

## ENV 407 – Research for Master Thesis

### WEEKLY READING SCHEDULE – Winter 2019

Readings and other material assigned for class each day is listed here by week with complete citations for each item. You should read/watch these materials *before* the class day for which they are listed. Readings for each week are listed in a suggested reading order.

***This printed list is provided as a convenience only. Please refer to D2L during the quarter for up-to-date information, deadlines, etc., and email me with any questions.***

**Reminder:** Each week there is a 300-600 word typed reading response due. Please turn in a paper copy at the end of each class.

**“Consider for next week” thoughts:** At the end of each list of readings is a short list of questions or tasks to consider for the following week. These are not assignments per-se in that I will never collect or grade or check your completion of the tasks, but rather are meant to be things to ponder or do that will keep you on track for the class and help you complete the couple major assignments for this course (Assignments 1 & 2, and the Research Proposal).

**“Additional resources and handouts” list:** Includes any handouts posted to D2L and/or handed out during class. These are more for your perusal and reference later, though occasionally, I will instruct you to review something in greater detail in advance of class.

#### **WEEK 1 – Course & M.S. thesis overview, Organizing large research projects, The process of transdisciplinary research in the sustainability & environmental sciences**

Rice, M. (2013). Spanning disciplinary, sectoral and international boundaries: A sea change towards transdisciplinary global environmental change research? *Current Opinion in Environmental Sustainability*, 5, pp.409–419. doi:10.1016/j.cosust.2013.06.007 [An overview of the developments in interdisciplinary global environmental change (GEC) research over the past several decades and vision for the future of transdisciplinary GEC research.]

Mitchell, C., Cordell, D., & Fam, D. (2015). Beginning at the end: The outcome spaces framework to guide purposive transdisciplinary research. *Futures*, 65, pp.86–96. doi:10.1016/j.futures.2014.10.007

(Optional) Scholz, R.W. & Steiner, G. (2015a). *The real type and ideal type of transdisciplinary processes: part I—theoretical foundations. Sustainability Science*, 10, pp.527–544. doi:10.1007/s11625-015-0326-4. [A theory- and history-laden treatise on the process of transdisciplinary research in theory and practice; dense, but worth digging into.]

Additional resources and handouts:

“M.S. Thesis Requirements – DePaul University – Environmental Science” (draft; last updated January 8, 2019)

Handouts from Jess' research lab, LUFA, the Lab for Urban Forestry in the Anthropocene:

Vogt, J. (2019). "Box for LUFA students." Handout.

Vogt, J. (2019). "LUFA Workflow Rules." Handout.

Vogt, J. (2019). "Project Log Template." Handout.

\*\*\*\*Consider for next week:

- Set up the organized set of folders for your thesis research in Box (or your preferred cloud-based – and therefore backed-up – file storage service of choice, though Box is free and unlimited as a DePaul student, and Google Drive is highly discouraged). This does not have to be immutable; you may find it valuable to add folders or sub-folders as you go along. But set up as much as you can now and you'll find it easier to stay organized through your thesis.
- Write down some preliminary answers to the set of reflection questions for Week 1 (passed out at the end of class) in order to begin situating yourself as a researcher in the field. Your notes on these questions will help you write your Researcher Orientation essay (Assignment #1).
- Prepare the summary and assessment of your assigned systematic literature review example article (see Week 2 reading list).

## **WEEK 2 – Reading the scientific literature, Conducting a literature review**

Ruben, A. (2016, Jan 20). "How to read a scientific paper." *Science*, doi:10.1126/science.caredit.a1600012. Retrieved from <https://www.sciencemag.org/careers/2016/01/how-read-scientific-paper> [A tongue-in-cheek "guide" to reading scientific literature: in short, even full time, professional scientists get frustrated with scientific papers sometimes.]

Pain, E. (2016, Mar 21). "How to (seriously) read a scientific paper." *Science*, doi: 10.1126/science.caredit.a1600047. Retrieved from <https://www.sci20encemag.org/careers/2016/03/how-seriously-read-scientific-paper> [A more helpful guide for close reading of scientific literature.]

Siddaway, A.P., Wood, A.M., & Hedges, L.V. (2019). How to do a systematic review: A best practices guide for conducting and reporting narrative reviews, meta-analyses, and meta-syntheses. *Annual Review of Psychology*, 70, pp.9.1-9.24. doi:10.1146/annurev-psych-010418-102803 [A very good step-by-step set of guidelines for how to write a systematic literature review. As a former ENV 407 student put it, the guidelines in this article are "like a spine: flexible, but with structure."]

Pautasso, M., 2013. Ten Simple Rules for Writing a Literature Review. *PLoS Comput. Biol.* 9, e1003149. doi:10.1371/journal.pcbi.1003149 [A slightly different take on writing a literature review than the systematic approach provided in Siddaway et al. (2019)]

Gaziulusoy, A.I., & Boyle, C. (2013). Proposing a heuristic reflexive tool for reviewing literature in transdisciplinary research for sustainability. *Journal of Cleaner Production*, 48, pp.139-147. [Builds on the transdisciplinary readings from Week 1 and proposes a specific methodology for the special transdisciplinary research challenge that is reviewing literature spanning multiple disciplines.]

*Examples of systematic literature reviews – Each student + instructor will be assigned 1 of the following to read and summarize/appraise/evaluate for the class:*

- Stewart, I.D. (2011). A systematic review and scientific critique of methodology in modern urban heat island literature. *International Journal of Climatology*, 31, pp.200–217.  
doi:10.1002/joc.2141
- Gill, T. (2014). The Benefits of Children’s Engagement with Nature: A Systematic Literature Review. *Children, Youth and Environments*, 24(2), 10pp. doi:10.7721/chilyoutenvi.24.2.0010
- Hilbert, D.R., Roman, L.A., Koeser, A.K., Vogt, J., van Doorn, N.S. (*In review*). Urban tree mortality: A literature review. Submitted to *Arboriculture & Urban Forestry*. (**Jess**)

Additional resources and handouts:

- Vogt, J. (2012). “Tips and tricks for reading scientific articles.” Handout.
- Vogt, J. (2018). “LUFA manuscript disclaimers & author credit procedures.” Handout. [*See also the CRediT website: <https://casrai.org/credit/>.*]
- Cornell University Library. (2018, Nov 27) A guide to conducting systematic reviews. Retrieved from [http://guides.library.cornell.edu/systematic\\_reviews](http://guides.library.cornell.edu/systematic_reviews) [*An excellent reference guide for how to conduct systematic literature reviews. Be sure to click through all of the various pages contained within the guide for information on how to get started, the basic steps in a systematic review, documenting your methodology, searching the published and “grey” literature, and managing the entire process in an organized fashion.*]
- Ottawa Hospital Research Institute, & University of Oxford. (2015). PRISMA: the Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Retrieved from: <http://www.prisma-statement.org> [*One of the reporting databases that catalogues in-progress and published systematic literature reviews that have been reported to PRISMA and conducted according to their best practices guidelines.*]
- UK NHS National Institute for Health Research, & University of York Centre for Reviews and Dissemination. (n.d). PROSPERO: International prospective register of systematic reviews. Retrieved from: <https://www.crd.york.ac.uk/prospéro/> [*Another registry of systematic reviews; registering your review with PROSPERO helps insure you don’t get scooped by someone else doing the same or a very similar review.*]

\*\*\*\*Consider for next week:

- Think about and take some notes on the reflective questions for Week 2 (passed out at the end of class), particularly in the context of the Gaziulusoy & Boyle (2013) literature review article. These notes will help you craft your Researcher Orientation essay (Assignment #1).
- To prepare for conducting your own systematic literature review for your thesis research (and Research Proposal for this class), begin drafting a step-by-step literature search strategy, based on the suggestions from the Cornell University Library (2018) and Siddaway et al. (2019). (Some considerations for this are described in the Week 2 reflective questions.)

**WEEK 3 – Perspectives on science in society, Scientific explanation, Causation & causal reasoning**

- Merton, R.K. (1938). Science and the social order. *Philosophy of Science*, 5(3), pp.321-337.  
doi:10.1086/286513 [*Read this piece closely. A classic perspective on the role of science in society, written just before World War II. When reading, you can mostly skip the footnotes,*

*except pay special attention to fn. 14, 16, 18, 22, & 25. And try not to get too irritated at the author's consistent and antiquated use of the male pronoun for "scientist." ]*

- Lewenstein, B.V. (1992). The meaning of 'public understanding of science' in the United States after World War II. *Public Understanding of Science*, 1, pp.45–68. doi:10.1088/0963-6625/1/1/009 [Skim-read this one. A historical account of the evolution of the relationship of science to the general public, from the beginning of the 20<sup>th</sup> century to the mid-1960s. Again, excuse the prolific use of male pronouns for "scientist." ]
- Stinchcombe, A.L. (1968). The logic of scientific inference: Fundamental forms of scientific inference. pp.15–28 in: *Constructing Social Theories*, The University of Chicago Press, Chicago, IL. [Note that the PDF on D2L has the entire chapter, for your reference, but I'm only asking you to read pages 15-28 of the 38 page chapter. Another classic about the role of inference and causality in science from the social sciences. This piece describes how we use science to know things, with lots of simple examples. A relatively quick read if you're familiar with logic and probability notation (or you skip/skim the logic notation). Again, excuse the prolific use of male pronouns for "scientist." ]
- Platt, J.R. (1964). Strong inference: Certain systematic methods of scientific thinking may produce much more rapid progress than others. *Science*, 146, pp.347–353. doi:10.1126/science.146.3642.347 [Makes the case for why the use of "strong inference" and the scientific method have resulted in prolific scientific advancements in certain fields.]
- Driscoll, C.T., Lambert, K.F., Chapin, F.S., Nowak, D.J., Spies, T.A., Swanson, F.J., Kittredge, D.B., & Hart, C.M. (2012). Science and society: The role of long-term studies in environmental stewardship. *Bioscience*, 62, pp.354–366. doi:10.1109/imcec.2016.7867525
- Ripple, W.J., Wolf, C., Newsome, T.M., Galetti, M., Alamgir, M., Crist, E., Mahmoud, M.I., Laurance, W.F. & 15,364 scientist signatories from 184 countries. (2018). World scientists' warning to humanity: A second notice. *Bioscience*, 67(12), pp.1028–1030. [A short, 2-page "Viewpoint" published by leading sustainability scientists targeted at policy makers; an example of scientists taking a stand and declaring a specific role for themselves with respect to society and policy making.]
- (Optional) Woodward, J. (2014). "Scientific Explanation." *Stanford Encyclopedia of Philosophy* (Fall 2017 Edition). 1–22pp. Retrieved from <https://plato.stanford.edu/archives/fall2017/entries/scientific-explanation/> [A long-ish encyclopedia entry by a well-known scholar of the philosophy of science, discussing the role of the deductive-nomological model of scientific reasoning and scientific explanation.]
- (Optional) Freedman, D. (1999). From Association to Causation: Some Remarks on the History of Statistics. *Statistical Sciences*, 14(3), pp.243–258. [An excellent history of statistics and the evolution of modern notions of causation. Worth a read if you'll be attempting to claim causality in any of your research.]
- (Optional) Bornmann, L., & Mutz, R. (2015). Growth rates of modern science: A bibliometric analysis based on the number of publications and cited references. *Journal of the Association for Information Science and Technology*, 66(11), pp.2215–2222. doi:10.1002/asi.23329

#### Additional resources and handouts:

Alliance of World Scientists website, which hosts the Ripple et al. (2018) "second notice": <http://scientistswarning.forestry.oregonstate.edu>

Kaplan, S. (2017, Nov 13). "Thousands of scientists issue bleak 'second notice' to humanity." *Washington Post*. Retrieved from

<https://www.washingtonpost.com/news/speaking-of-science/wp/2017/11/13/thousands-of-scientists-issue-bleak-second-notice-to-humanity/> [An example of the media coverage that the Ripple et al. (2018) “second notice” received.]

\*\*\*\*Consider for next week:

- Think about and take some notes on the reflective questions for Week 3 (passed out at the end of class), particularly in the context of what you think the role of science (and scientists) in society is or should be. Consider these questions with respect to the environmental and sustainability sciences but also, more specifically, your own sub-field.
- Think particularly about causation and scientific inference: For your thesis research, which you’ll begin formalizing a proposal for in the coming weeks, how will causation and scientific inference be treated? That is, will you attempt to establish causation between one or more constructs as part of your research? If so, how? If not, why not?
- Your Researcher Orientation essay (Assignment 1) is due next week (Week 4) in class. Given all we’ve thought about related to the process and role of scientific research and of researchers these first three weeks, respond to the reflective prompt posed (“Who am I as a researcher?”).

#### **WEEK 4 – Research design, part 1: Experiments, Quasi-experiments, Natural experiments**

Bernard, H.R. (2011). Research design: Experiments and experimental thinking, pp.82-112. In: *Research Methods in Anthropology: Qualitative and Quantitative Approaches*, Sage, Thousand Oaks, CA.

Dunning, T. (2008). Improving causal inference: Strengths and limitations of natural experiments. *Political Research Quarterly*, 61 (2), pp.282–293. doi:10.1177/1065912907306470

Haddaway, N.R., & Verhoeven, J.T.A. (2015). Poor methodological detail precludes experimental repeatability and hampers synthesis in ecology. *Ecology and Evolution*, 5(19), pp.4451–4454. doi:10.1002/ece3.1722

Borer, E.T., Harpole, W.S., Adler, P.B., Lind, E.M., Orrock, J.L., Seabloom, E.W., & Smith, M.D. (2014). Finding generality in ecology: A model for globally distributed experiments. *Methods in Ecology and Evolution*, 5, pp.65–73. doi:10.1111/2041-210X.12125

(Optional) Margoluis, R., Stem, C., Salafsky, N., & Brown, M. (2009). Design alternatives for evaluating the impact of conservation projects. *New Directions for Evaluation*, 122, pp.85–96. doi:10.1002/ev.298 [Discusses multiple research design alternatives]

(Optional) Jenerette, G.D., & Shen, W. (2012). Experimental landscape ecology. *Landscape Ecology*, 27(9), pp.1237–1248. doi:10.1007/s10980-012-9797-1

\*\*\*\*Consider for next week:

- Think and take some notes on the reflective questions for Week 4 (passed out at the end of class).
- If you haven’t already, start thinking (and talking with your thesis advisor) about what the research design for your thesis will be. Will it be an experimental design? If so, which of the designs from Bernard (2011) will your thesis research design most closely approximate?
- Before reading next week’s research on case studies and comparative methods, consider: How would you define a “case study” or case study research? Jot down your definition and compare with that of Gerring (2004).

**WEEK 5 – Research design, part 2: Case studies, Field studies, The comparative method**

Gerring, J. (2004). What Is a Case Study and What Is It Good for? *American Political Science Review*, 98: 341–354. doi:10.1017/S0003055404001182 [Illuminates method and philosophy of conducting case study research; originally written for political science researchers but could apply to any other field which utilizes cases, particularly interdisciplinary fields or fields that use mixed methods.]

Lijphart, A. (1975). The comparable-cases strategy in comparative research. *Comparative Political Studies*, 8(2): 158–177. [Also from the political science discipline; the first couple pages mention critiques to a previous article the author wrote – you can skim this part and start paying closer attention to the text when he starts providing definitions of comparative research on p. 160 onward. Excuse some of the dated language and male-gendered pronouns.]

Rudel, T.K. (2008). Meta-analyses of case studies: A method for studying regional and global environmental change. *Global Environmental Change*, 18: 18–25. doi:10.1016/j.gloenvcha.2007.06.001 [From the environmental science field – discusses systematic methods for utilizing case studies to gain broader inference about regional environmental change.]

McDonald, T.I.L. (2003). Review of environmental monitoring methods: Survey designs. *Environmental Monitoring and Assessment*, 85(3): 277–292. [Discusses notation and method of sample selection for environmental monitoring; don't worry too much about his notation, but instead focus on the discussion of the pros/cons of the different methods of selecting panels for sampling.]

Ellis, J.I., & Schneider, D.C. (1997). Evaluation of a gradient sampling design for environmental impact assessment. *Environmental Monitoring and Assessment*, 48: 157–172. [Compares two types of research designs for field work in environmental monitoring – case-impact v. gradient sampling; pay particular attention to the discussion on statistical power.]

(Optional) Elmendorf, S.C., Henry, G.H.R., Hollister, R.D., Fosaa, A.M., Gould, W.A., Hermanutz, L., Hofgaard, A., Jónsdóttir, I.S., Jorgenson, J.C., Lévesque, E., Magnusson, B., Molau, U., Myers-Smith, I.H., Oberbauer, S.F., Rixen, C., Tweedie, C.E., & Walker, M.D. (2015). Experiment, monitoring, and gradient methods used to infer climate change effects on plant communities yield consistent patterns. *Proceedings of the National Academy of Sciences*, 112, 448–452. doi:10.1073/pnas.1410088112

(Optional, but recommended for students who have not taken ENV 261 Mixed Methods) Small, M.L., 2011. How to Conduct a Mixed Methods Study: Recent Trends in a Rapidly Growing Literature. *Sociology* 37: 55-84. doi:10.1146/annurev.soc.012809.102657

(Optional, but recommended for students who have not taken ENV 261 Mixed Methods) Onghena, P., Maes, B., Heyvaert, M. (2018). Mixed Methods Single Case Research: State of the Art and Future Directions. *Journal of Mixed Methods Research*, in press. 20 pp. doi:10.1177/1558689818789530

\*\*\*\*Consider for next week:

- Think and take some notes on the reflective questions for Week 5 passed out at the end of class.
- Start compiling your notes and thoughts on research design and causation in preparation for the Research Design and Causation paper (Assignment 2; see Syllabus and D2L for complete prompt).

## **WEEK 6 – Methods selection, Measurement, Evaluation of research**

- Drost, E.A. 2011. Validity and reliability in social science research. *Educ. Res. Perspect.* 38, 105–123. doi:10.1161/01.HYP.0000050927.96979.41
- Wolf, B., Lindenthal, T., Szerencsits, M., Holbrook, J.B., Heß, J., 2013. Evaluating research beyond scientific impact: How to include criteria for productive interactions and impact on practice and society. *Gaia* 22, 104–114. doi:10.14512/gaia.22.2.9
- Johnson, M.L., Novem Auyeung, D.S., Sonti, N.F., Pregitzer, C.C., McMillen, H.L., Hallett, R., Campbell, L.K., Forgione, H.M., Kim, M., Charlop-Powers, S., Svendsen, E.S., 2019. Social-ecological research in urban natural areas: an emergent process for integration. *Urban Ecosyst.* 22, 77–90. doi:10.1007/s11252-018-0763-9
- (Optional)* Adcock, R., Collier, D., 2001. Measurement Validity: A Shared Standard for Qualitative and Quantitative Research. *Am. Polit. Sci. Rev.* 95, 529–546. *[Another perspective on measurement validity, from political science.]*
- (Optional)* Lederman, N.G., Abd-El-Khalick, F., Bell, R.L., Schwartz, R.S., 2002. Views of Nature of Science Questionnaire: Toward Valid and Meaningful Assessment of Learners' Conceptions of Nature of Science. *J. Res. Sci. Teach.* 39, 497–521. doi:10.1002/tea.10034 *[Example of testing the validity of a human subjects research instrument.]*
- (Optional)* Weich, S., Burton, E., Blanchard, M., Prince, M., Sproston, K., Erens, B., 2001. Measuring the built environment: Validity of a site survey instrument for use in urban settings. *Health Place* 7, 283–292. *[Example of testing the validity of an observation research instrument.]*
- (Optional)* Thomas, C.W., Koontz, T.M., 2011. Research Designs for Evaluating the Impact of Community-Based Management on Natural Resource Conservation. *J. Nat. Resour. Policy Res.* 3, 97–111. doi:10.1080/19390459.2011.557877

## **WEEKS 7-9 – Research Proposal Work Time**

*There will be no formal in-class meetings during Weeks 7, 8, or 9 of the quarter. Instead, you should schedule weekly meetings with your Thesis Advisor, and use the time to complete your Research Portfolio. You may also meet with the ENV 407 instructor as needed.*

## **WEEK 10 – Research Proposal presentations**

*These may take place at a time and place other than our normal class meeting in order to accommodate other ENV professors who desire to attend. We'll schedule this ASAP and I will let you know.*

## **FINALS WEEK – Course wrap-up**

*Scheduled finals period is Wednesday, March 20, 11:30am-1:45pm. We may not need have a meeting during this time, but we may need to wrap up some final course details, so put it on your schedule just in case.*