The Global Wildfire Problem as a Social-Ecological System

Course Number
● UM EAS 677.056 (1.5 credits)

Meeting Dates and Times
● Tuesdays, March 14-April 18
● US Eastern time: 1-3 PM

Meeting Location
● Zoom [https://umich.zoom.us/j/95959929995](https://umich.zoom.us/j/95959929995) (passcode in Course Google Drive folder)

Instructors
● Heidi Huber-Stearns, School for Environment and Sustainability, University of Michigan, hstearns@umich.edu

COURSE DESCRIPTION
Fire is an important process in many terrestrial ecosystems, but around the world it is also becoming an increasingly devastating natural hazard. As wildfires burn larger areas at higher severities, fire fighters struggle to fulfill mandates for protecting life and property, forest managers question whether current strategies will ensure forests and their ecosystem services in the future, and communities face difficult decisions about how to cope while equitably distributing the costs of risk mitigation and recovery. Wildfire is now recognized as a pressing yet intractable environmental problem with complex social and ecological causes and consequences. This is especially true in places like the US Pacific Northwest and South-Central Chile where large wildfires were historically uncommon but now break out with disturbing regularity.

In this graduate-level virtual seminar, students will investigate the global wildfire problem through the lens of social-ecological systems (SES) theory. SES theory provides a framework for understanding complex problems through analysis of social, ecological, and technical forces in an integrated way. Concepts from the SES literature such as feedbacks, path dependency, and cross-scale interactions have the potential to enhance understanding of environmental problems, potentially leading to more sophisticated solutions.

Through analysis of research papers, news articles, documentaries, and reports, and discussions, we will build our collective
understanding of wildfire as a SES and how to manage it as such. We will use the wildfire situation in the western US to advance our understanding of SES theory as it relates to wildfire risk. This course will help prepare students for applied research and practice in the context of complex environmental programs and in geographic regions affected by wildfire specifically.

1 COURSE OBJECTIVES
By the end of this course, students will be able to:
● Identify key social, ecological, and technical forces that shape wildfire risk globally, and especially in regions where wildfires were previously infrequent
● Understand key SES concepts that are relevant for wildfire risk
● Describe key system dynamics that govern wildfire risk
● Understand how an analysis of wildfire as SES can inform policy and management

COURSE ORGANIZATION AND ASSIGNMENTS
Class sessions will include discussion of journal articles, reports, and documentaries; conversations with faculty working on wildfire; and presentations of students' own graphic and narrative characterizations of wildfire as an SES.

Each week, students should read assigned scholarly journal articles and come to class prepared to discuss these articles. Students will also search for and read several news articles about wildfire risk and post interesting articles to a Slack channel with comments about any SES dynamics they feature.

FINAL ASSIGNMENT: For the final assignment, students will develop a simple conceptual model of a wildfire SES and a potential management, policy, or governance intervention. The assignment must include a graphic representation of the conceptual model (i.e., a figure) and a written description of the key components, relationships among components (i.e., system dynamics), and potential interventions. The written component should be no more than two single-spaced pages in length (not including references) and should include citations to scholarly articles and, at least two sources of relevant gray literature. The final assignment should be submitted as a Word file with an image of the graphic figure inserted into the document. Students can work on the final assignment independently or in groups. If working in a group, students may choose to submit either individual papers, or one final assignment document with all group members listed on it. Students will present their conceptual models and interventions to the class on April 18, for approximately 5 minutes. These models can be in any stage of completion, since it is before the assignment due date.

Final assignment now due before midnight eastern April 21, 2023

Grading scheme: Pass/Fail
<table>
<thead>
<tr>
<th>WEEK</th>
<th>ASSIGNMENTS DUE (Readings can be found in course folder)</th>
<th>IN-CLASS ACTIVITIES</th>
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| 1 (3/14) | 1. Read and come prepared to discuss papers on SESs and wildfire risk:  
   c. Optional: Luvuno et al. 2018. Woody Encroachment as a Social Ecological Regime Shift. | 1. Introductions  
2. Mini-lectures:  
   a. Dr. Paige Fischer  
   b. Dr. Heidi Huber-Stearns |
| 2 (3/21) | 1. Read and come prepared to discuss papers on the global wildfire trends:  
   c. Optional: Doerr and Santin 2016. Global trends in wildfire and its impacts: perceptions versus realities in a changing world. | Activity 1: Think about a different region in the world where wildfire is an issue. Give examples of how a specific community is vulnerable to wildfire, including: where is it, what has been occurring related to wildfire, why is this community vulnerable and what they are doing to address vulnerabilities. |
| 3 (3/28) | 1. Read and come prepared to discuss papers on drivers of wildfire risk:  
   b. Higuera et al. 2023. Shifting social-ecological fire regimes explain increasing structure loss from Western wildfires.  
   c. Optional:  
2. Post news article(s) to Slack with comments | Activity 2: Brainstorm and organize drivers of wildfire risk, including feedbacks, time lags, and interactions across temporal and spatial scales |
| 4 (4/4) | 1. Read and come prepared to discuss papers on impacts of wildfire risk:
   c. Optional: Coop et al. 2020. "Wildfire-Driven Forest Conversion in Western North American Landscapes." Bioscience 70(8): 659-673. 2. Post news article(s) to Slack with comments | Activity 3: Brainstorm and organize key impacts (short and long term impacts, impacts with different levels of certainty) |

| 5 (4/11) | 1. Read and come prepared to discuss papers on wildfire SES dynamics:
   b. Adlam et al. (2022) Keepers of the Flame: Supporting the Revitalization of Indigenous Cultural Burning
   2. Post questions for Chris Adlam in shared google doc ("In Class Activities >Week 5") and/or post related recent news articles to Slack and note how they relate to the Adlam et al. article | Guest Lecture: Chris Adlam, Oregon State University Extension Fire Program
Activity 4: Working time for final assignments, group time |
| 6 (4/18) | 1. Read and come prepared to discuss papers on wildfire risk interventions:

2. No Slack posting, can focus on final assignment | Discussion of wildfire risk interventions (Heidi present)

*Activity*: Come prepared to share your SES paper figure (in any stage of completion—does not need to be final) and talk about it for 3-5 minutes.

**Final paper now due by midnight eastern April 21, 2023**