

# INTD497: Governing Complex Ecosystems

McGill University, Winter 2023

Lecturer: Dr. Jonathan Wald (he/him) ([jonathan.wald@mcgill.ca](mailto:jonathan.wald@mcgill.ca))

**Class Time:** Wednesday and Friday 10:05AM-11:25AM in McConnell Engineering 11

**Office Hours:** Wednesday 12:30PM-2:30PM in Leacock 822A

**Course Description:** Living in a period of pronounced global climate change, environmental disasters, and challenges to environmental governance has highlighted the complexities of living in deeply interconnected ecosystems. Barely skimming the surface of any environmental topic immediately raises concerns about how each organism plays a unique role in larger biotic systems, and that threats to any one organism can have dire ramifications for the broader network. However, how do environmental scientists and regulators concretely make sense of this sprawling complexity? Drawing on Science and Technology Studies (STS), this course will examine the conceptual framings of environmental concerns, such as “ecosystems,” “complexity,” and “nature” as well as the practical implementations of ecosystem modeling to critically interrogate the existing tools for addressing ecological breakdown. Moving through the “natural science” of climate change and into the institutional questions of environmental regulation, this course will conclude with speculative and literary efforts to cope with the potentially overwhelming impacts of the global climate crisis.

**Course Objectives:** By the end of the semester, students should be able to:

- Understand the history and utility of methodologies for understanding ecosystem management.
- Articulate the significance of multiple conceptual framings of ecological complexity.
- Develop a conceptually sensitive analysis of an environmental governance topic.

**Course Content:**

**Readings** to be completed each day before class.

The assigned readings are either published articles or chapters from books.

All readings are available as pdfs on MyCourses. Each day’s assigned readings include “key questions” intended to help you focus your attention on the broad contributions of this article to the overall course. The goal of the readings is to provide tools for thought rather than an exhaustive bibliography of relevant literature.

One book is required for this course and can be purchased at Paragraph Bookstore at 2220 McGill College. It is also available for free as an ebook through the McGill library.

Waubgeshig Rice. 2018. *Moon of the Crusted Snow*. Toronto: ECW Press.

**Seminars** will review and expand upon the readings.

Course time will be primarily dedicated to discussing and interrogating the assigned texts. To get conversation started, we will have discussion questions provided in advance by students and short lectures with background information provided by the instructor.

## **Evaluation (More details on MyCourses)**

### **Participation: (10%)**

Participation can mean many things but encompasses attendance, classroom contributions, discussion board activity, or group notetaking. It is not a measure of who speaks the most. I am looking for a good-faith effort to engage with the class.

### **Discussion Question: Signup on MyCourses (15%)**

In 500 words, you will summarize a reading and provide a discussion question for the class. Submissions will be posted to the MyCourses Discussion section and presented in class. Sign-up for a reading at <https://docs.google.com/spreadsheets/d/1szYygp7K9hOeoBvkcY5CqC2cRSDfsHaLuln0312JTrI/edit?usp=sharing>

### **Topic Proposal: Due 27 January (10%)**

In 1-2 pages, you will explain and pose a research question related to environmental politics that you will address in your other assignments.

### **Annotated Bibliography: Due 24 February (20%)**

Drawing on academic databases, you will find and summarize 4 articles that contribute to your research question.

### **Rough Draft of Research Paper: Due 13 April**

In 10-12 pages, you will address your research question using sources from the class and others.

### **Peer Evaluation: Due 17 April (5%)**

You will be asked to give feedback on a rough draft of another student's research paper.

### **Final Draft of Research Paper: Due 24 April (40%)**

Your final draft of your paper should incorporate feedback from your peer review. You cannot submit your final paper until you have given feedback to your partner.

**Mental Health Resources:** Please take care of yourselves. Take walks, drink water, eat healthy, or do whatever else you need to feel well. It is also okay to feel unwell, especially now. If you feel that you need support, please reach out. You can access support through the McGill Wellness Hub (<https://www.mcgill.ca/wellness-hub/>) or by contacting your local Integrated Health and Social Services Centre (CLSC) (<https://sante.gouv.qc.ca/en/repertoire-ressources/votre-cisss-ciuss/>). Keep.meSAFE is available to all MCGill Students 24/7 through the MySSP app (<https://ssmu.ca/blog/2020/03/mental-health-resource-available-keep-mesafe/>). Crisis support is available 24/7 through various crisis centers (<https://santemontreal.qc.ca/en/public/support-and-services/crisis-centres/>) or from Suicide Action Montreal, which you can find at <https://suicideactionmontreal.org/en/> or by calling 1 866 277 3553.

**General Accommodations Policy:** My goal is to ensure that everyone is able to engage with the course material as thoroughly as possible. If events external to the class make this unduly difficult, please feel free to let me know so that we can create a strategy to allow you to continue to engage with the course.

**Notice for Students with Disabilities:** I will do my best to accommodate students with disabilities. If this pertains to you, I encourage you to contact the office for Student Access and Achievement (formerly the Office for Students with Disabilities) (514-398-6009, [access.achieve@mcgill.ca](mailto:access.achieve@mcgill.ca)) as soon as possible so that we can provide necessary accommodations.

**Land Acknowledgment:** McGill University is located on unceded indigenous lands. The Kanien'kehá:ka Nation is recognized as the custodians of the lands and waters on which we gather. Tiotiá:ke/Montreal is historically known as a gathering place for many First Nations. Today, it is home to a diverse population of Indigenous and other peoples. We respect the continued connections with the past, present and future in our ongoing relationships with Indigenous and other peoples within the Montreal community. I encourage you to think of the history of the land on which you are living now as part of this course. (This territorial acknowledgement was adapted from Concordia University's Indigenous Directions Leadership Group [2017]. To read the entire territorial acknowledgment and to learn more about how it was written, please visit <https://www.concordia.ca/about/indigenous/territorial-acknowledgement.html>.)

**Email Policy:** I will do my best to respond to your emails in a timely manner. To help me do this, I ask that you please include "INTD497" in the subject lines of your emails. This will help me find your questions amidst my other emails and respond to them faster.

**Academic Integrity:** McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see [www.mcgill.ca/students/srr/honest/](http://www.mcgill.ca/students/srr/honest/) for more information) (approved by Senate on 29 January 2003)

**Assignment Languages:** In accordance with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

*Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté.*

# Class Schedule

Schedule may shift due to unforeseen circumstances

## 4 January: Introduction

Read class syllabus

Email Jonathan with (1) preferred name and pronouns, (2) what you hope to gain from this class, and (3) anything else I should know to help you get the most from this course.

## 6 January: Ecological Holism

Bateson, Gregory. 2000. "Pathologies of Epistemology." In *Steps to an Ecology of Mind*, 486–95. Chicago: University of Chicago Press.

Guattari, Félix. 2014. *The Three Ecologies*. London: Bloomsbury Academic.

**Key Questions:** What is an ecology? How and why should they be understood holistically?

## 11 January: Laws of Nature

Daston, Lorraine. 2022. "Natural Laws and Laws of Nature." In *Rules: A Short History of What We Live By*, 212–37. Princeton: Princeton University Press

**Key Questions:** What is "nature?" How has it been conceptually structured through ideas of order and regularity?

## 13 January: The Ecosystem Concept

Willis, Arthur J. 1997. "The Ecosystem: An Evolving Concept Viewed Historically." *Functional Ecology* 11: 268–71.

Levin, Simon A. 1992. "The Problem of Pattern and Scale in Ecology: The Robert H. MacArthur Award Lecture." *Ecology* 73 (6): 1943–67.

**Key Questions:** What is an ecosystem? How does it build on or contrast from other framings of nature or ecology?

## 18 January: Infrastructures of Ecosystems Science

Chapters 1 and 2 in Edwards, Paul N. 2013. *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. Cambridge: MIT Press.

**Key Questions:** What conceptual and material conditions must be in place to think of a "global climate?"

## 20 January: Indigenous Critiques of Global Climate Science

Liboiron, Max. 2021. "Land, Nature, Resource, Property." In *Pollution Is Colonialism*, 39-79. Durham: Duke University Press.

**Key Questions:** How do Indigenous and anti-colonial challenge the presumed globalism of climate science?

## 25 January: Quantifying and Qualifying Complexity

Chapters 3 and 4 in Pagels, Heinz R. 1989. *The Dreams of Reason: The Computer and the Rise of the Sciences of Complexity*. New York: Bantam.

**Key Questions:** What is complexity? How can it be studied analytically?

### **27 January: Chaos and Systematicity**

Prigogine, Ilya and Isabelle Stengers. 1984. "The Three Stages of Thermodynamics" in *Order Out of Chaos: Man's New Dialogue with Nature*, 131-176. New York: Bantam Books.

**Key Questions:** How can a rule-governed, deterministic system exhibit unpredictable behavior?

### **1 February: Complex Adaptive Systems**

Solé, Ricard V., and Jordi Bascompte. 2006. "Nonlinear Dynamics" in *Self-Organization in Complex Ecosystems*. Monographs in Population Biology 42, 17-64. Princeton: Princeton University Press.

**Key Questions:** How do the principles of chaos and complex dynamics apply to ecosystems?

### **3 February: Unruly Complexity**

Taylor, Peter. 2011. "Conceptualizing the Heterogeneity, Embeddedness, and Ongoing Restructuring That Make Ecological Complexity 'Unruly.'" In *Ecology Revisited: Reflecting on Concepts, Advancing Science*, edited by Astrid Schwarz and Kurt Jax, 87–95. New York: Springer.

**Key Questions:** What challenges emerge from framing ecosystems as complex systems?

### **8 February: Climate Models**

Chapters 6 and 7 in Edwards, Paul N. 2013. *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. Cambridge: MIT Press.

**Key Questions:** How can complex climate be modelled?

### **10 February: Modelling Surprise**

Schneider, Stephen H. 2004. "Abrupt Non-Linear Climate Change, Irreversibility and Surprise." *Global Environmental Change*, 14 (3): 245–58.

**Key Questions:** How can surprise both be unexpected and predicted? What does it mean to plan for surprise?

### **15 February: Climate Governance**

Chapters 1 and 4 in Knox, Hannah. 2020. *Thinking Like a Climate: Governing a City in Times of Environmental Change*. Durham: Duke University Press.

**Key Questions:** How does the quantification and modelling of the climate crisis work in practice?

### **17 February: Mineiro Case Studies of Environmental Modelling**

Xavier, Marcos Vinícius Eloy, Andrea Marcello Bassi, Cibele Mally de Souza, Wilson Pereira Barbosa Filho, Kevin Schleiss, and Felipe Nunes. 2013. "Energy Scenarios for the Minas Gerais State in Brazil: An Integrated Modeling Exercise Using System Dynamics." *Energy, Sustainability and Society* 3 (1): 17.

Nunes, Felipe, Britaldo S. Soares-Filho, Raoni Rajão, and Frank Merry. 2017. "Enabling Large-Scale Forest Restoration in Minas Gerais State, Brazil." *Environmental Research Letters* 12 (4): 044022.

**Key Questions:** How do environmental models shape policy choices?

## **22 February: Financializing the Climate**

Callison, Candis. 2014. "What Gets Measured Gets Managed." In *How Climate Change Comes to Matter: The Communal Life of Facts*, 201-241. Experimental Futures. Durham: Duke Univ. Press.

**Key Questions:** What gets overlooked through an economic framing of environmental politics?

## **24 February: Green Economics**

Price, Matt. 2004. "Economics, Ecology, and the Value of Nature." In *The Moral Authority of Nature*, edited by Lorraine Daston and Fernando Vidal, 182-204. Chicago: University of Chicago Press.

**Key Questions:** Can ecology and economics be unified?

## **8 March: Governance and Values**

Fortun, Kim, and Mike Fortun. 2005. "Scientific Imaginaries and Ethical Plateaus in Contemporary U.S. Toxicology." *American Anthropologist* 107 (1): 43-54.

**Key Questions:** How do science, politics, and ethics interact in regulation?

## **10 March: Green and Blue Infrastructure**

Carse, Ashley. 2012. "Nature as Infrastructure: Making and Managing the Panama Canal Watershed." *Social Studies of Science* 42 (4): 539-63.

Ballestero, Andrea. 2015. "The Ethics of a Formula: Calculating a Financial-Humanitarian Price for Water." *American Ethnologist* 42 (2): 262-78.

**Key Questions:** What is "infrastructure?" What assumptions and questions are implicit in infrastructural projects?

## **15 March: Ecological Development**

Ogden, Laura. 2008. "The Everglades Ecosystem and the Politics of Nature." *American Anthropologist* 110 (1): 21-32.

Lyons, Kristina Marie. 2014. "Soil Science, Development, and the 'Elusive Nature' of Columbia's Amazonian Plains." *Journal of Latin American and Caribbean Anthropology* 19 (2): 212-36.

**Key Questions:** How does the concept of ecology shape development politics?

## **17 March: Climate Models in Global Governance**

Read the full series at Blair, James J. A., and Cindy Isenhour. 2022. "Negotiating the Crisis: Critical Perspectives on Climate Governance." *Fieldsights*, Hot Spots, June. <https://culanth.org/fieldsights/series/negotiating-the-crisis>.

**Key Questions:** How do anthropologists approach a global phenomenon like the COP meetings? What kinds of information are helpful?

## **22 March: Absurdist Climates**

Petryna, Adriana. 2018. "Wildfires at the Edges of Science: Horizoning Work amid Runaway Change." *Cultural Anthropology* 33 (4): 570-95.

Rojas, David. 2016. "Climate Politics in the Anthropocene and Environmentalism Beyond Nature and Culture in Brazilian Amazonia." *PoLAR: Political and Legal Anthropology Review* 39 (1): 16-32.

**Key Questions:** How does science progress when it seems impossible to provide solid or helpful information?

### **24 March: The Limits of Criticism**

Masco, Joseph. 2015. "The Crisis in Crisis." In *Infrastructure, Environment and Life in the Anthropocene*. Montreal, QC.

**Key Questions:** What is the place of academic critique in the climate crisis?

### **29 March: Apocalypse Now**

Bendell, Jem. 2018. "Deep adaptation: a map for navigating climate tragedy." Institute for Leadership and Sustainability (IFLAS) Occasional Papers Volume 2. University of Cumbria, Ambleside, UK.

Optional: Zing, Tsjeng. 2019. "The Climate Change Paper So Depressing It's Sending People to Therapy." Vice. February 27, 2019.

<https://www.vice.com/en/article/vbwpdb/the-climate-change-paper-so-depressing-its-sending-people-to-therapy>.

**Key Questions:** Is it helpful to present the climate crisis as apocalyptic? What are the stakes of this framing?

### **31 March: The End of Whose World?**

Mitchell, Audra, and Aadita Chaudhury. 2020. "Worlding beyond 'the' 'End' of 'the World': White Apocalyptic Visions and BIPOC Futurisms." *International Relations*, August, 1–24.

Whyte, Kyle P. 2018. "Indigenous Science (Fiction) for the Anthropocene: Ancestral Dystopias and Fantasies of Climate Change Crises."

*Environment and Planning E: Nature and Space* 1 (1–2): 224–42.

**Key Questions:** How do apocalyptic narratives frame the climate crisis? How do these perspectives interact with Indigenous experiences?

### **5 April: Climate Stories**

Rice, Waubgeshig. 2018. *Moon of the Crusted Snow*. ECW Press.

**Key Questions:** Can literature provide another avenue for understanding the climate crisis?

### **13 April: Conclusion**

Bring your research papers to class.