

BioE 6100E 3GG (3679): Ecology Disrupted: Sustainability and human environmental impact

Course Description:

This course is rooted in the evolutionary-ecological land ethic espoused eighty years ago by pre-eminent wildlife ecologist, Aldo Leopold. Leopold understood the “land” as a system of interacting living and non-living parts. He saw the system components as important for the interactions they have with one another. Additionally, he saw each living component as a valuable record of its past. To Leopold, an organism’s life history, appearance, and even its surroundings were all evidence of the remarkable fact of its evolution. Leopold’s recognition that each organism and ecosystem has an evolutionary history provides a roadmap for interpreting human impact on species and ecological interactions through an evolutionary lens. Leopold understood human impact on ecology as a disruption of evolution. This interpretation of human impact as an evolutionary disruption of ecological function tightly links these areas into one topic, *ecology disrupted*.

We will use this *Ecology Disrupted* method to bring Leopold’s evolutionary-ecological perspective to each topic studied in this course. The goal of this approach is to learn about the importance and complexity of normal ecological function, by studying the environmental issues that result when people *disrupt* them. This model uses the same intellectual approach that the field of genetics uses to understand gene function. Simply put, geneticists learn gene function by studying the phenotypes that result from mutations that disrupt normal gene function. In this model, you will learn the complexity of functioning ecosystems by studying the environmental issues that result from human actions that disrupt normal ecological function. Studying ecological disruption will unlock the complexity that connects everyday human actions to environmental issues and will show the important role that ecology plays in daily life. Framing this course as an exploration of how people disrupt evolutionary systems, will help focus on the human connections to ecosystems and how to alter behaviors and policies in order to live sustainably.

Schedule: Thursdays: 4:50pm-7:20pm

Room: TBA

Instructor: Professor Yael Wyner (Visser)

Office: NAC 5/205c

Email: ywyner@ccny.cuny.edu

Phone: 212-650-5869

Office Hours: Thursday, 3pm-4pm and by appointment.

Policy on Academic Integrity:

Under the CUNY Student Academic Integrity Policy (web.cuny.edu/academics/info-central/policies/academic-integrity.pdf) “Academic Dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, suspension, and expulsion, as provided herein.” Violations of this policy fall into these areas that include but are not limited to:

- Cheating
- Obtaining Unfair Advantage
- Falsifying of Records and Official Documents
- Plagiarizing

Here are more details on plagiarism from the CUNY academic integrity policy:

Plagiarism is the act of presenting another person’s ideas, research or writings as your own.

The following are some examples of plagiarism, but by no means is it an exhaustive list:

- Copying another person’s actual words without the use of quotation marks and footnotes attributing the words to their source.
- Presenting another person’s ideas or theories in your own words without acknowledging the

source.

- Using information that is not common knowledge without acknowledging the source.
- Failing to acknowledge collaborators on homework and laboratory assignments.

Internet plagiarism includes submitting downloaded term papers or parts of term papers, paraphrasing or copying information from the internet without citing the source, and “cutting & pasting” from various sources without proper attribution.

I welcome any questions you may have concerning academic integrity and will do my best to help you understand the standards of academic scholarship. I use CUNY guidelines to sanction any incidents of academic dishonesty in my courses. Any student who violates this policy will FAIL the course.

Reading: *A Sand County Almanac and Sketches Here and There* by Aldo Leopold. Additional readings will be distributed throughout the course. Make sure that you check blackboard for reading assignments.

Blackboard: All students must use CUNY electronic blackboard. It is assumed that you will check blackboard for all assignments and announcements. Blackboard includes a feature that automatically sends announcements via email, please make sure that you login to your CCNY account to check email.

Course Requirements:

Active participation; consistent and timely attendance

Weekly reading of assignments

Timely completion of all required work

Attendance, punctuality, and participation

Attendance is required. This is a discussion based course, so "getting notes from a friend" will not replicate the learning experience of a missed session. If you miss, for whatever reason, more than three sessions, you will be withdrawn from the course. The expectation is that you will be present, on time, and prepared for every class. Just as any professional teacher does in school, please contact me if you will not be present in class due to any special circumstances or an emergency. Those who are more than 10 minutes late to class will be counted as late. Three late marks will count as an absence. Consult the CCNY academic calendar when planning vacations or travel.

Candidates are expected to come to class prepared. This entails reading all the assigned materials before class and completing all the assigned activities (when applicable). Active participation and engagement in class discussions and activities are expected at all times.

Studentship

Studentship is your eagerness to learn, reflected in a positive, searching attitude and in your full, purposeful, and meaningful participation in coursework and class discussions. Studentship necessitates your taking responsibility for your educational experience. You will be evaluated based on your preparedness, your willingness to participate in activities and discussions in a reflective and professional manner, and your ability to ask questions that represent thoughtful reflection on the material presented and the readings. It is insufficient to merely read the assigned materials and complete the activities. You are expected to think deeply about the pedagogy embedded in them. Good teachers must also be good colleagues. Thus, you will also be assessed on how well you work with others. See the rubric below that will be used to assess this criterion.

Grading:

- 1) Participation (including participation and posts for online discussions): 20%
 - I. Online Discussion of “February” on 2/20 (5%)
 - II. In Class Discussion (15%)
- 2) Assignments: 40%
 - I. Reading and analysis of writings of Gifford Pinchot, John Muir, and Aldo Leopold **Due 2/6** (15%)
 - II. Newspaper Article Summary and Analysis **Due Thursday, 2/13** (15%)
 - III. Do 2: Reflection on “Prairie Birthday,” “January,” “November,” “Marshland Elegy.” (10%)
- 3) Ecology Disrupted Project: 30%
 - I. Reflection on the *Ecology Disrupted* Approach – **Due 3/12**
 - II. Revised Reflection on the *Ecology Disrupted* Approach – **Due 3/26** (10%)
 - III. Draft of Ecology Disrupted Project **due 4/23** (Every day late 1 point will be deducted from final project grade and will miss out on in-class feedback before final project is due)
 - IV. Final Project & Presentation of Final Version of Ecology Disrupted Project **due 5/7** (20% of grade)
- 4) Reflection on your completed and other people’s Ecology Disrupted Final Projects: **Due 5/14** (10%)

<i>Date</i>	<i>Topic</i>	<i>Reading</i> (due on date listed for row)
1/30	Science and Sustainability What is Natural?	
2/6	The Land Ethic: Contextualizing ecology into our daily lives	Gifford Pinchot: “The Conservation of Natural Resources” John Muir: “Our National Parks” Aldo Leopold: “The Land Ethic” in <i>A Sand County Almanac</i> <u>Assignment I: Analysis of Readings Due</u>
2/13	Newspaper summary, article analysis and discussion	<u>Assignment II: Newspaper Article Summary Due</u>
2/20	Online Class “February” from <i>A Sand County Almanac</i> by Aldo Leopold.	Online Discussion of “February” from <i>A Sand County Almanac</i> by Aldo Leopold. Make initial post by 4:50pm on Thursday 2/20. Discussion ends by Wednesday 2/26 at 11:59pm. <ol style="list-style-type: none">1. Respond to discussion question (Thurs.)2. Respond to posts of classmates (Sat.)3. Respond to classmates responses to your post. (Mon.)

4. If relevant respond to any additional responses (Weds.)
See rubric below for more details

2/27	Evolution and Biodiversity The intersection of humanity and ecosystems as products of natural selection Assignment of Ecology Disrupted Final Project	“Prairie Birthday” from <i>A Sand County Almanac</i> by Aldo Leopold. Evolution: Understanding Evolution https://evolution.berkeley.edu/evolibrary/article/evo_01 Biodiversity: National Geographic https://www.nationalgeographic.org/encyclopedia/biodiversity/
3/5	Energy Flow and Our Food Supply <i>Mercury pollution in one of the world’s most isolated places</i>	“January” from <i>A Sand County Almanac</i> by Aldo Leopold. Energy Economics in Ecosystems: https://www.nature.com/scitable/knowledge/library/energy-economics-in-ecosystems-13254442 Energy Flow in Ecosystems https://www.learner.org/courses/envsci/unit/text.php?unit=4&secNum=3 Article: Fishing Down Aquatic Food Webs
3/12	Ecosystem Fundamentals Community Interactions & Food Webs Subdivisions and Lyme Disease: How Forest Fragments Cause Fevers In class work session for <i>Ecology Disrupted Reflections</i>	“November” from <i>A Sand County Almanac</i> by Aldo Leopold. Food Webs: https://www.nature.com/scitable/knowledge/library/food-web-concept-and-applications-84077181 Biodiversity and Ecosystem Stability: https://www.nature.com/scitable/knowledge/library/biodiversity-and-ecosystem-stability-17059965 Community Ecology: https://www.nature.com/scitable/knowledge/library/characterizing-communities-13241173 <u>Due Draft Reflection on Ecology Disrupted Approach</u>

3/19	Populations & Gene Flow	Conservation genetics https://learn.genetics.utah.edu/content/science/conservation/
3/26	<p>The flow of water, nitrogen, and carbon through terrestrial, aquatic, and atmospheric systems Part 1</p> <p>Water Footprints</p> <p>Are We Dense About Development? The Costs and Benefits of High-Density Living.</p>	<p>Water Cycle: https://water.usgs.gov/edu/watercyclesummary.html</p> <p>Nitrogen Cycle: https://www.nature.com/scitable/knowledge/library/the-nitrogen-cycle-processes-players-and-human-15644632</p>
	<p>The nitrogen cycle and the food we eat: The interplay of our food production system with nitrogen in the land and water</p>	<p><u>Due Revised Reflection of Ecology Disrupted Topic</u></p>
4/2	<p>The flow of water, nitrogen, and carbon through terrestrial, aquatic, and atmospheric systems Part 2</p> <p>Nitrogen Footprints</p> <p>The carbon cycle and ocean acidification and climate change</p> <p>Household Carbon Footprints</p>	<p>Marshland Elegy from <i>A Sand County Almanac</i> by Aldo Leopold. (pg 95-101)</p> <p>Carbon Cycle: https://earthobservatory.nasa.gov/Features/CarbonCycle/</p>
4/9	Spring Break	

4/16

Spring Break

4/23

Biomes & Climate

How an Introduced Predator “Outfoxed”
Ecological Succession and Nutrient
Cycling on the Aleutian Islands

The Hazards of Development: Linking
Climate Change and Patterns of Natural
Disasters

From sink to source: The role of climate
and pine beetles in forest transformation

Animal and Plant Migrations

In class work session for *Ecology*
Disrupted Projects

Basic Drivers of Climate:

<https://www.nature.com/scitable/knowledge/library/introduction-to-the-basic-drivers-of-climate-13368032>

Terrestrial Biomes:

<https://www.nature.com/scitable/knowledge/library/terrestrial-biomes-13236757>

Aquatic Biomes:

<http://www.ucmp.berkeley.edu/glossary/gloss5/biome/aquatic.html>

Drafts Due of Ecology Disrupted Data Analysis

4/30

Climate Change: Evidence and
Biological Impacts

Springing Backwards: How Climate
Affects Flower Emergence and Bird
Survival

IPCC Summary Report for Policy Makers: Go to this
link for pdf:

https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf

5/7

Presentations

Final Project and Presentation Due

5/14

Reflection on Presentations

Reflection on Final Project Due

Assignments in Detail:

- I. Reading and analysis of writings of Gifford Pinchot, John Muir, and Aldo Leopold **Due 2/6 (15%)**
 - A. Read over the articles by Pinchot, Muir, and Leopold.
 - B. Summarize the major themes of each author. Include relevant quotes and statements from each author to support each theme summary.
 - C. How are they similar in their emphasis? How are they different in their emphasis?
 - D. How are the viewpoints of each author relevant today? Identify the relevant viewpoint and explain the way it informs how society deals with environmental issues today.
 - E. How are their viewpoints dated? Describe the perspectives of each writer that feels outmoded and explain why it feels like it is from another time.
 - F. Are there any viewpoints that you haven't considered before? Which viewpoint rings most true to you? Justify your response with examples.

Note: Leopold is much more difficult to understand than the other two authors. Read him carefully.

	Low (0-1 points)	Mid- (2-3 points)	High (4-5 points)
Pinchot Summary (10%)	Major themes are poorly described and supported by quotes and statements from the author.	Some of the major themes are included and they are somewhat supported by quotes and statements from the author.	All major themes included and they are well supported by quotes and statements from the author. Well- written
Muir Summary (10%)	Major themes are poorly described and supported by quotes and statements from the author.	Some of the major themes are included and they are somewhat supported by quotes and statements from the author.	All major themes included and they are well supported by quotes and statements from the author. Well- written
Leopold Summary (20%)	Major themes are poorly described and supported by quotes and statements from the author.	Some of the major themes are included and they are somewhat supported by quotes and statements from the author.	All major themes included and they are well supported by quotes and statements from the author. Well- written
Author Similarities (15%)	Poorly described and supported	Adequately described and supported.	Well-described and supported with examples.
Author Differences (15%)	Poorly described and supported	Adequately described and supported.	Well-described and supported with examples.
Relevant today (10%)	Poorly identifies viewpoints that are relevant to today and poorly explains how they inform the ways in which society deals with environmental issues today	Identifies relevant viewpoints for most authors and explains how they inform the ways in which society deals with environmental issues today	Clearly identifies relevant viewpoints for each author and explains with examples how they inform the ways in which society deals with environmental issues today.
Outdated Viewpoints (10%)	Poorly describes the viewpoints that feel outmoded and does not justify why the viewpoints feel outmoded.	Describes at least one viewpoint from each writer that feels outmoded and sometimes uses examples to explain why it feels like it is from another time.	Clearly describes at least one viewpoint from each writer that feels outmoded and uses examples to explain why it feels like it is from another time.
Viewpoints – new or interesting (10%)	Poorly describes the viewpoint that rings most true or that you haven't considered before.	Describes the viewpoint that rings most true or that you haven't considered before. Justifies response with some reference to text.	Clearly describes the viewpoint or viewpoints that rings most true or that you haven't considered before. Well-justified response with examples.

II. Newspaper Article Summaries and Analysis **Due 2/13.**

Read your assigned articles and write a summary and an analysis of the hidden environmental connection for each article.

1. Article summaries should be no longer than a few sentences.
2. Most of assignment should be your analysis of the hidden environmental connections. What is the missing environmental story for each article? We will do one example in class as a way of demonstrating how to do this exercise.

For each article describe in detail:

- a. How people are impacting the environment. Include supporting evidence.
- b. How the environmental impact affects people and other life forms. Include supporting evidence.

“February:” 2/20

Post: Write about something that you find meaningful in Aldo Leopold’s February essay; To what aspect of it do you relate?; What don’t you understand?; Formulate an insightful question or two

about “February” and then attempt to answer your own questions; Write about an aspect of the reading that you don’t understand and explain;

Responses: Respond to the posts of others. You can build upon them, disagree or re-think. Strive for thoughtfulness and nuance.

Make initial post by 4:50pm on Thursday 2/20. Discussion ends by Wednesday 2/26 at 11:59pm.

1. Respond to discussion question (Thurs.)
2. Respond to posts of classmates (Sat.)
3. Respond to classmates responses to your post. (Mon.)
4. If relevant respond to any additional responses (Weds.)

See rubric below for more details

Reflections on Ecology Disrupted in Detail: Define a focus area

1. Draft Reflection of Ecology Disrupted Approach – **Due 3/12** (small group feedback)
2. Revised Reflection on the *Ecology Disrupted* Approach – **Due 3/20** (10%)

Find data that elucidate an aspect of an environmental issue. You will use data to explore how an environmental issue interacts with an ecological function, daily life, and sustainability.

1. Give an overview of the environmental issue
2. How does it connect to an ecological principle?
3. How does it connect to daily life?
4. How does it connect to sustainability?
5. Explain what the data show about the environmental issue. Include
 - a. Context of study: Location, Date
 - b. Experimental Design or Study Design
 - c. Results & Claims

Use the rubric below as a guide.

2. Reflection on your completed and other student completed *Ecology Disrupted* assignments – **Due 5/10** (10%)

Reflect upon:

1. What role did data play in constructing understanding of *your* topic?
2. How well do you think your environmental issue connected to daily life, ecological function, and sustainability? Did it connect to some topics better than others?
3. Identify one element of each project that stood out for you: something you hadn’t thought about before, something that you can relate to, a particularly innovative or useful way of teaching? A table may be the best way to complete this part of the project.
4. What did you learn from your project and from your classmates’ projects that you hadn’t really considered before? This can be new ways of thinking about ecology, sustainability, human impact or daily life or it can be new ways of formulating data or presenting ideas. What have you learned here that you will take to the classes you teach?

Ecology Disrupted Project (20%):

1. Draft of Ecology Disrupted Project **due Thursday, 4/23**
2. Ecology Disrupted Project **due 5/7** (20%)

Project Goals:

The goal of this project is to use data about an environmental issue from one scientific publication to link the environmental issue to its underlying ecological concept(s), daily life, and to some type of sustainable practice that can ameliorate the reported environmental issue. With these goals in mind, your lesson/unit should address these four topics:

Environmental Issue: Choose an environmental issue of interest and find data that help to understand this issue. Develop a worksheet that uses the data to understand the environmental issue. A good source of environmental issues is the AMNH *Science Bulletin* website; <https://www.sciencedaily.com/> and <https://www.eurekalert.org/>.

Ecological Concept(s): Explicitly link the environmental issue to its appropriate ecological concepts. You can do so by asking questions that overlay an ecological framework on the related human action and environmental issue. Appropriate types of questions to consider are:

How is human action disrupting normal ecological function?

How does that disruption lead to an environmental issue?

This section asks you to reframe the discussion of the environmental issue into explicit ecological language. You will need to do research to develop appropriate answers to your questions.

For example, fish farming is a human action that disrupts that leads to overfishing, which disrupts marine food webs (ecological principle). Fish farming can also be placed in the context of the nitrogen cycle, a different ecological principle. In this case, it disrupts the nitrogen cycle by artificially concentrating so many nutrients in one place.

Daily Life: Explicitly link the environmental issue to daily life. You can do so by asking questions that link daily life to the environmental issue. Appropriate types of questions to consider are: Why do we practice such environmentally damaging behavior? What aspects of daily life are helped by our practice? Why do people engage in environmentally destructive behavior? You will need to do research to develop appropriate answers to your questions.

For example, how do we benefit from farmed fish? If not obvious, do research to develop this idea. For example, people benefit from farmed salmon by being able to buy cheap fish. Document the consumption rates and the price of salmon today versus 20 years ago.

Sustainable Practice: Explicitly link the environmental issue to sustainability. You can do so by asking questions that link sustainability and daily life to the environmental issue. Appropriate types of questions to consider are: How can we change our behavior or alter our practice to reduce our ecological impact? What will be the ecological, economic, and societal repercussions of our change in practice? You will need to do research to develop appropriate answers to your questions.

For example: Can we eat less farmed fish? Can we farm different species? Can we develop different food sources for our farmed fish? How will these changes impact people's livelihood?

Lesson Components:

For this activity you should develop student worksheets. You also need to include appropriate background information that will help interested teachers implement the lesson:

Items to Include:

- i. Title
- ii. Appropriate Grade Levels
- iii. Objectives: What you want students to learn. What are your learning goals? Include learning goals about: 1.Data analysis 2.Environmental Issues 3. Daily Life 4. Ecology 5. Sustainability
- iv. Prior Knowledge: The concepts and ideas with which students should be familiar
- v. Body of the Lesson: Instructions for lesson implementation
- vi. Handouts and Worksheets: Student versions
 1. Worksheets Should Contain Scaffolding questions that help student understanding:
 - a. The study
 - b. The data
 - c. Claims based on data
 - d. The environmental issue

Presentation Components:

1. Introduction which includes: Grade Level, Course, Environmental Issue, Daily Life, Ecological Concept, Sustainability and how you plan to connect ecology, daily life, and sustainability to the environmental issue. **One Slide: SHORT**
2. Hand out worksheets and walk class thru them to explain: 1. Study 2. Data 3. Claims based on data 4. Environmental Issue

Grading Rubric for the Final Ecology Disrupted Project & Presentation due 5/7 (20%)

Criteria	Low-performing (0-1 points)	Mid-performing (2-3 points)	High Performing (4-5 points)
Title and Grade Level	Only title or grade level included. Title does not accurately describe lesson.	Only title or grade level included. Title accurately describe lesson.	Both title and grade level are included. Title accurately describes lesson.
Objectives	Poorly explained, inaccurate, and barely match the goals of this project.	Fairly well explained, accurate, and mostly match the goals of this project. Only addresses some of the topic objectives.	Well-explained, accurate, & match the goals of this project. Easy to follow. Address ecology, environmental issues, daily life, sustainability & data analysis Objectives. Is specific.
Prior Knowledge	Poorly explained, inaccurate, and barely matches the chosen activity	Fairly well explained, accurate, and mostly matches the needs of the chosen activity Includes questions that somewhat effectively require students to think about prior knowledge.	Well-explained, accurate, & matches the needs of the activity. Includes questions that require students to think with prior knowledge, not just regurgitate.
Total (10%)	Parts are poorly organized.	Parts are somewhat organized are can be followed.	All parts well organized and formatted, easy to follow.
Data Analysis Worksheets	Instructions for data analysis are poorly communicated.	Instructions for data analysis are fairly clear.	Instructions for data analysis are clear, easy to follow.
(55%)	The activity design poorly facilitates learning about the specific details of the environmental issue.	The activity design somewhat facilitates learning about the specific details of the environmental issue. Includes appropriate scaffolding questions, but some questions are difficult to answer with the given information. The questions attempt to help student understanding of the study, the data, claims based on data & the environmental issue	The activity design facilitates learning about the specific details of the environmental issue. It includes appropriate scaffolding questions to help student data analysis and understanding of the study, the data, claims based on data & the environmental issue
Ecological Concept, Daily Life, Sustainability Effectiveness (15%)	The lesson does a poor job contributing to learning about how the ecological concept, daily life & sustainability relate to the environmental issue.	The lesson adequately contributes to learning about how the ecological concept, daily life & sustainability relate to the environmental issue.	The lesson clearly and effectively contributes to learning about how the ecological concept, daily life & sustainability relate to the environmental issue .
Presentation of data analysis worksheets (20%)	The presentation does not run smoothly & data not properly used to learn about a about a specific environmental issue and the introduction poorly explains how issue is connected to relevant ecological concepts, daily life and sustainability .	The presentation runs fairly smoothly, stays close to allotted time & data are used to learn about a specific environmental issue and the introduction somewhat explains how issue is connected to relevant ecological concepts, daily life and sustainability .	The presentation runs smoothly, stays within allotted time & data are used to learn about a specific environmental issue and the introduction explains how issue is connected to relevant ecological concepts, daily life and sustainability .