

ECO 582 – Human Dimension of Global Change  
Fall 2014

*“What has changed in recent history, long after our moral codes were developed, is the human ability to employ pervasive and powerful technologies, as humans exert more and more dominance over natural systems. The effect of these changes on human morality is that we live in a hugely expanded moral universe of human responsibility.” Bryan G. Norton, Sustainability: Philosophy of Adaptive Ecosystem Management. p. 199.*

Time: Tuesday/Thursday – 12:30 to 1:45

Location: 101 Norman Smith Hall (Mitchell Center/SSI)

Instructor: Mark W. Anderson

305 Winslow Hall

Phone: 581-3198

Email: on First Class

**Learning Outcomes:** By the end of this course, you will be able to explain the reciprocal nature of human/nature interactions with particular emphasis on feedbacks between human behavior and natural processes, otherwise known as global change. The goal is for you to construct for yourself an understanding of the implications of this reciprocity for the human prospect. If you prefer a question to consider for the semester: is it justified to say that the Earth has entered a new epoch – the Anthropocene?

**Expectations:** For you to accomplish these learning outcomes, at a minimum I expect that you will:

- complete all assigned weekly readings before the first class of the week.
- complete and post to the FirstClass conference folder for the course no later than 7:00 a.m. on Tuesday mornings a 2-4 page essay where you respond to the week’s readings and discuss their relevance in the context of the course. You should use APA format for citing the readings and other relevant material that you use in your discussions. These essays should **not** summarize the readings, rather they should make an argument about their relevance and implications. Essays will be graded on:

- Does the paper make an effective argument about the relevance of the readings to the course?
- Does the paper avoid summarizing; does it engage the material?
- Citation/References: How well is style guide followed?
- Source Materials: Are sources credible, current, and complete?
- Application: How well is relevant theory applied?
- Writing Style, Spelling, Grammar, and Punctuation
- come to class prepared to discuss the readings and to contribute meaningfully the class discussions each week. Attendance is necessary but not sufficient.
- complete a term paper that develops a thesis of interest to you relevant to the broad theme of human dimensions of global change. Specifically, your thesis and its development should explore the nexus of the concepts developed in the course and some aspect of your graduate program. Term papers should be 20-30 pages (including references) and be a scholarly development of a meaningful thesis. In the scheduled final exam period, every student will make a ten minute oral presentation on his or her term paper.

### **Texts:**

- Assigned readings from the journal literature. All are available through URSUS or a link to the publication as .pdf is provided in course schedule below.
- McNeill, J.R. and William H. McNeill. (2003). The Human Web: A Bird's-Eye View of World History. New York: W.W. Norton.
- Cronon, William. (1983). Changes in the Land: Indians, Colonists and the Ecology of New England. New York: Hill & Wang.
- Smil, Vaclav. (1999). Energies: An Illustrated Guide to the Biosphere and Civilization. Cambridge: MIT Press.
- McFalls, Joseph A. (2007). Population: A Lively Introduction. Population Bulletin, 62:1.  
<http://www.prb.org/Publications/PopulationBulletins/2007/PopulationALivelyIntroduction.aspx>
- Kent, Mary M. and Carl Haub. (2005). Global Demographic Divide. Population Bulletin, 60:4.  
<http://www.prb.org/Publications/PopulationBulletins/2005/GlobalDemographicDivide.aspx>

### Additional Titles of Interest:

- Cuff, David J. and Andrew S. Goudie. (2009). *The Oxford Companion to Global Change*. Oxford: Oxford University Press. This is available in the reference

section of Science and Engineering of Fogler Library. It is also available as an e-book through URSUS.

- The classic exposition on the Industrial Revolution: Landes, David. (2003). The Unbound Prometheus. Second Edition. Cambridge: Cambridge University Press.
- An insightful analysis on where human dimensions may be taking us: Smil, Vaclav. (2008). Global Catastrophes and Trends: The Next Fifty Years. Cambridge, MA: MIT Press.
- A good concise version of the story: Alfred Crosby. (2006). Children of the Sun: A History of Humanity's Unappeasable Appetite for Energy. New York: W.W. Norton.

**Academic honesty:** Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

**Grading:** Your final grade will be based on the following:

Weekly essays	30%
Contribution to class discussions	25%
Term paper presentation	10%
Term paper	35%

Tuesday	Thursday
September 2 Course Organization	September 4 -- The Anthropocene? <ul style="list-style-type: none"> <li>○ Arrow et al. (1995). Economic Growth, Carrying Capacity, and the Environment. <i>Science</i>, 268, 520-521.</li> <li>○ Vitousek et al. (1997). Human Domination of Earth's Ecosystems. <i>Science</i>, 277, 494-499.</li> <li>○ Wackernagel, et al. (2002). Tracking the ecological overshoot of the human economy. <i>PNAS</i>, 99(14), 9266-9271.</li> <li>○ Crutzen, P. J. (2002). Geology of mankind. <i>Nature</i>, 415(6867), 23.</li> </ul>
September 9 & 11 <b>Big Picture</b> McNeill & McNeill, Introduction – Chapter V.	
September 16 & 18 McNeill & McNeill, Chapters VI – IX.	
September 23 & 25 <b>Little Picture</b> Cronon, Preface – Chapter 4	
September 30 & October 2 Cronon, Chapters 5 - 8	
October 7 & 9 October 11 <b>Energetics of Human Development</b> Smil, Chapters 1 & 4-6	
October 14 Fall Break	October 16 <b>Demographic Transition &amp; Demographic Divide</b> McFalls and Kent & Haub  <b>No short paper due this week.</b>

**October 21 & 23 Water Resources**

- Baron, J. S., Poff, N. L., Angermeier, P. L., Dahm, C. N., Gleick, P. H., Hairston Jr, N. G., ... & Steinman, A. D. (2002). Meeting ecological and societal needs for freshwater. *Ecological Applications*, 12(5), 1247-1260.
- Zedler, J. B., & Kercher, S. (2005). Wetland resources: status, trends, ecosystem services, and restorability. *Annu. Rev. Environ. Resour.*, 30, 39-74.
- Aeschbach-Hertig, W., & Gleeson, T. (2012). Regional strategies for the accelerating global problem of groundwater depletion. *Nature Geoscience*, 5(12), 853-861.

**October 28 & 30 Biogeochemical Cycles**

- Klee, R.J. and T.E. Graedel. (2004). Elemental Cycles: A Status Report on Human or Natural Dominance. *Annual Review of Environment and Resources*, 29, 60-107.
- Janzen, H.H. Carbon cycling in earth systems—a soil science perspective. *Agriculture Ecosystems & Environment*, 104, 399-417.
- Galloway, J.N. and E. B. Cowling. (2002). Reactive Nitrogen and the World: 200 Years of Change. *Ambio*, 31(2), 64-71.
- Childers, D. L., Corman, J., Edwards, M., & Elser, J. J. (2011). Sustainability challenges of phosphorus and food: solutions from closing the human phosphorus cycle. *BioScience*, 61(2), 117-124.

**Thursday, October 30**

Term Paper Prospectus Due – Post to First Class Conference Before Class

Prospectus should include the following:

- Thesis you plan to develop in your paper (one to two sentences)
- Relevance of this thesis to the course objective (two to three paragraphs)
- How you plan to develop the thesis (two to three paragraphs)
- Initial reading list (in APA format) for your paper

### November 4 & 6 **Climate**

- IPCC. (2013). Climate Change 2013: The Physical Science Base: Summary for Policymakers.  
[http://www.climatechange2013.org/images/uploads/WGI\\_AR5\\_SPM\\_brochure.pdf](http://www.climatechange2013.org/images/uploads/WGI_AR5_SPM_brochure.pdf)
- Dukes, J.S. (2003). Burning Buried Sunshine: Human Consumption of Ancient Solar Energy. *Climate Change*, 61, 31-44.
- Chakravarty, S. et al. (2009). Sharing global CO<sub>2</sub> emission reductions among one billion high emitters. *PNAS*, 106, 11884-11888.
- Lenton, et al. (2008). Tipping elements in the Earth's climate system. *PNAS*, 105, 1786-1793.

### November 11 & 13 **Human Appropriation of Net Primary Productivity**

- Vitousek et al. (1986). Human Appropriation of the Products of Photosynthesis. *BioScience*, 36, 368-373.
- Rojstaczer, S. et al. (2001). Human Appropriation of Photosynthesis Products. *Science*, 294, 2549-2552.
- Imhoff, M. et al. (2004). Global patterns in human consumption of net primary productivity. *Nature*, 429, 870-873.
- Smil, V. 2011. Harvesting the Biosphere: The Human Impact. *Population and Development Review*, 37, 613-636.

### November 18 & 20 **Biodiversity**

- Dirzo, R. and P. H. Raven. (2003). Global State of Biodiversity and Loss. *Annual Review of Environment and Resources*. 28, 137-167.
- Steneck, R.S. et al. (2004). Accelerating Trophic-level Dysfunction in Kelp Forest Ecosystems of the Western North Atlantic. *Ecosystems*, 7, 323-332.
- Cardinale, B. J., Duffy, J. E., Gonzalez, A., Hooper, D. U., Perrings, C., Venail, P., ... & Naeem, S. (2012). Biodiversity loss and its impact on humanity. *Nature*, 486(7401), 59-67.
- McShane, T. O., Hirsch, P. D., Trung, T. C., Songorwa, A. N., Kinzig, A., Monteferri, B., ... & O'Connor, S. (2011). Hard choices: Making trade-offs between biodiversity conservation and human well-being. *Biological Conservation*, 144(3), 966-972.

<p>November 25 <b>Land Cover</b></p> <ul style="list-style-type: none"> <li>○ Williams, M. (2008). A New Look at Global Forest Histories of Land Clearing. <i>Annual Review of Environment and Resources</i>, 33, 345-367.</li> <li>○ Ramankutty N. and J. A. Foley. (2002). People on the Land: Changes in Global Population and Croplands during the 20<sup>th</sup> Century. <i>Ambio</i>, 31(3), 2515-257.</li> <li>○ Ellis, E. C., Kaplan, J. O., Fuller, D. Q., Vavrus, S., Goldewijk, K. K., &amp; Verburg, P. H. (2013). Used planet: A global history. <i>Proceedings of the National Academy of Sciences</i>, 110(20), 7978-7985.</li> </ul> <p><b>No short paper due this week.</b></p>	<p>Thanksgiving</p>
<p>December 2 &amp; 4 <b>Globalization</b></p> <ul style="list-style-type: none"> <li>○ Gallagher, Kevin P. (2009). Economic Globalization and the Environment. <i>Annual Review of Environment and Resources</i>, 34, 279-304.</li> <li>○ Myers, S. S. and J. A. Patz. (2009). Emerging Threats to Human Health from Global Environmental Change. <i>Annual Review of Environment and Resources</i>, 34, 223-252.</li> <li>○ Levy, Marc A. (1995). Is the Environment a National Security Issue? <i>International Security</i>, 20(2), 35-62.</li> </ul>	
<p>December 9 &amp; 11 <b>What of the Anthropocene?</b></p> <ul style="list-style-type: none"> <li>○ Steffen, Will, et al. "The Anthropocene: conceptual and historical perspectives." <i>Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences</i> 369.1938 (2011): 842-867.</li> <li>○ Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., ... &amp; Foley, J. A. (2009). A safe operating space for humanity. <i>Nature</i>, 461(7263), 472-475.</li> <li>○ Kates, R. W. and T. M. Parris. (2003). Long-Term Trends and a Sustainability Transition, <i>Proceedings of the National Academy of Sciences</i>, Vol. 100, No.14, pp. 8062-8067.</li> <li>○ Kareiva, P, S. Watts, R. McDonald, and T. Boucher. (2007). Domesticated Nature: Shaping Landscapes and Ecosystems for Human Welfare. <i>Science</i>, 316, 1866-1869.</li> <li>○ Pimentel, D., Whitecraft, M., Scott, Z. R., Zhao, L., Satkiewicz, P., Scott, T. J., ... &amp; Moe, T. L. (2010). Will limited land, water, and energy control human population numbers in the future? <i>Human Ecology</i>, 38(5), 599-611.</li> <li>○ There are dozens more I wish I could have you read at this point....</li> </ul>	

Week of December 15 Final Exam Week – presentations during scheduled final examination period. **Term Paper is due Friday, December 19 at noon**

**Rubric for Weekly Paper Evaluation:**

Category	Superior	Good	Adequate	Inadequate
Does the paper make an effective argument about the relevance of the readings to the course?	4	3	2	1
Does the paper avoid summarizing and engage the material?	4	3	2	1
Citation/References: How well is style guide followed?	4	3	2	1
Source Materials: Are sources credible, current, and complete?	4	3	2	1
Category	Superior	Good	Adequate	Inadequate
Application: How well is relevant theory applied?	4	3	2	1
Writing Style	4	3	2	1
Spelling, Grammar, and Punctuation	4	3	2	1
Overall	4	3	2	1