

YID2215 The Ecology of Food
Semester 2 2022

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Food and ecology are inextricably linked, both in the production of domesticated food through agriculture and livestock, and in the harvesting of wild plants and animals. Furthermore, the production and consumption of food has downstream consequences through energy consumption, food waste, trophic interactions and the transportation of food around the globe. These topics link to many of the fundamental concepts of ecology, including population biology, the niche, trophic interactions, nitrogen cycling and the effects on biodiversity. In this class we will explore each of these topics intensively through a combination of lectures, readings and interactive field trips to local ecosystems and local food producers.

Each week, we will meet twice: each for 110 minutes for a combination of lectures, problems, discussion, field trips and guest lectures. On campus, we will visit Yale-NUS courtyards, while locally we will visit the Singapore Botanic gardens and local food producers. There will be a few field trips that do not fit into normal class meeting times; these will either be on Thursday but with extended time or on the weekend.

Deliverables

- Paper responses (10 at 1 pt each; due each wk)
 - Brief summaries (2-3 sentences) and 2-3 questions on reading each week
- Lab worksheets (5 pts each)
 - Population dynamics
 - Diversity of wild nut trees
- Journal of food topics (8 at 3-4 pts each)
 - Near weekly journal entry relating 1 item/dish consumed to weekly ecological topic (e.g., diversity, coevolution, wild vs. domesticated foods, population dynamics (esp. birth and death rates), etc.
- Paper/project
 - 7-9 page paper (or equivalent other media) relating an ecological concept from class with a food topic not covered and written for a general audience (25 pts)
 - Paper/project presentation to class on above topic (5 pts)

Grading

• Attendance, Preparation and Participation	20%
• Paper responses	10%
• Lab worksheets	10%
• Journal of food topics	30%
• Paper/project	25%
• Paper/project presentation	5%

Late Assignments

I expect that students will submit assignments *on time*. I recognize, however, that students cannot always accomplish this due to, e.g., sickness, family emergencies, interviews, school-sanctioned events, etc. I will accommodate you ***if you alert me ahead of time***. Otherwise, your grades will be subject to grading penalties. In general, you will lose 10% for every day late.

Hazards

This is a **field** course that has many meetings outside. On field days, come prepared for inclement weather (heat, sun & rain) and rough ground. Bring water. If you have any allergies (bee stings, plant contact, food), please let me know immediately. Wear appropriate shoes (closed toe, no heels) in which you can walk off-trail and appropriate clothing that will protect you from sun and biting insects. We will discuss needs for each outing during the previous class.

Academic Dishonesty/Plagiarism

- All work on exams and other assignments should be your own, unless specifically allowed and noted.
- You must cite all sources used for papers, including drafts of papers, and repeat the reference each time you use the source in your written work.
- Place quotation marks around any cited or cut-and-pasted materials, IN ADDITION TO footnoting or otherwise marking the source.
- If you do not quote directly – that is, if you paraphrase – you still need to mark your source each time you use borrowed material. Otherwise you have plagiarized.
- List all sources consulted for the draft or paper in the closing materials, such as a bibliography or roster of sources consulted.
- Some assignments require a search of the research literature, in which case the above guidelines apply: all sources must be cited. In the case of problem sets, unless your instructor explicitly allows collaboration, it is expected that your work is your own. It is generally not acceptable to submit another person's solution to a problem, or to submit a solution you find online.
- You may not submit the same paper, or substantially the same paper, in more than one course. If topics for two courses coincide, you need written permission from both instructors before either combining work on two papers or revising an earlier paper for submission to a new course.

Violations in academic dishonesty will result in, at a minimum, a grade of 0 on the exam/assignment.

Schedule

Readings and schedule subject to change – check the course website and watch for announcements.

Week:	M	R	Readings	Off-site?
1 M 10/1	Introduction What is Ecology? Lunch 20 questions	Yale-NUS Courtyards Levels of organization	Francis et al. 2003 Purugganan & Hewitt 2004 Valiela 2009	
2 M 17/1	Individuals, The Niche	Yale-NUS Courtyards Population Exercise		Y
3 M 24/1	Communities Diversity Wild Collecting	Singapore Botanic Gardens Forest vs Farm Wild Collecting	Abrams & Nowacki 2008 Worksheet 1 Due	Y
4 M 31/1	NO CLASS	Agricultural environment Yale-NUS Farm	Diamond, J 1999 Ch 6-7	Y
5 M 7/2	Agriculture – Domestication & Techniques Nitrogen Cycling	TBA	Worksheet 1 Due	
6 M 14/2	Agriculture: Sexual vs Asexual Reproduction Genetic Diversity	Gardens by the Bay: Pollination & Pollinators Fruits, Co-evolution	Montoya et al. 2019 Potts et al 2016 Paper/Project Proposals Due	
	Recess Week			
7 M 28/2	Support for Papers/Projects	Sustainable Agriculture: FT to Green Circle Eco Farm	Crowder et al 2010	Y
8 M 7/3	Modern Agricultural Technology Monocultures	FT to Eco-City Hydroponics	Cook 2019 Pingali 2012	
9 M 14/3	Food Choices: HANPP; Composting; Food Webs & Metabolic Inefficiency	TBA	Alexander et al. 2017 Haberl et al. 2004 Hall et al. 2009 Kloppenberg, Jr. et al. 1996 (Herrero et al. 2013)	Y
10 M 21/3	Wild & Commercial Fisheries Wild Populations Small scale fisheries	Guest Lecture: Anthony Madrano	Pauly et al. 1998 Greenberg 2014	Y
11 M 28/3	Fisheries Population dynamics – mortality; Maximum sustainable yield	FT: James Cook University (Singapore) Aquaculture Facility	Arlinghaus et al. 2019 Greenberg 2014	N
12 M 4/4	NO CLASS	Fisheries wrap-up FT prep	SAT/SUN FT – Aquaculture & Mangroves	
13 M 4/11	Debrief from FT Prep for projects	Presentations	Papers/projects Due 20/4	

Readings

- Abrams, M.D. and G.J. Nowacki. 2008. Native Americans as active and passive promoters of mast and fruit trees in the eastern USA. *The Holocene* **18(7)**: 1123-1137.
- Alexander, P. et al. 2017. Could consumption of insects, cultured meat or imitation meat reduce global land use? *Global Food Security* **15**:22-32.
- Arlinghaus, R., et al. 2019. Governing the recreational dimension of global fisheries. *PNAS* **116(12)**:5209-5213.
- Coley, D., M. Howard, and M. Winter. 2009. Local food, food miles, and carbon emissions: A comparison of farm shop and mass distribution approaches. *Food Policy* **34**:150-155.
- Cook, K. 2019. Glyphosate pesticide in beer and wine. U.S. Pirg Education Fund.
- Crowder, D.W., T.D. Northfield, M.R. Strand, and W.E. Snyder. 2010. Organic agriculture promotes evenness and natural pest control. *Nature* **466**:109-113.
- Diamond, Jared. 1997. Guns, Germs and Steel. W. W. Norton & Company, New York, NY.
- Ch 6: To Farm or Not to Farm?
 - Ch 7: How to Make an Almond
- Fiala, N. 2009. The greenhouse hamburger. *Scientific American* **300(2)**: 72-75.
- Francis, C. et al. 2003. Agroecology: The Ecology of food systems. *Journal of Sustainable Agriculture* **22(3)**:99-118.
- Greenberg, P. 2014. Four Fish: The Future of the Last Wild Food. Penguin Books. New York.
- Haberl, H. et al. 2004. Human appropriation of net primary production and species diversity in agricultural landscapes. *Agriculture, Ecosystems, and Environment* **102**: 213-218.
- Hall, K.D., J. Guo, M. Dore, and C.C. Chow. 2009. The progressive increase of food waste in America and its environmental impact. *PLoS ONE* **4(11)**:
- Herrero, M., et al. 2013. Biomass use, production, feed efficiencies, and greenhouse gas emissions from global livestock systems. *PNAS* **110(52)**: 20888-20893
- Montoya, D. et al. 2019. Trade-offs in the provisioning and stability of ecosystem services in agroecological systems. *Ecological Applications* **29(2)**:1-12
- Pauly, D., V. Christensen, J. Dalsgaard, R. Froese and F. Torres Jr. 1998. Fishing down marine food webs. *Science* **279(5352)**:860-863.
- Paustian, K., J. Lehmann, S. Ogle, D. Reay, G.P. Robertson & P. Smith. 2016. Climate-smart soils. *Nature* **532**:49-57.
- Pingali, P.L. 2012. Green revolution: Impacts, limits, and the path ahead. *Proceedings of the National Academy of Sciences* **109**:12302-102308.
- Potts, S. G., et al. 2016. Safeguarding pollinators and their values for human well-being. *Nature* **540**:220-229.
- Purugganan, M., and J. Hewitt. 2004. How to read a scientific article. *Cain Project in Engineering and Professional Communication*.

Tilman, D., C. Balzer, J. Hill and B.L. Befort. 2011. Global food demand and the sustainable intensification of agriculture. *PNAS* **108**: 20261-2064.

Valiela, I. 2009. Ch. 1 Obtaining Scientific Information. *Doing Science: Design, Analysis and Communication of Scientific Research*. Oxford University Press.

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