

Conservation Ecology

Ecol., Evol., & Nat. Res. 11:216:317 (3 cr)

Spring 20XX

Instructor: David Ehrenfeld (dehrenfeld@aesop.rutgers.edu)

ENR, room 122

Office Hours: By appointment

Class meeting time: Wednesday 9:15-12:15 (double period) in ENR room 123

Pre-requisite: Gen Bio 115/116

Course Objectives:

1. To gain an understanding of the effects of technology and human population growth on species, ecosystems, and human communities.
2. To understand the environmental impact of agricultural and industrial systems on animal, plant and human communities.
3. To learn and understand the biological and social underpinnings of conservation through extensive scientific and non-scientific readings.
 - 3a. To be able to follow and critique complex ecological arguments regardless of whether they were from a research article in *Science* or a play by Ibsen. To be able to detect the main points of the readings, to identify their main strengths and weaknesses, to give concise evaluations of each reading, and to understand why each reading was assigned.
4. To write clear, concise weekly short and long reports on the readings, explaining the points listed in 3a, and to submit a final term paper after a draft revision.
5. To be able to join creatively in articulate, informed class discussions of the readings.

Course Learning Goals:

1. To become familiar with the major environmental challenges of our time, and their interactions (terrestrial and marine pollution, climate change, emerging diseases, species extinctions, invasive species, agricultural problems, energy shortages, nuclear accidents, and the environmental and social upheavals they cause). To be able to use scientific and technological information to evaluate the potential effectiveness of proposed responses to the challenges. To understand and evaluate the often opposing opinions that each challenge generates.
 2. To use the corrective feedback acquired in class discussions to improve the students' ability to evaluate and discuss novel problems.
- To use the corrective feedback provided by the instructor's grading of the weekly reading reports and the instructor's after-class, individual discussions with students to improve their ability to evaluate the readings and to steadily improve their use of written English in reports and assigned papers. Students must submit for approval their term paper topic (February), and a term paper progress report including progress with literature survey (late March). Except for books which you should purchase (marked with an asterisk *), all of the readings for the course are in this packet except online readings (marked with a capital letter). **Textbook:**

Conservation Ecology: Course Guide and Readings, compiled by David Ehrenfeld. I revise this printed and bound course guide yearly (420 pages in 2015). I make no profit from the sale of this course guide. Other likely required books for Spring, 2016: *The Unsettling of America*, Wendell Berry, Sierra Club, 1977; *The Sixth Extinction*, Elizabeth Kolbert, Bloomsbury, 2014; *The Death of Ramon Gonzalez*, Angus Wright, University of Texas Press, 2005; *Small Is Beautiful*, E. F. Schumacher, Harper & Row, 1973; *The Long Emergency*, James Kunstler, Grove Press, 2006; *An Enemy of the People*, H. Ibsen; Signet, 1970; *Our Ecological Footprint*, M. Wackernagel & W. Rees, New Society, 1996; *How to Clone a Mammoth: the Science of De-Extinction*, Beth Shapiro, Princeton University Press, 2015.

Academic Integrity: All students are expected to follow University policies on academic integrity: <http://academicintegrity.rutgers.edu/> A page on plagiarism and the university policy is in the course guide.

CONSERVATION ECOLOGY 11:216:317 SPRING, 2015
PROFESSOR D. EHRENFELD

<u>ASSIGN- MENT</u>	<u>READINGS</u>
	* Please purchase books marked with an asterisk.
1 *	<p><u>The Sixth Extinction</u>, Elizabeth Kolbert, Bloomsbury paperback, 2014.</p> <p>"The unpredictable environment," E. Kraus, <u>New Scientist</u> 63, 649-52, 1974.</p> <p>"Can we raise grain yields fast enough?" Lester R. Brown, <u>World Watch</u>, July/Aug., 1997.</p> <p>"Agriculture and food in crisis: An overview," Fred Magdoff and Brian Tokar, in: <u>Agriculture and Food in Crisis</u>, F. Magdoff and B. Tokar, eds., Monthly Review Press, 2010.</p> <p>(A) "Our Coming Food Crisis," G. P. Nabhan (I), <u>N.Y. Times</u>, July 21, 2013.</p> <p>"Concentration of agricultural markets," Mary Hendrickson and William Heffernan, Dept. Rural Sociology, Univ. of Missouri/Columbia, 2007. + 2011 update. HendricksonM@missouri.edu</p> <p>"Implementing the transition to a sustainable agriculture: An opportunity for ecology," D. Ehrenfeld (I), <u>Bull. Ecol. Soc. America</u> 68(1), 5-8, 1987.</p>
2	<p><u>Out of the Earth</u>, D.J. Hillel (New York: Free Press, 1991), Chaps. 18,19, (pp. 135-158).</p> <p>"The next dust bowl," Joseph Romm, <u>Nature</u> 478: 450-451, 2011.</p> <p>(B) "Panel's Warning on Climate Risk," J. Gillis, <u>New York Times</u>, Mar. 31, 2014.</p> <p>"Food production and the energy crisis," D. Pimentel, et al., <u>Science</u> 182, 443-9, 1973.</p> <p>"The energy costs of food production," G. Leach, in <u>The Man/Food Equation</u>, F. Steele & A. Bourne, eds., Academic Press, 1975, p. 152.</p> <p>"Reducing energy inputs in the agricultural production system," D. Pimentel II, from: <u>Agriculture and Food in Crisis</u>, F. Magdoff and B. Tokar, eds., Monthly Review Press, 2010.</p> <p>"Pesticides," R.L. Rudd, in <u>Environment: Resources, Pollution and Society</u>, W.W. Murdoch, ed. (Stamford, Conn.: Sinauer, 1971), pp. 279-301.</p>
3 *	<p><u>The Unsettling of America: Culture and Agriculture</u>, Wendell Berry (San Francisco: Sierra Club Books, 1977), Chaps. 1-5, 7.</p> <p>"<u>Fifty Million Farmers</u>, Richard Heinberg (Great Barrington, MA: E. F. Schumacher Society, 2006), 1-32.</p>
4	<p>"Silent spring," R. Dunn, <u>Nature</u> 485, 578-579, 2012.</p> <p>"The evolution of insecticide resistance: Have the insects won? J. Mallet, <u>Trends in Ecology and Evolution</u> 4: 336-340, 1989.</p> <p>"New antibiotics and new resistance, C.F. Amábile-Cuevas, <u>Am. Scientist</u> 91: 138-149, 2003.</p> <p>"Antidotes for antibiotic use on the farm," C. Mlot, <u>BioScience</u> 50: 955-960, 2000.</p> <p>"Get pigs off antibiotics," F. Aarestrup, <u>Nature</u> 486, 465, 2012.</p>

abc	4 (contd.)	<p><u>Genes From the Wild: Using Wild Genetic Resources For Food and Raw Materials</u>, R. and C. Prescott-Allen (London: Earthscan (International Institute for Environment and Development), 1983), 9-20, 71-73.</p> <p>"The DNA era," R.C. Lewontin, <u>GeneWatch</u> 16: 3-7, 2003.</p> <p>"The cow tipping point," D. Ehrenfeld (II), <u>Harper's Magazine</u> 305: 13-19, 2002.</p>
abc	5	<p>"Transgenics and cloning as tools for species conservation," David Ehrenfeld (III), <u>Conservation Biology</u> 20: 723-732, 2006.</p> <p>"Patents, plants, and people: The need for a new ethical paradigm," Lori B. Andrews, in: <u>Engineering the Farm: Ethical and Social Aspects of Agricultural Biotechnology</u>, B. Baily and M. Lappé, eds. (Washington, D.C., Island Press, 2002), pp. 67-79.</p> <p>"The seed emergency: The threat to food and democracy," Vandana Shiva (I), http://www.aljazeera.com/indepth/opinion/profile/vandana-shiva.html Feb. 6, 2012.</p> <p>"Supreme Court rules out patents on 'natural' genes," E. Marshall, <u>Science</u> 340: 1387-88, 21 June, 2013.</p> <p>"Emerging conflicts between biodiversity conservation laws and scientific research: the case of the Czech entomologists in India," D. Kothamasi and E.T. Kiers, <u>Cons. Biology</u> 23(5): 1328-1330, 2009.</p> <p>"Vavilov Institute scientists heroically preserve world plant genetic resources collections during World War II siege of Leningrad," S.M. Alexanyan and V.I. Krivchenko, <u>Seed Savers 1992 Summer Edition</u> (Seed Savers Exchange), pp. 45-50 (from: <u>Diversity</u> 7(4), 1991).</p> <p>"Closed-source crops," Paul Salopek, <u>Conservation, Summer 2011</u>: 18-25.</p>
abc	6 *	<p>*<u>The Death of Ramon Gonzalez</u>. Angus Wright (Austin, TX, University of Texas Press, 2005), chaps. 1-10.</p> <p>"Taking seriously the claim that genetic engineering could end hunger: A critical analysis," Peter Rosset, in: <u>Engineering the Farm</u>, op. cit., pp. 81-93.</p> <p>"Hardy cotton-munching pests are latest blow to GM crops," P. Bagla, <u>Science</u> 327: 143, 2010.</p> <p>"Cotton genes found in wild species," Maria Elena Hurtado, http://www.scidev.net/en/agriculture-and-environment/gm-crops/news/gm-cotton-genes-found-in-wild-species-1.html 2011.</p> <p>"War on weeds loses ground," H. Thompson, <u>Nature</u> 485, 430, 2012.</p> <p>"How to get even with pests," Lindsay A. Turnbull and Andy Hector, <u>Nature</u> 466: 36-37, 2010.</p> <p>"Globalization and the war against farmers and the land," Vandana Shiva (II), in <u>The Essential Agrarian Reader</u>, Norman Wirzba, ed., University Press of Kentucky, 2003, 121-139.</p> <p>Shiva (III), "False claims and scaremongering...GMO mumbo-jumbo," <u>Resurgence/Ecologist</u>, Jan.-Feb. 2014, 12-13.</p>
abc	7	<p>"Planet and population," Sir David Attenborough, <u>Population Press</u>,</p>

			<p>http://www.populationpress.org/ Spring 2011.</p> <p>"Demographic trends undermine hope for a better world future," Leon Kolankiewicz, <u>Population Press</u>, Spring 2011: 12-14.</p> <p>"China says on path to eventually scrap one-child policy," Sui-Lee Wee, Reuters, Nov. 19, 2013.</p> <p>"The incident at Browns Ferry," D.D. Comey, <u>Not Man Apart</u>, 1-8, 1975. "Utility board votes to restart a nuclear reactor in Alabama that has been idle since 1985," David Firestone, <u>The New York Times</u>, Friday, May 17, 2002, p. A12.</p> <p>"Can it happen here?" Union of Concerned Scientists, <u>Catalyst Summer 2011</u>, 7-9.</p> <p>"Concerns over nuclear energy are legitimate," C. Macilwain, <u>Nature</u> 471, 549, 2011.</p> <p><u>Normal Accidents: Living with High-Risk Technologies</u>, C. Perrow Princeton University Press, 3-12, 84-89, 1999.</p> <p>"Epilogue," <u>Command and Control: Nuclear Weapons, the Damascus Accident, and the Illusion of Safety</u>, E. Schlosser, Penguin, 2013, 460-63.</p> <p>"The Deepwater Horizon Blowout: Proximate and Ultimate Causes," <u>Drilling Down: the Gulf Oil Debacle and Our Energy Dilemma</u>, J. Tainter and T. Patzek, Springer-Science + Business Media, 208-213, 2012.</p>
abc	8	*	<p><u>Small is Beautiful</u>, E.F. Schumacher (New York: Harper & Row, 1973), Part I, chaps. 2,4,5; Part II, chap. 5; Part III, chap. 2; Part IV, chap. 1.</p> <p>"The end of cheap coal," R. Heinberg II and D. Fridley, <u>Nature</u> 468: 367-369, 2010.</p> <p>"Global energy: The latest infatuations," Vaclav Smil, <u>American Scientist</u> 99: 212-219, 2011.</p> <p>"Revisiting the limits to growth after peak oil," C. Hall and J. Day, Jr., <u>Am. Scient.</u> 97, 230-237, 2009.</p> <p><u>Green Illusions</u>, O. Zehner, U. Nebraska Press, 7-28, 2012.</p> <p>"Adding biofuels to the invasive species fire, S. Raghu, et al., <u>Science</u> 313, 293, 2006.</p> <p>"Biofuels reassessed," T. Beardsley, <u>BioScience</u> 62, 855, 2012.</p> <p>"Cool it," S. Battersby, <u>New Scientist</u> 215, 31-35, 2012.</p> <p>"Forgotten fundamentals of the energy crisis," A.A. Bartlett, <u>Am. J. Physics</u> 46, 876-888, 1978.</p>
abc	9	*	<p><u>The Long Emergency</u>, James Howard Kunstler, Grove Press, 2005,06.</p> <p>"Fueling global fishing fleets," Peter H. Tyedmers, R. Watson, and D. Pauly, <u>Ambio</u> 34: 635-638, 2005.</p>
abc	10	*	<p>"An Enemy of the People," H. Ibsen, in <u>Ibsen - Four Major Plays</u>, vol. 2. (New York: Signet, 1970), pp. 115-222.</p> <p>"War on nature," Michael G. Renner, <u>WorldWatch</u> 4, 18-25, May/June 1991.</p> <p>"Disturbing facts about war and the environment," J. Goodall, <u>Frontiers in Ecology and the Environment</u> 1: 283, 2003.</p>

CONSERVATION ECOLOGY 11:216:317 SPRING, 2015
 PROFESSOR D. EHRENFELD

abc	11	<p>“Circling in on a vulture killer,” F. Proffitt and P. Bagla, <u>Science</u> 306: 223, 2004. “Vultures soar in India,” <u>Science</u> 338, 1014, 2012.</p> <p>“Last days of the locust,” S. Levy, <u>New Scientist</u> 181, 21 Feb. 2004, 48-49.</p> <p>“Biological invasion,” S. Lowe, et al., <u>Aliens</u> 12, 3-11, Dec., 2000.</p> <p>“Don't judge species on their origins,” M. Davis, et al., <u>Nature</u> 474, 153-154, 2011; letters (Simberloff; Lockwood; Wickham), <u>Nature</u> 475, 36-37, 2011.</p> <p>“The Galápagos Islands kiss their goat problem goodbye,” Jerry Guo (I), <u>Science</u> 313: 1742, 2006.</p> <p>“Cane toad invasion: ugly, but not so bad,” W. Zukerman, <u>New Scientist</u> 207 (No. 2777): 18, 11 Sept. 2010.</p> <p>“The 18-km² rat trap,” H. Nicholls, <u>Nature</u> 497, 306-8, 2013.</p> <p>“Forest management plans in a tangle,” D. Venton, <u>Nature</u> 501, 15, 2013.</p> <p>“Rights,” in: <u>Beginning Again: People and Nature in the New Millennium</u>, D. Ehrenfeld (IV), Oxford, 1995, 127-131.</p>
abc	12	<p>“Parasites from fish farms driving wild salmon to extinction,” E. Stokstad, <u>Science</u> 318, 1711, 2007.</p> <p>“Polar bears are in trouble -- and ice melt's not the half of it,” C. Dybas, <u>BioScience</u> 62 (12), 1014-1018, 2012.</p> <p>“A question of breeding,” Editorial, <u>Nature</u> 449: 6 Sept. 2007, 2; “Year of the tiger,” J. Guo (II), <u>Nature</u> 449: 6 Sept. 2007, 16-18.</p> <p>“Plight of the bumblebee,” A. King, <u>New Scientist</u> 215, 42-5, Aug. 11, 2012.</p> <p>“The trouble with neonicotinoids,” F. Sanchez-Bayo, <u>Science</u> 346, 806, 2014.</p> <p>“Into the wild: Reintroduced animals face daunting odds,” Virginia Morell, <u>Science</u> 320: 742-743, 9 May 2008.</p> <p>“Slow 'n' steady wins conservation race,” J. Hamzelou, <u>New Scientist</u> 216 (No. 2893), 15, 2012.</p> <p>“A bit of Texas in Florida,” C. Packer, <u>Science</u> 329, 1606-07, 2010.</p> <p>“Home, home outside the range?” R. Stone, <u>Science</u> 329: 1592-1594, 2010.</p> <p>“Re-wilding North America,” J. Donlan et al., <u>Nature</u> 436, 913-14, 2005; letters (C. Smith; G. Chapron; S. Shay; E. Dinerstein; M. Schlaepfer) <u>Nature</u> 437: 15, 22 Sept., 13 Oct., 2005.</p> <p>“The new top dog,” S. Levy, <u>Nature</u> 485, 296-7, 2012.</p> <p>(C) “U.N. Court Orders Japan To Halt Antarctic Whaling,” M. Simmons, <u>N.Y. Times</u>, Mar. 31, 2014.</p>
abc	13	<p>“Restoring wetland habitats with cows and other livestock,” J. Tesauro, <u>Cons. Biol. in Practice</u> 2: 26-30, 2001.</p> <p>“Fluttering from the ashes?” R. Stone, <u>Science</u> 340, 19, 2013.</p> <p>“Six-legged giant...” R. Krulwich, www.npr.org/blogs/krulwich/2012/02/24/147367644/six-legged-giant-finds-secret-hideaway-hides-for-80-years?sc=tw pp. 1-9, 2012.</p> <p>“As threats to corals grow, hints of resilience emerge,” C. Schmidt,</p>

CONSERVATION ECOLOGY 11:216:317 SPRING, 2015
PROFESSOR D. EHRENFELD

		<p><u>Science</u> 339, 1517-1519, 2013.</p> <p>"The new geography of trade: globalization's decline may stimulate local recovery," F. Curtis and D. Ehrenfeld, <u>Solutions</u> 3, 35-40, 2012.</p> <p>"What must we do?" Wendell Berry, http://www.energybulletin.net/stories/2011-05-05/what-must-we-do 2011.</p> <p>Where the birds are our friends," Gary Nabhan, in <u>The Desert Smells Like Rain</u> (San Francisco: North Point Press, 1982), pp. 89-97.</p> <p>"Nurturing nature," N. Schultz, <u>New Scientist</u> 208 (No. 2785): 32-37, 6 Nov. 2010.</p>
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*Our Ecological Footprint: Reducing Human Impact on the Earth, M. Wackernagel and W. Rees (New Society Publishers, 1996). Your midterm exam is based on this book.

Optional reading:

Becoming Good Ancestors: How We Balance Nature, Community, and Technology, David Ehrenfeld, New York: Oxford University Press, 2009.

Beginning Again: People and Nature in the New Millennium, David Ehrenfeld, New York: Oxford University Press, 1993, 1995.

The Arrogance of Humanism, David Ehrenfeld, New York: Oxford University Press, 1978, 1981.

Drilling Down: The Gulf Oil Debacle and Our Energy Dilemma, Joseph Tainter and Tadeusz Patzek, Springer, 2012.

CONSERVATION ECOLOGY 11:216:317 SPRING, 2015
PROFESSOR D. EHRENFELD

- Deadlines:**
 - Feb. 18 Select topic. Hand in a regular-sized piece of paper with a) title, b) 1-paragraph description, c) list of 4 or 5 refs.
 - Mar. 25 Progress report: a) title, b) 1-2 paragraphs explaining what you have done so far, c) list any new refs.
 - April 29 **Paper due.** Last day of class. **No extensions** except for serious illness or major family problems (documented).
- Paper topic:** You may choose any topic you wish -- I will speak with you if the topic seems unnecessarily difficult or inappropriate. Do not choose topics that are unrelated to the subject matter of the course, eg. "A new method for treating sewage sludge." I do, however, permit related topics in fields other than ecology - even as far afield as history, psychology, or literature. If you are having trouble finding a topic, I suggest that you look at a recent issue of *Conservation Biology*, *Ecological Applications*, *BioScience*, or any other journal with good conservation articles. When you find a paper that interests you, it may suggest a topic, and this will automatically give you references to follow up.
- Page limit:** **At least 12 pages of text, not including figures** (no more than 50 pages) **Put figures and tables at the end, after references.** Double- or 1 1/2-spaced, normal margins, with a font size that gives about 14 words to a line and at least 27 lines to a page. **Number your pages!** If you can, print double-sided to save paper. Please do not use plastic covers; a staple is sufficient.
- Research and references:** The best citations for this paper will be articles from journals such as *Conservation Biology*, *Frontiers in Ecol. & Env.*, *American Scientist* (this is not *Scientific American*), *BioScience*, *Ecological Applications*, *Biological Conservation*, *Science*, *Nature*, *Bull. Marine Science*, *New Scientist*, etc. Books are second-best. Newspaper and popular magazine articles are acceptable, but should not predominate. A typical good list of references will have 10-40 items. **I will not accept more than five websites in your list of references. In addition to the web address, you must have the name and affiliation of the person responsible for the information in the web site.** (This is because web citations are often anonymous, of low quality, and have not been reviewed or edited to make them meet acceptable standards of truthfulness and accuracy. They are also transient, here one day, gone or "down" the next.) Papers that violate this guideline will receive low grades. **Do not rely on Wikipedia** – if you use it, check the information in other sources.
- Literature Cited:** Use the citation format found in *Conservation Biology*. For example, in your paper say, "Smith (1996) reported..." or, "This observation has been noted by a number of scientists (Smith 1921; Jones 1994; Brown et al. 2006)." The Literature Cited section should be arranged alphabetically by author. Do **not** include things you have read but not cited in the paper; this is **not** a bibliography. **Do not use numbered footnotes.** The Literature Cited section must include a reference to every article or book cited in the text. For examples of how to cite references, look at the "literature cited" section of any article in *Conservation Biology*, and consult the "Citation of References" section of the **Guidelines for Writing Papers.** **Also read the page on Plagiarism and Academic Integrity.**