

**Thinking Socially in Social-Ecological Systems (RES 510)**

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### Purpose

At the core of many environmental issues are intertwined social and ecological processes that drive changes for both ecological systems and human communities at multiple scales. The multiple causes of environmental problems have long troubled traditional academic approaches because social and ecological systems have generally been studied separately. Increasingly, interdisciplinary socio-ecological approaches are being developed in order to consider these processes together, providing important insights regarding the complex dynamics of diverse and interlinked processes operating across temporal and spatial scales. This course investigates both disciplinary and interdisciplinary approaches that are important to understanding connections and linkages across social and ecological realms. This will include exposure to several case studies, and also to fields of study, their key constructs, and their methods that focus on coupled systems and the integration of socio-ecological perspectives. Attention will also be paid to the evaluation of perspectives where such integration does not yet occur and why this matters. Students will leave the course with an understanding of (i) how these interlinked systems and dynamics function (or are dysfunctional), (ii) how existing policies, economic incentives, governance regimes, behaviors (individual and collective), and preferences affect these systems and processes and (iii) how new policies and institutions might learn from available research to better promote sustainable trajectories.

### Learning Objectives and Outcomes:

By the end of the course, all students should be able to do the following:

1. Synthesize from the literature a dozen key concepts and processes from the natural and social sciences that are necessary for understanding ecological and social dynamics and their intersection in environmental problems;
2. Identify and describe major approaches that help to integrate social and ecological, or human-natural systems, dynamics, or understandings;
3. Analyze the strengths and weaknesses of different approaches, including how they may help navigate environmental change;
4. Analyze and express what purposeful socio-ecological change might entail, and understand how such changes might be engineered or fostered through policy, management, or other interventions;
5. Communicate key elements of the politics and policies (formal and informal) as drivers of change and the implications of these for just governance, institutions and outcomes;
6. Describe several of the major critiques of 'systems' perspectives, including difficulties associated with bounding the system, and 'compartmentalized' and fragmented understandings of complex interrelated processes;
7. Describe the criteria for systems to be complex and adaptive (including the difference between biological and physical systems); and, conversely, what it might mean for social and governance systems to be 'adaptive'.
8. Understand emerging social ecologies and their implications for ideas about system change and adaptive management?
9. Explain the relevance of debates about human behaviour, behaviour change and values and their implications for both assessing and assigning value to system changes

### Course Description

The course will cover the building blocks for systemic/dynamic understanding of social-ecological systems, with two weeks spent on the biophysical perspectives and two weeks on social perspectives. We will then move to integrative social-ecological approaches and consider what these include and attend to, and what remains sidelined. Using case studies, we will ground these lessons in diverse contexts. Students will also work in interdisciplinary teams for final projects, which can be more research-oriented or more practice-oriented.

## Course Policies

As per university requirements:

### Attendance

Following university regulation, regular attendance is expected of students. Students who neglect their academic work and assignments may be excluded from the final examinations (note: there are no exams in this course). Students who are unavoidably absent because of illness or disability should report to their instructors as soon as they are able.

The University accommodates students with disabilities who have registered with the Disability Resource Centre. The University accommodates students whose religious obligations conflict with attendance, submitting assignments, or completing scheduled assignments. Please let the instructors know in advance, preferably in the first week of class, if you will require any accommodation on these grounds. Students who plan to be absent for varsity athletics, family obligations, or other similar commitments, cannot assume they will be accommodated, and should discuss their commitments with the instructor before the drop date.

### Late Assignments

When exceptional circumstances will prevent you from completing an assignment on time, you may request an extension and it will be granted where possible and appropriate. In the absence of a granted extension, a 5% reduction of grade will be assigned for each day an assignment is late beyond the required due date.

### Academic Dishonesty

Please review the UBC Calendar "Academic regulations" for the university policy on cheating, plagiarism, and other forms of academic dishonesty. Students should retain a copy of all submitted assignments (in case of loss) and should also retain all their marked assignments in case they wish to apply for a Review of Assigned Standing. Students have the right to view their marked examinations with their instructor, providing they apply to do so within a month of receiving their final grades. This review is for pedagogic purposes. The examination remains the property of the university.

## Schedule

### Week 1 (January 3<sup>rd</sup>): Social-Ecological Systems (SES): What Are They, and Why Study Them?

Introduction to the course content, structure, and purpose. Introductions to course professors and fellow students, including our various research and learning goals. A mini-lecture on the history of social-ecological systems thinking and its possible application to contemporary environmental issues; and discussion of relative foci/strengths and omissions/weaknesses.

Learning Objectives:

1. Trace a rough history of academic mindset on SES
2. Initial understanding of strengths, limits, and foci of SES
3. Understand well the overall semester goals

#### **Readings:**

*Mandatory:*

Berkes, F., J. Colding and C. Folke, Eds. (2003). Navigating Social-Ecological Systems: Building Resilience for Complexity and Change. Cambridge, UK, Cambridge University Press. Pp. 1-30

[http://books.google.ca/books?id=Joh0\\_7X5DHMC](http://books.google.ca/books?id=Joh0_7X5DHMC)

Liu, J. G., T. Dietz, S. R. Carpenter, et al. (2007). "Complexity of coupled human and natural systems." Science **317**(5844): 1513-1516. <http://www.sciencemag.org/cgi/content/full/317/5844/1513>

Schoon, Michael; Sander van der Leeuw (2015) The Shift Toward Social-Ecological Systems Perspectives: Insights into the Human-Nature Relationship. *Nature, Sciences, Societies*. *23*, 166-174

#### **Questions for Thinking Through Readings:**

1. When considering Berkes *et al.*, and given your existing knowledge, what kinds of ecological processes or considerations are glossed over or 'assumed' and/or what kinds of social phenomena are considered and not?
2. How is the concept of resilience operationalized in Berkes *et al.*, and what exactly is being made 'resilient' in response to 'what'?
3. Should we be thinking of SES with respect to resilience only, or should other 'goals' be just as primary?
4. What are the major shifts that Schoon and van der Leeuw identify as trends in SES work, *in your own language*?
5. What for Liu et al. 2007 are the defining features of complexity and what kinds of demands do these ideas place on the provision and use of evidence?

### Week 2 (January 10): Updated SES Framework Resilience and Vulnerability

#### **Key Concepts:**

Vulnerability, resilience, social networks, coping,

Learning Objectives:

1. Solidify as much as possible your definitions of the key concepts
2. Understand some empirical options for investigating these and what makes that difficult
3. Clarify the different trajectories of SES work (and theory) that has occurred between Berkes chapter last week and McGinnis and Ostrom's update.

#### **Readings:**

McGinnis, Michael D., and Elinor Ostrom. "Social-ecological system framework: initial changes and continuing

challenges." *Ecology and Society* 19.2 (2014): 30.

Adger, W. N. (2006). "Vulnerability." *Global Environmental Change* 16(3): 268-281.

<http://www.sciencedirect.com/science/article/pii/S0959378006000422>

Miller, Fiona, et al. "Resilience and vulnerability: complementary or conflicting concepts?." *Ecology and Society* 15.3 (2010): 1-25.

Thrush, S.F. et al., 2009. Forecasting the limits of resilience: integrating empirical research with theory. *Proceedings of the Royal Society B: Biological Sciences*, 276(1671): 3209-3217.

Turner et al. (2003) Illustrating the coupled human-environment system for vulnerability analysis: Three case studies. *PNAS* 100(14):8080-8085.

*Presentation:*

A Van Apeldoorn, D. F., et al. (2011) Panarchy rules: rethinking resilience of agroecosystems, evidence from Dutch dairy-farming. *Ecology and Society* 16(1): 39. [online] URL: <http://www.ecologyandsociety.org/vol16/iss1/art39/>

**Questions for Thinking Through Readings:**

1. McGinnis and Ostrom identify the central problem of distinguishing key processes and outcomes of SES in different contexts. How doable is this challenge and are their contexts where the line between process and outcome is blurred?
2. Is their differentiation of theory, model and framework useful – why or why not?
3. Adger found himself frustrated with ecological notions of vulnerability and therefore sought a largely social definition. Does he overstate this difference, and in what sense is his operationalization of vulnerability (once defined for yourself) more SES or S?
4. Many argue that vulnerability and resilience are two sides of the same coin: Prepare and defend for yourself whether you see this claim and mostly true or false?

**Week 3. (Jan 17) Primary SES Theory II: Adaptive Cycle, Thresholds and Regime Change**

*Learning Objectives:*

*Readings:*

Folke, C., S. Carpenter, B. Walker, M. Scheffer, T. Elmqvist, L. Gunderson and C. S. Holling (2004). "Regime shifts, resilience, and biodiversity in ecosystem management." *Annual Review of Ecology Evolution and Systematics* 35: 557-581 <http://arjournals.annualreviews.org/doi/abs/10.1146%2Fannurev.ecolsys.35.021103.105711>

Groffman, Peter M., et al. "Ecological thresholds: the key to successful environmental management or an important concept with no practical application?." *Ecosystems* 9.1 (2006): 1-13.

Gunderson, L., Holling, C.S. and Peterson, G. (2002) Surprises and Sustainability: Cycles of renewal in the Everglades (Ch 12). In: Panarchy. Understanding transformations in human and natural systems. Eds. Gunderson, L. and Holling, C.S. Island Press.

Walker, B. H., N. Abel, J. M. Anderies, and P. Ryan. 2009. Resilience, adaptability, and transformability in the Goulburn-Broken Catchment, Australia. *Ecology and Society* 14(1): 12. [online] URL: <http://www.ecologyandsociety.org/vol14/iss1/art12/>

**Questions for Thinking Through Readings:**

1. Can we and should we think of institutions as responsive or adaptive, and what makes them so (or not)? [Folke et al. 2005]
2. Reflecting critically on Holling's article: How much and what kind of evidence is presented in support of adaptive cycles? Of panarchy? How prevalent should we expect such dynamics to be, and how regular a procession through phases of the adaptive cycle?
3. In what circumstances might it be preferable to manage for transformability rather than resilience? [Walker et al.]

*In class activity:*

*1. Group problem-solving, based on readings*

#### **Week 4. Jan 24: Some Ecological Critiques of SES**

Guest lecture: [Kai Chan](#) IRES

#### **Key Concepts:**

Identify key concepts from ecology as applied to particular SES contexts, which provide critical understanding of the issue and the pertinent SES dynamics.

#### **Readings:**

Groffman, Peter M., et al. "Ecological thresholds: the key to successful environmental management or an important concept with no practical application?" *Ecosystems* 9.1 (2006): 1-13.

Ellis, E and Ramankutty, N. (2008) Putting people in the map: anthropogenic biomes of the world. *Frontiers in Ecology and the Environment* 6(8): 439–447.

Spencer, C. N., B. R. McClelland and J. A. Stanford (1991). "Shrimp stocking, salmon collapse, and eagle displacement." *BioScience* 41: 14-21. <http://www.jstor.org/stable/1311536>

Levin, S. A. (2005). "Self-organization and the emergence of complexity in ecological systems." *BioScience* 55(12): 1075-1079. [http://dx.doi.org/10.1641/0006-3568\(2005\)055\[1075:SATEOC\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2005)055[1075:SATEOC]2.0.CO;2)

#### **Questions for Thinking Through Readings:**

Questions

1. Re: Levin 2005, What makes a system complex? What distinguishes a complex adaptive system from a complex one? Which is more predictable? What is the atmosphere (just complex, or complex adaptive)? The biosphere?
2. If you could express the single-most important general insight from Spencer et al., pertinent to all ecosystem managers, what would it be? How predictable were the events described? How predictable in general are the outcomes of species introductions?
3. To what extent does Groffman explode the concept of thresholds – and do the problems he identifies matter more for theory or practice? Why?
4. Why might a biome classification provide a better basis for understanding coupled systems and what new questions for SES does such an approach inspire?
5. Does Groffman provide a compelling argument for why thresholds are an elusive basis for understanding system change? Why?

6. If you could express the single-most important general insight from Spencer et al., pertinent to all ecosystem managers, what would it be? How predictable were the events described? How predictable in general are the outcomes of species introductions?

***In class activities:***

**Week 5. Jan 31: Institutions, Adaptive Capacity and Management**

***Learning Objectives:***

Much depends on institutions, and adaptive capacity, understand why and critically evaluate whether some practices viz adaptation are more important than others – which and why? Understand some logics for evaluating adaptive capacity.

***Readings:***

Engle, N. L. (2011). "Adaptive capacity and its assessment." *Global Environmental Change*, 21(2): 647-656.

<http://www.sciencedirect.com/science/article/pii/S0959378011000203>

Ostrom, Elinor, et al. "Revisiting the commons: local lessons, global challenges." *Science* 284.5412 (1999): 278-282.

Ostrom, Elinor. "Background on the institutional analysis and development framework." *Policy Studies Journal* 39.1 (2011): 7-27.

Berman, Rachel, Claire Quinn, and Jouni Paavola. "The role of institutions in the transformation of coping capacity to sustainable adaptive capacity." *Environmental Development* 2 (2012): 86-100.

Armitage, D. 2005. Adaptive capacity and community-based natural resource management. *Environmental Management*, 35: 703–715.

Olsson, P., C. Folke and T. P. Hughes (2008). "Navigating the transition to ecosystem-based management of the Great Barrier Reef, Australia." *Proceedings of the National Academy of Sciences of the United States of America* 105(28): 9489-9494. <http://dx.doi.org/10.1073/pnas.0706905105>

***Questions for Thinking Through Readings:***

***In class activities:***

1. *Group problem-solving, based on readings*

2. *Hand out/discuss assignment*

**Week 6. Feb 7. Shocks and Stressors and the Real Life of Constructs**

*Guest lecture: Maery Kaplan-Hallam, Gerald Singh IRES?*

***Key Concepts:***

Understand the difference between shocks and stressors; provide some logics for how to identify both and the evidence that might apply for such identification. Understand why the distinction matters. Chronic disasters; corrosive communities; contamination and community stigma



**Readings:**

Baggio, Jacopo A., et al. "Multiplex social ecological network analysis reveals how social changes affect community robustness more than resource depletion." *Proceedings of the National Academy of Sciences* 113.48 (2016): 13708-13713.

Bromet, E. J., J. M. Havenaar and L. T. Guey (2011). "A 25 year retrospective review of the psychological consequences of the Chernobyl accident." *Clinical Oncology* 23(4): 297-305.

<http://www.sciencedirect.com/science/article/pii/S0936655511005334>

Jackson, J. B. C., M. X. Kirby, W. H. Berger, et al. (2001). "Historical overfishing and the recent collapse of coastal ecosystems." *Science* 293(5530): 629-638. <http://www.jstor.org/stable/3084305>

Caves, E. M., S. B. Jennings, J. HilleRisLambers, J. J. Tewksbury and H. S. Rogers (2013). "Natural experiment demonstrates that bird loss leads to cessation of dispersal of native seeds from intact to degraded forests." *PLoS ONE* 8(5): e65618. <http://dx.doi.org/10.1371/journal.pone.0065618> (Open access)

Freudenburg, W. et al. 2008 Organizing Hazards, Engineering Disasters? *Social Forces* Volume 87(2): 1015-1038. <http://sf.oxfordjournals.org/content/87/2/1015.short> <http://www.stevenpicou.com/pdfs/community-impacts-of-the-exxon-valdez-oil-spill.pdf>

**Questions for Thinking Through Readings:**

1. Do some events produce more shocks than stressors and why?  
Which is worse and why?

**In class activities****Week 7. Feb 14: Rethinking SES I: The New Social Ecologies****Key Concepts:**

Actor Network Theory, Constructed Natures,

**Readings:**

Davidson, D., 2010. The Applicability of the Concept of Resilience to Social Systems: Some Sources of Optimism and Nagging Doubts. *Society & Natural Resources*, 23(12), pp.1135-1149.

Bosco, (2006) Actor Network Theory: Networks and Relational Approaches to Human Geography, in Aitken and Valentine, *Approaches to Human Geography*. Sage Publications, London. (pages 136-139; 144-146 only)

Page, Justin (2014) *Tracking the Great Bear, Select Chapters*. Vancouver: UBC Press

Robbins, P. (2004). "Comparing Invasive Networks: Cultural and Political Biographies of Invasive Species." *Geographical Review* 94(2): 139 - 156.

**Questions for Thinking Through Readings:**

**In class activities:**

Week 8. Feb 28: Rethinking the Social II: further Thinking on How Change Works [Might Work] Socially

**Key Concepts:****Readings:**

Robards, M. D., M. L. Schoon, C. L. Meek and N. L. Engle (2011). "The importance of social drivers in the resilient provision of ecosystem services." *Global Environmental Change* **21**(2): 522-529.  
<http://www.sciencedirect.com/science/article/pii/S0959378010001172>

Fehr, E. and A. Falk (2002). "Psychological foundations of incentives." *European Economic Review* **46**(4-5): 687-724.  
<http://www.sciencedirect.com/science/article/pii/S0014292101002082>

Kahan, D. (2010). "Fixing the communications failure." *Nature* **463**(7279): 296-297.  
<http://dx.doi.org/10.1038/463296a>

John, P., G. Smith and G. Stoker (2009). "Nudge nudge, think think: Two strategies for changing civic behaviour." *The Political Quarterly* **80**(3): 361-370. <http://dx.doi.org/10.1111/j.1467-923X.2009.02001.x>

Shove, E. (2010). "Beyond the ABC: climate change policy and theories of social change." *Environment and Planning A* **42**(6): 1273-1285. <http://www.envplan.com/abstract.cgi?id=a42282>  
[https://blog.itu.dk/hest/files/2012/10/shove\\_abc.pdf](https://blog.itu.dk/hest/files/2012/10/shove_abc.pdf)

Eakin, H. (2005). "Institutional Change, Climate Risk and Rural Vulnerability: Cases from Central Mexico." *World Development* **33**(11): 1923- 2938.

**In class activities (tba):**

1. Case study selection and group discussion
2. Group problem solving, based on readings

Week 9. March 7: Assessing Social-Ecological Change

**Note: Project status updates presented in class**

**Key Concepts and In Class Activity:****Readings:**

Anderies, John M., Marco A. Janssen, and Elinor Ostrom. "A framework to analyze the robustness of social-ecological systems from an institutional perspective." *Ecology and society* **9.1** (2004): 18.

Neumayer and Plumper (2007) The gendered nature of natural disasters: the impact of catastrophic events on the gender gap in life expectancy, 1981 – 2002. *Annals of the Association of American Geographers* **97** (3): 551 – 566.

Ban, Natalie C., et al. "Applying empirical estimates of marine protected area effectiveness to assess conservation plans in British Columbia, Canada." *Biological Conservation* **180** (2014): 134-148.

Turner, N. J. and K. L. Turner (2008). ""Where our women used to get the food": cumulative effects and loss of ethnobotanical knowledge and practice; case study from coastal British Columbia." *Botany* **86**(2): 103-115. <http://dx.doi.org/10.1139/B07-020>

Hagerman, Shannon M., Hadi Dowlatabadi, and Terre Satterfield. "Observations on drivers and dynamics of environmental policy change: insights from 150 years of forest management in British Columbia." *Ecology and Society* 15.1 (2010): 2.

### **Presentation Readings**

Heath, C. and D. Heath (2010). *Switch: How to Change Things When Change Is Hard*. New York, Crown Publishing Group. (at least Chapter 1) <http://books.google.ca/books?id=QgzBqhbdlvUC>

### **Questions for Thinking Through Readings:**

### **In Class Activities**

#### **Week 10. March 14: Valuing Social-Ecological Change**

Hagerman, S and Satterfield, T. [Agreed but not preferred: expert views on taboo options for biodiversity conservation, given climate change](#). *Ecological Applications*, 24(3), 2014, pp. 548–559

Satterfield, T. and L. Kalof (2005). Environmental values: An introduction. *The Earthscan Reader in Environmental Values*. L. Kalof and T. Satterfield. Sterling, VA, Earthscan: xxi-xxxiii. [url](#)

Slovic, P., D. Zionts, A. K. Woods, R. Goodman and D. Jinks (2011). Psychic numbing and mass atrocity. *The Behavioral Foundations of Public Policy*. E. Shafir. Princeton, NJ, Princeton University Press: 126-142. [http://papers.ssrn.com/sol3/Papers.cfm?abstract\\_id=1809951](http://papers.ssrn.com/sol3/Papers.cfm?abstract_id=1809951) [url](#)

Presentation Reading:

Heal, G. (1999) Markets and Sustainability. *The Science of the Total Environment* 240:75-89 <http://www.sciencedirect.com/science/article/pii/S0048969799003149>

#### **Week 11. March 21: Workshopping SES Constructs and their Empirical Expressions**

#### **Week 12. March 28: Student Case Study Presentations**

#### **Week 13. Reschedule: Student Case Study Presentations**

## Assignments

### Overview

This course will be run as a graduate-level seminar. This means that reading, critical responses, and discussion are essential to the success of the course and your own learning. You *absolutely* should have completed all readings before coming to class.

Your grade for the course will be determined as follows:

Short Papers @ 3	45%
Case Study Proposal	5%
Presentation of Paper Ideas	10%
Case Study Presentation	10%
Case Study Paper	30%
Class Participation	Modifier

Assigned readings may change slightly throughout the semester, but all readings will be finalized and each week's reading list made available at least two weeks prior to the due date.

### Assignments Schedule

- Various weeks: Short Papers Addressing Readings and Core Concepts and Debates (1000 words each)
- Feb 28: Case Study Proposal Due
- March 28 & ?: Case Study Presentation
- Dec 4: Final Case Study Paper Due