuznets curve

# Mathematics

## Functions

Function definition  
Dependent and independent variables  
Graphs of functions  
Slope/average rate of change  
Inverse Functions

## Polynomial and Rational Functions

Linear functions  
Quadratic functions  
Polynomial functions  
Graphs of polynomials and turning points  
Asymptote

## Exponential and Logarithmic Functions

Exponential functions  
Exponential function with natural base  $e$   
Logarithmic functions  
Graphs of exponential and logarithmic functions  
Compound interest (annually and continuously)  
Doubling time  
Exponential growth and decay

# Statistics

## **Data Types**

Continuous data  
Discrete data  
Categorical data  
Nominal data  
Ordinal data

## **Measures of Central Tendency**

Mean  
Median  
Mode

## **Measures of Dispersion/Variation**

Standard deviation  
Variance  
Range

## **Inferential Statistics**

Hypothesis testing  
Sampling  
Normal distribution  
Confidence intervals  
Type I errors  
Type II errors  
Correlation  
Linear regression  
Coefficient of determination R-Square  
P-value  
Chi-square tests  
Analysis of variance (ANOVA)

## **Misc.**

JMP

## **Anthropology**

Cultural diversity

Cultural relativism

Vanishing cultures and emerging worlds

Primitive and pre-modern

Ethnography

Discourse and narratives



# Sociology

## Theme 1

Industrialization  
Capitalism  
Neoliberal capitalism  
Invisible hand  
Property rights  
Deregulation  
Privatization  
Division and alienation of labor  
Commodities  
Fetishism of commodities

## Theme 2

Colonialism  
Imperialism  
Globalization  
Commodity chains  
U.S. hegemony  
World Bank  
International Monetary Fund  
World Trade Organization  
Development  
Uneven development  
Sustainable development

## Misc. (put in a theme)

Disaster capitalism and shock doctrine  
Freedom and liberty  
Human rights  
Class inequality  
Structuring of power and privileges (social stratification?)  
Political economy  
Urbanization  
Modernity  
Migration and internal displacement  
Individualism and collectivism  
Rise of social movement in the U.S. in the 60s  
Nation-states and imagined communities  
Corporations and corporate personhood  
Consumerism  
Information society

## **Part 8: Environmental Philosophy and Ethics**

### **Traditional Ethical Theories**

Anthropocentrism  
Egocentrism  
Individualism  
Tragedy of the commons  
Human exceptionalism

### **Alternative scenarios for human engagement with the non-human world**

Ecofeminism  
Deep ecology  
Ecocentrism  
Holism  
Dualism  
Empathy  
Social ecology  
Environmental justice

### **Misc.**

Instrumental and intrinsic values  
Moral considerability  
Human vs. nature distinction  
Human responsibility to nature

The Physical and Chemical Environment			
Terms every ENVS student should be familiar with - links provide more complete information and figures illustrating key features.			
SUBJECT	TERMS	DEFINITIONS	LINKS
Climate Change	Greenhouse effect	A greenhouse gas is a gas in the atmosphere that absorbs infrared radiation from the Earth's surface, producing the so-called "greenhouse effect" which warms Earth's surface. The main greenhouse gases include water vapor, carbon dioxide, methane, and CFCs. The addition of greenhouse gases to the atmosphere as a result of human activities, such as the burning of fossil fuels and deforestation, intensifies the greenhouse effect, thus warming Earth's climate.	<a href="http://climate.nasa.gov/causes">http://climate.nasa.gov/causes</a> <a href="http://www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-1-3.html">http://www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-1-3.html</a>
	Albedo effect	Albedo refers to the reflectivity of a surface. Different surfaces produce different albedo on a scale from zero, for no reflecting power of a perfectly black surface, to 1, for perfect reflection of a white surface. Lighter surfaces such as snow and ice produce high albedo while soil and forest produce low albedo. Approximately 30% of Sun's radiation is reflected back to space due to the overall albedo of the earth, controlling how much heat gets absorbed by the earth and shaping both local and global climate. The albedo effect plays a key role in climate change. As surface temperatures increase, snow and ice at high latitudes and altitudes melt faster, exposing bare ground or ocean, both of which have lower reflectivities than ice. With a lower reflectivity, the exposed surfaces absorb more solar radiation, causing further warming. Further warming initiates further melting of snow and ice, with further exposure of more energy-absorbent terrain. A positive feedback is established known as the ice/snow-albedo feedback.	<a href="http://www.eoearth.org/view/article/149954/">http://www.eoearth.org/view/article/149954/</a> <a href="http://en.wikipedia.org/wiki/Ice-albedo_feedback">http://en.wikipedia.org/wiki/Ice-albedo_feedback</a>
	Sea level rise	As water gets warm it expands. Thermal expansion is one of the main factors, alongside the melting of glaciers and ice sheets, linking global climate change to sea level rise.	<a href="http://www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-5-1.html">http://www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-5-1.html</a>
	Ocean acidification	Ocean acidification refers to the ongoing decrease in the pH of the Earth's oceans, caused by their uptake of anthropogenic carbon dioxide from the atmosphere. The ocean absorbs about a quarter of the CO <sub>2</sub> we release into the atmosphere every year, so as atmospheric CO <sub>2</sub> levels increase as a result of human activities, so do the levels in the ocean. Ocean acidification is expected to impact ocean species to varying degrees. Photosynthetic organisms may benefit from higher CO <sub>2</sub> conditions in the ocean. On the other hand, a more acidic environment has a dramatic effect on the ability of some organisms to produce and maintain their shells (e.g. coral bleaching). When shelled organisms are at risk, the entire food web may also be at risk.	<a href="http://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F">http://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F</a>

	Desertification / dust generation	Desertification refers to the process by which fertile land becomes infertile, typically as a result of drought, deforestation, and agriculture. Climate change exacerbates desertification by altering spatial and temporal patterns in temperature, rainfall, solar insolation, and winds. Conversely, desertification aggravates climate change through the release of CO <sub>2</sub> from cleared and dead vegetation and through the reduction of the carbon sequestration potential of desertified land. Desertification also creates a potential source for dust generation. Dust aerosols interact with the climate because of their albedo effect, while at the same time aerosols deposition affect biogeochemical cycles of oceanic and terrestrial ecosystems.	<a href="http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=403">http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=403</a>
	Ocean circulation disruptions	Oceans play a key role in redistributing heat around the globe and have a profound effect on the world's climate. Ocean surface water that is heated by the sun near the equator makes its way to the high latitudes where it cools off and sinks. Eventually, that cooled water makes its way back to the equator where it wells up and becomes surface water again. The whole cycle then repeats itself. This system of upwelling, heating, cooling, and downwelling is called the global thermohaline circulation system. Changes in wind patterns, and in the temperature and salinity of water as a result of climate change may disrupt this global ocean 'conveyor belt' system. One fear is that rapidly melting polar ice sheets deliver huge influxes of cold fresh water to the polar oceans thus disrupting global ocean circulation patterns. Small changes in ocean currents can have a large effect on regional and global climate.	<a href="http://oceanmotion.org/html/impact/conveyor.htm">http://oceanmotion.org/html/impact/conveyor.htm</a>
<b>Carbon Cycle</b>	Carbon cycle	All living organisms are built of carbon compounds. It is the fundamental building block of life and an important component of many chemical processes. Most of Earth's carbon is stored in rocks. The rest is in the ocean, atmosphere, plants, soil, and fossil fuels. Carbon is exchanged, 'cycled,' among Earth's oceans, atmosphere, ecosystem, and geosphere through several processes including ocean absorption, photosynthesis, respiration, decomposition, volcanic eruptions and the burning of fossil fuels. The global carbon cycle maintains a balance that keeps Earth's temperature relatively stable, like a thermostat.	<a href="http://earthobservatory.nasa.gov/Features/CarbonCycle/">http://earthobservatory.nasa.gov/Features/CarbonCycle/</a> <a href="http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch7s7-3.html">http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch7s7-3.html</a>
	Deforestation impact on C cycle	Deforestation is a process of land-use change which results in the permanent loss of forest cover and a large release of carbon dioxide (CO <sub>2</sub> ) into the atmosphere. Forests play an extremely important role in the carbon cycle: They are constantly taking in carbon through the process and photosynthesis to create biomass, and releasing carbon through respiration and decay. Standing forests represent an important carbon sink - they sequester large volumes of carbon from the atmosphere in living biomass for decades or centuries. When this biomass is destroyed through forest clearance and burning, the carbon is released back into the atmosphere. Currently, deforestation is occurring primarily in tropical countries as forests are permanently cleared and converted to agriculture and urban settlement.	<a href="http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=77">http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=77</a> <a href="http://www.ipcc.ch/ipccreports/sres/land_use/index.php?idp=150">http://www.ipcc.ch/ipccreports/sres/land_use/index.php?idp=150</a>

	Photosynthesis	<p>The biological process of synthesis of organic materials from carbon dioxide and water utilizing sunlight as the energy source and with the aid of chlorophyll and other associated biological structures. Photosynthesis is one of the ways in which carbon leaves the atmosphere and enters the terrestrial and oceanic biospheres. Photosynthesis also generates the oxygen that animals need to survive.</p> $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{sunlight} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ <p>(carbon dioxide + water + light energy → glucose + oxygen)</p>	<a href="http://www.cliffsnotes.com/sciences/biology/biology/photosynthesis/photosynthesis-defined">http://www.cliffsnotes.com/sciences/biology/biology/photosynthesis/photosynthesis-defined</a> <a href="https://www.khanacademy.org/science/biology/photosynthesis/v/photosynthesis">https://www.khanacademy.org/science/biology/photosynthesis/v/photosynthesis</a>
<b>Nitrogen Cycle</b>	Nitrogen cycle	Nitrogen is present in the environment in a wide variety of chemical forms. The processes of the nitrogen cycle - fixation, nitrification, assimilation, ammonification, and denitrification - transform nitrogen from one form to another, inputting reactive nitrogen from the atmosphere into the biosphere where it can be readily used by plants as nutrient. The nitrogen cycle is of particular interest to ecologists because nitrogen availability can affect the rate of key ecosystem processes, including primary production and decomposition.	<a href="http://www.ic.ucsc.edu/~wxcheng/envs23/lecture13/global_n_cycle.jpg">http://www.ic.ucsc.edu/~wxcheng/envs23/lecture13/global_n_cycle.jpg</a>
	Anthropogenic N deposition	Human activity has greatly increased the amount of biologically available N entering the natural environment. Fossil fuel combustion and fertilizers have led to a rise in atmospheric levels of N oxides and ammonia gases increasing N deposition to the biosphere. Anthropogenic N deposition has the potential to strongly influence plant performance either directly by stimulating growth, or indirectly by facilitating the establishment of faster-growing exotic species.	<a href="http://www.apis.ac.uk/overview/pollutants/overview_N_deposition.htm">http://www.apis.ac.uk/overview/pollutants/overview_N_deposition.htm</a>
	Eutrophication	The process by which a body of water acquires a high concentration of nutrients, especially phosphates and nitrates. These typically promote excessive growth of algae. As the algae die and decompose, high levels of organic matter and the decomposing organisms deplete the water of available oxygen, causing the death of other organisms, such as fish. Eutrophication is a natural, slow-aging process for a water body, but human activity greatly speeds up the process.	<a href="http://www.eoearth.org/view/article/152690/">http://www.eoearth.org/view/article/152690/</a> <a href="http://www.youtube.com/watch?v=6LAT1gLMPu4">http://www.youtube.com/watch?v=6LAT1gLMPu4</a>
<b>Agriculture</b>	Domestication	Domestication is the process whereby a population of living organisms is changed at the genetic level, through generations of selective breeding, to accentuate traits that ultimately benefit humans. It can also be viewed as examples of evolution under human selection pressure (as opposed to natural selection). Domestications of wild plants and animals have played a fundamental role in shaping current agricultural practices.	<a href="http://www.britannica.com/EBchecked/topic/168592/domestication">http://www.britannica.com/EBchecked/topic/168592/domestication</a>
	Slash-and-Burn/ Swidden Agriculture	Slash and burn agriculture is a method of cultivation which involves clearing the vegetation in a particular plot of non-cultivated land, setting fire to the land, and using the ashes to provide nutrients to the soil for use of planting food crops. Cultivation on the plot is done for a few years, until the fertility of the land is reduced again at which point the plot is left alone for longer allowing wild vegetation to grow back on the plot of land. When vegetation has grown again, the slash and burn process may be repeated. Places where open land for farming is not readily available because of dense vegetation, soil infertility, and low soil nutrient content are the places where slash and burn agriculture is practiced most often. Critics argue that slash and burn, like shifting agriculture, agriculture	<a href="http://www.eoearth.org/view/article/156045/">http://www.eoearth.org/view/article/156045/</a> <a href="http://geography.about.com/od/urbaneconomicgeography/a/slashburn.htm">http://geography.about.com/od/urbaneconomicgeography/a/slashburn.htm</a>

		contributes to a number of environmental issues including deforestation, erosion, soil nutrient loss and biodiversity loss.	
	Shifting agriculture	It refers to a system of cultivation whereby a plot of land is cleared and cultivated for a short period of time; then it is abandoned and allowed to revert to its natural vegetation while the cultivator moves on to another plot. The period of cultivation is usually terminated when the soil shows signs of exhaustion or, more commonly, when the field is overrun by weeds. The length of time that a field is cultivated is usually shorter than the period over which the land is allowed to regenerate by lying fallow. Slash-and-burn agriculture is one type of shifting agriculture. Critics argue that shifting agriculture contributes to a number of environmental issues including deforestation, erosion, soil nutrient loss and biodiversity loss. Others argue that shifting agriculture can be sustainable in tropical regions if the land is allowed to remain fallow for a sufficient amount of time.	<a href="http://www.britannica.com/EBchecked/topic/540331/shifting-agriculture">http://www.britannica.com/EBchecked/topic/540331/shifting-agriculture</a> < <a href="http://www.new-ag.info/99-5/pov.html">http://www.new-ag.info/99-5/pov.html</a> >
	Conventional agriculture	Conventional agriculture refers to a prevalent form of modern agriculture characterized by the heavy use of synthetic pesticides, fertilizers, and machineries. Most conventional farming uses large scale monocultures of highly selected or pure-bred cultivars. This form of agriculture has achieved the goal of producing large quantities of food per unit area of cultivated land and per unit of human labor. Many believe that conventional farming, especially the use of synthetic fertilizers combined with modern breeding has contributed, in a major way, to the continued increase of food production worldwide during the past 60 years. At the same time, conventional agriculture is criticized for contaminating soils, waterways (eutrophication) and air, using large amounts of fossil fuel, leading to biodiversity loss and soil erosion, and its use of genetically modified organisms (GMOs). Organic agriculture and other options have been proposed as more sustainable alternatives to conventional agriculture.	<a href="http://www.ucsusa.org/food_and_agriculture/our-failing-food-system/industrial-agriculture/">http://www.ucsusa.org/food_and_agriculture/our-failing-food-system/industrial-agriculture/</a> < <a href="http://www.panna.org/issues/food-agriculture/industrial-agriculture">http://www.panna.org/issues/food-agriculture/industrial-agriculture</a> >

	Genetically modified organisms (GMOs)	Genetically modified organisms (GMOs) are organisms whose genome has been engineered in the laboratory in order to favour the expression of desired traits. In conventional livestock production, crop farming, and even pet breeding, it has long been the practice to breed select individuals of a species in order to produce offspring that have desirable traits. In genetic modification, however, recombinant genetic technologies are employed to produce organisms whose genomes have been precisely altered at the molecular level, usually by the inclusion of genes from unrelated species of organisms for traits that would not be obtained easily through conventional selective breeding. GM crops have been developed for the purpose of improving the crops' insect and virus resistance, as well as their herbicide tolerance. Critics of GMOs warn about possible threats to human health, including allergic reactions and gene transfer, and environmental threats, such as the capability of the GMO to escape and potentially introduce the engineered genes into wild populations, the potential generation of resistant insects and pathogens, and the increased use of chemicals in agriculture.	<a href="http://www.who.int/foodsafety/publications/biotech/20questions/en/">http://www.who.int/foodsafety/publications/biotech/20questions/en/</a>
	Tillage	Tillage is the agricultural preparation of the soil by mechanical agitation of various types, such as digging, stirring, and overturning. There are different methods of tillage - from conventional-till to conservation-till and no-till - that vary by how much crop residue they leave on the surface. Tillage helps farmers aerate the soil and fight weeds, but it is energy-intensive and disrupts soil structure, accelerating surface runoff and soil erosion.	<a href="http://www.epa.gov/agriculture/ag101/cropsoil.html">http://www.epa.gov/agriculture/ag101/cropsoil.html</a>
	Phosphorus	Phosphorus (P) is a limiting nutrient for crop growth and one of the essential elements in modern agriculture. Agriculture is by large the main user of phosphorus globally, as the vast majority of phosphorus compounds are used to produce fertilizers for crops. Runoff of fertilizers and animal manure from agricultural land is a concern for surface waters because phosphorus can lead to the eutrophication of aquatic ecosystems.	<a href="http://www.epa.gov/agriculture/ag101/impactphosphorus.html">http://www.epa.gov/agriculture/ag101/impactphosphorus.html</a>
<b>Radioactive isotopes</b>	Radioactive isotopes	Radioactive isotopes are unstable versions of an element. They undergo spontaneous radioactive decay until they achieve a stable version of the isotope and can no longer convert themselves into another element. Radioactive isotopes occur naturally or are manufactured, as in the process of nuclear reaction.	<a href="http://www.iaea.org/Publications/Booklets/Isotopes/one.html">http://www.iaea.org/Publications/Booklets/Isotopes/one.html</a> <a href="http://www.dummies.com/how-to/content/nuclear-chemistry-halfives-and-radioactive-dating.html">http://www.dummies.com/how-to/content/nuclear-chemistry-halfives-and-radioactive-dating.html</a>
	Half life	Each radioactive isotope decays at a rate that is characteristic to itself. The rate at which a radioactive isotope decays is measured in half-life. Half-life defines the time it takes for one-half of the atoms of a radioactive material to disintegrate. Half-lives for various radioactive isotopes can range from a few microseconds to billions of years. Because of their half lives, radioactive isotopes are used by scientists to determine the ages of different materials and the rates of processes such as biogeochemical cycles and soil-water-atmosphere processes. For example, in environmental studies radioactive isotopes half lives have been used to track water pollution and monitor climatic changes.	<a href="http://www.iaea.org/Publications/Booklets/Isotopes/one.html">http://www.iaea.org/Publications/Booklets/Isotopes/one.html</a> <a href="http://www.dummies.com/how-to/content/nuclear-chemistry-halfives-and-radioactive-dating.html">http://www.dummies.com/how-to/content/nuclear-chemistry-halfives-and-radioactive-dating.html</a>

<b>Basic physical geography and weather</b>	Elevation, pressure and temperature (relationship between-)	As elevation increases atmospheric pressure decreases and the temperature of the air gets lower. This is because the higher the pressure of any gas -- like air -- the warmer it becomes, so as atmospheric pressure decreases the air becomes cooler.	<a href="http://curiosity.discovery.com/question/why-altitude-affect-air-temperature">http://curiosity.discovery.com/question/why-altitude-affect-air-temperature</a>
	Adiabatic precipitation	As air rises it cools. If the air rises enough it cools to the point of reaching its dew point . At the dew point, moisture condenses and precipitates as rain. The change in temperature caused by the air rising is called adiabatic cooling.	<a href="http://www.laep.org/target/fragile_habitats/la_habitat.html">http://www.laep.org/target/fragile_habitats/la_habitat.html</a>
	El Niño	El Niño episodes refer to the large-scale warming of water temperatures in the Pacific Ocean near the equator, as opposed to La Niña. El Niño has important consequences for weather around the globe, with its effects felt most noticeably at the coasts of Ecuador and Peru, where it causes destructive flooding and the collapse of the fishing industry. El Niño episodes are also associated with wet winters over the southeastern US, and drought in Indonesia and Australia. Episodes occur every three to seven years around the months of December and January, and last several months to a year. El Niño episodes are difficult to predict since they are the product of very complicated large-scale ocean-atmosphere interactions. The exact cause of El Niño is still not known. An immediate precursor to El Niño is a shift of a major persistent low-pressure cell normally found over northern Australia and Indonesia eastward into the central Pacific, a phenomenon called the Southern Oscillation. Its onset is apparently tied to the shifting of the monsoons of the Indian Ocean, where the wind and ocean currents change direction twice each year. Together, El Niño and La Niña are extreme phases of a naturally occurring climate cycle referred to as El Niño/Southern Oscillation.	<a href="http://earthobservatory.nasa.gov/Features/ElNino/">http://earthobservatory.nasa.gov/Features/ElNino/</a> <a href="http://www.csa.com/discoveryguides/prednino/overview.php">http://www.csa.com/discoveryguides/prednino/overview.php</a>
	La Niña	La Niña is characterized by unusually cold ocean temperatures in the Equatorial Pacific, as opposed to El Niño. La Niña tends to bring nearly opposite effects of El Niño. Together, El Niño and La Niña are extreme phases of a naturally occurring climate cycle referred to as El Niño/Southern Oscillation.	<a href="http://en.wikipedia.org/wiki/La_Ni%C3%B1a">http://en.wikipedia.org/wiki/La_Ni%C3%B1a</a> <a href="http://www.elnino.noaa.gov/lanina_new_faq.html">http://www.elnino.noaa.gov/lanina_new_faq.html</a>
	Ocean-atmosphere teleconnections	Teleconnections are caused by energy transport and wave propagation in the atmosphere and ocean. Teleconnections enable the atmosphere to act like a “bridge” between different parts of the ocean and enable the ocean to act like a “tunnel” linking different atmospheric regions. Teleconnection patterns explain large-scale changes in the atmospheric wave and jet stream patterns, and influence temperature, rainfall, and hurricane generation. Ocean-atmosphere teleconnections are often responsible for abnormal weather patterns occurring simultaneously in different regions. The connection between the El Niño Southern Oscillation and the Asian Monsoon is an example of ocean-atmospheric teleconnection. Ocean-atmosphere teleconnections are also key for understanding the impacts of anthropogenic climate change. Scientists warn that	<a href="http://www.ipcc.ch/ipccreports/tar/wg1/301.htm">http://www.ipcc.ch/ipccreports/tar/wg1/301.htm</a> <a href="http://centerforoceansolutions.org/climate/impacts/ocean-circulation/">http://centerforoceansolutions.org/climate/impacts/ocean-circulation/</a>



		warmer temperatures could potentially disrupt the global system of ocean currents. Similarly warming ocean temperatures are expected to cause more frequent and intense storms and hurricanes.	
<b>Soils</b>	Soil Function	Soils have five essential functions: storage and recycling of nutrients, water flow regulation, filtering of pollutants, habitat for many organisms, and anchorage for plants and human structures. Soil quality, also referred to as soil health, is the capacity of a specific kind of soil to function.	<a href="http://soils.usda.gov/sqi/concepts/concepts.html">http://soils.usda.gov/sqi/concepts/concepts.html</a>
	Soil formation	Most soils are mineral soils formed by the weathering of solid rock masses into unconsolidated materials, except for organic soils that mostly develop from plant residues. Soil forming factors include parent material, climate, topography, time, biota including humans, and the interaction between these factors.	<a href="http://soils.usda.gov/education/facts/formation.html">http://soils.usda.gov/education/facts/formation.html</a>
	Soil Properties	Soil functions depend on the specific physical, chemical and biological properties of soil. Key physical properties of soil include texture, structure, color, density, porosity and permeability. Key chemical properties include nutrient content, Ph, Cation Exchange Capacity (CE), and salinity. Biological properties include the amount of organic matter, presence of flora, fauna and microorganisms.	<a href="http://landresources.montana.edu/SWM/PDF/Final_proof_SW1.pdf">http://landresources.montana.edu/SWM/PDF/Final_proof_SW1.pdf</a> <a href="http://www.nrcs.usda.gov/wps/portal/nrcs/detail/nj/home/?cid=nrcs141p2_018993">http://www.nrcs.usda.gov/wps/portal/nrcs/detail/nj/home/?cid=nrcs141p2_018993</a> <a href="http://soils.tfrec.wsu.edu/mg/chemical.htm">http://soils.tfrec.wsu.edu/mg/chemical.htm</a>
	Soil erosion	Soil erosion is a form of land degradation that removes topsoil, reduces levels of soil organic matter, and contributes to the breakdown of soil structure. This creates a less favorable environment for plant growth and can lead to the loss of arable land. Erosion also leads to the pollution of waterways, increased flooding, and human health threats. Erosion can occur naturally by wind and water, but increasingly human activities and in particular agriculture practices (e.g. deforestation, tillage, crop rotations, overgrazing, use of agrochemicals) have accelerated rates of soil erosion.	<a href="http://soils.usda.gov/sqi/publications/files/sq_two_1.pdf">http://soils.usda.gov/sqi/publications/files/sq_two_1.pdf</a> <a href="http://worldwildlife.org/threats/soil-erosion-and-degradation">http://worldwildlife.org/threats/soil-erosion-and-degradation</a>
	Acid Rain/ Point and non-point source pollution	Acid rain is rain containing higher than normal amounts of sulfuric and nitric acids due to atmospheric pollution. Acid rain can result from both natural sources, such as volcanoes and decaying vegetation, and man-made sources, primarily emissions of sulfur dioxide (SO <sub>2</sub> ) and nitrogen oxides (NO <sub>x</sub> ) from the burning of fossil fuels. Acid rain has a negative impact on soils, ecosystems and human structures. The largest emissions of sulfur dioxide and nitrogen oxides are due to point-source pollution (i.e. originating from a discrete source) from power plants and industrial facilities, which is easier to deal with than non-point source pollution (i.e. originating from diffuse sources). For example, scrubbers can be used to remove the sulfur-containing compounds from the gas emitted by power plants.	<a href="http://epa.gov/acidrain/what/">http://epa.gov/acidrain/what/</a> <a href="http://epa.gov/acidrain/effects/index.html">http://epa.gov/acidrain/effects/index.html</a>

	Ozone layer depletion by CFCs	The ozone layer absorbs a portion of the radiation from the sun, preventing it from reaching the planet's surface and protecting all life from the sun's harmful radiation. In the 70s, scientists showed how chlorofluorocarbons (CFCs) found in aerosols, air conditioners, refrigerators, and cleaning solvents lead to the depletion of the ozone layer. As they reach the stratosphere CFCs release their chlorine molecules, which initiate the break down of ozone molecules. The production of CFCs is being phased out by a majority of countries, including the US, since the signing of the Montreal Protocol in 1987.	<a href="http://www.epa.gov/ozone/science/sc_fact.html">http://www.epa.gov/ozone/science/sc_fact.html</a>
	Hydrological Cycle	The continuous movement of water on, above, and below the surface of the Earth through a series of physical processes - evaporation, condensation, precipitation, interception, infiltration, percolation, transpiration, runoff, and storage - in which water changes states between liquid, vapor, and ice. The main factors controlling the hydrological cycle are atmosphere-surface circulation, surface temperature and reservoirs on land. By transferring water from one reservoir to another, the water cycle purifies water, replenishes the land with freshwater, and transports minerals to different parts of the globe. It is also involved in reshaping the geological features of the Earth, through such processes as erosion and sedimentation.	<a href="http://ga.water.usgs.gov/edu/watercycle.html">http://ga.water.usgs.gov/edu/watercycle.html</a> <a href="http://www.eoearth.org/view/article/153627/">http://www.eoearth.org/view/article/153627/</a>
	Carrying Capacity (& Malthusian Theory)	'Carrying capacity' refers to the theoretical maximum population density/size that an ecosystem can sustain indefinitely (the environment's maximum load). Below carrying capacity (K), populations typically increase, while above, they typically decrease curtailed by factors such as limitations in food, competition for other resources, or disease, keeping population size at equilibrium. In 1798, Thomas Malthus in his book <i>Essay on the Principle of Population</i> warned that human population growth would eventually outstrip global food supply, sparking debates over the earth's global carrying capacity. Malthus argued that the linear growth of food supply could not possibly support the exponential growth of human population, thereby human population would either be controlled voluntarily or would crash by wars, starvation, or diseases.	<a href="http://www.britannica.com/EBchecked/topic/97118/carrying-capacity">http://www.britannica.com/EBchecked/topic/97118/carrying-capacity</a> <a href="https://www.khanacademy.org/science/cosmology-and-astronomy/life-earth-universe/humanity-on-earth-tutorial/v/thomas-malthus-and-population-growth">https://www.khanacademy.org/science/cosmology-and-astronomy/life-earth-universe/humanity-on-earth-tutorial/v/thomas-malthus-and-population-growth</a> < <a href="http://www.ic.ucsc.edu/~wxcheng/envs23">http://www.ic.ucsc.edu/~wxcheng/envs23</a>
<b>Laws of thermodynamics</b>	First Law of Thermodynamics/law of conservation of mass and energy	Mass - energy can neither created nor destroyed, but only transformed. This implies that all elements participating in the living world have to go through biogeochemical cycles.	<a href="http://www.cartage.org.lb/en/themes/sciences/physics/thermodynamics/LawsofThermodynamics/lawsofthermodynamics/lawsofthermodynamics.htm">http://www.cartage.org.lb/en/themes/sciences/physics/thermodynamics/LawsofThermodynamics/lawsofthermodynamics/lawsofthermodynamics.htm</a>
	Second Law of Thermodynamics/Entropy law	The entropy of a closed system increases over time. In other words, energy tends to change itself spontaneously into a more unavailable, dispersed, random, or less organized, form.	<a href="http://www.cartage.org.lb/en/themes/sciences/physics/thermodynamics/LawsofThermodynamics/lawsofthermodynamics/lawsofthermodynamics.htm">http://www.cartage.org.lb/en/themes/sciences/physics/thermodynamics/LawsofThermodynamics/lawsofthermodynamics/lawsofthermodynamics.htm</a>
	Third Law of Thermodynamics	No system can be cooled to a temperature of absolute zero. (Absolute Zero = 0 Kelvins = -273.15° Celsius)	<a href="http://www.dummies.com/how-to/content/absolute-zero-the-third-law-of-thermodynamics.html">http://www.dummies.com/how-to/content/absolute-zero-the-third-law-of-thermodynamics.html</a>

