Tufts University | Friedman School of Nutrition Science and Policy

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NUTR 0256: Climate Change: Risk and Adaptation in Food Systems and Beyond
Fall 2022

Class Meetings: Mondays, 9am-12:00pm, MedEd 507

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I welcome you to contact me by email outside of class hours.

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Teaching Asst. Office Hours:

Flaam: TBD or by appointment
Raunaq: TBD or by appointment

Semester Hour Units: 3

Prerequisites: Graduate standing or instructor consent.

Course Description: Climate change is one of the most pressing problems in the world today. This course will focus on the projected impacts of climate change around the world and related adaptations (risk management), with particular attention to humanitarian impacts and food systems. We will cover climate risk assessment, risk perception, risk communication, and climate risk management/adaptation. In doing this, we will cover major climate impacts by sector, as well as their interactions and humanitarian implications.

Each week of class will have two components: a lecture and a lab. The lecture will consist of instructor presentation of content as well as student reflection and discussion. The lab will consist of an exercise or simulation of technologies and methods related to climate impact assessment and management. There is no prior experience needed for the labs.

Students will experiment with different methodologies to assess climate risk and identify impact modeling methodologies that are most appropriate for specific applications. Students will learn why people perceive risk differently and experiment with innovative methods to communicate risk. In the risk management section, students will critique alternative risk management strategies and identify equity and justice implications. As a final project, students will develop a proposal for the Green Climate Fund, which is the largest global fund to address climate change.

Course Goals: Students will understand the variety of impacts of climate change. They will become familiar with methods to assess climate risk, from global, long-term risks to short-term, localized risks.

Students will learn heuristics behind risk perception, and they will evaluate risk communication techniques. Finally, students will understand the variety of climate change adaptation and risk management options that are being used or proposed around the world.

Texts or Materials: Readings are posted online on the course Canvas site.

Academic Conduct: Each student is responsible for upholding the highest standards of academic integrity, as specified in the Friedman School's Policies and Procedures Handbook and Tufts University policies (http://students.tufts.edu/student-affairs/student-life-policies/academic-integrity-policy). It is the responsibility of each student to understand and comply with these standards, as violations will be sanctioned by penalties ranging from failure on an assignment and the course to dismissal from the school.

Classroom Conduct: It is critical for the class that you read all the required readings before attending class, in order to be able to participate effectively in the discussion and labs. The class format is discussion-based, and therefore you will need to participate actively in each class session. Extenuating circumstances arise that can make this difficult. If you cannot attend a class, please let the teaching team know. If circumstances make you miss more than 3 classes during the semester, you may be overextended. I ask that you come see me to discuss your options.

All of us in the class, you, me, your peers, have a responsibility to create an environment in which we can all learn from each other. I expect everyone to participate in class so that we can all benefit from the insights and experiences that each person brings.

The Learning Process: What you can expect over the course of the semester.

1 **Pre-class reading**	2 **Monday first half of class: Lecture and Discussion**	3 **Pre-lab reading**	4 **Monday second half of class: Lab** Interactive exercise Submitted at end of class
5 **Climate Risk Assessment** Individual assignment assessing climate risk for a case study location. This is a written paper that will receive two rounds of feedback in the first half of the course.		6 **Final Project** Groups of 3 develop a written proposal for the Green Climate Fund due at the end of the semester. This will also be presented to the class.	

Assessment and Grading:

Labs: 35%

"Lab" exercises completed on Wednesdays during class time, with submission at end of class
12 labs during the semester; lowest grade is dropped
Grading scheme:

0	Did not participate
1	Partial work
2	Completed
3	Demonstrated mastery of concepts

Climate Risk Assessment: 25%

Format: A three-page policy brief
Topic:

Select a case study location
Identify a stakeholder audience
Detail current and future climate changes
Explain how these climate changes can affect society due to place-specific vulnerabilities

Grading process: You will submit draft 1 of the assignment for a round of peer review by your classmates. Based on their comments, you will revise the assignment and submit draft 2 to the teaching team. The teaching team will send you their feedback, and then you will revise again and submit a final version.
Grading scheme:

30	Revision process: • Thoughtful restructuring and adjustments made in response to feedback from peers and teaching team
30	Overview of climate: • Historical climate changes • Future projections
40	Risk landscape: • Vulnerable populations identified • Possible impacts/outcomes described • Details tailored to stakeholder audience

Final project: 40%

Students form groups of ~3 people, create a group contract (roles, meeting times)
Presented in class in last weeks of semester
Written version due at end of semester, along with a self-assessment and group assessment
Grading scheme:

10	Outline: • Justification • Salience of idea
35	Presentation: • Rationale and country context • Proposed intervention is beneficial and feasible • Information is communicated efficiently and clearly
55	Written submission: • Proposed idea is justified given risk context • Risk management outcomes are realistic and significant • Course material is integrated • All proposal sections are completed

Grading Range: A passing grade in the course is B- or better. Course grades will be based on the below (subject to revision during the course):

A	> 94%
A-	90 - <94%
B+	87 - <90%
B	84 - <87%
B-	80 - <84%

Instructions for Submission of Assignments and Exams: Labs are due at the end of class time and will be submitted via an electronic form provided during class. Assignments are due by midnight on the date assigned, and they should be submitted directly in Canvas. The final project consists of a class presentation and a written portion, the latter to be submitted in Canvas.

Assignments received after their deadline will not be accepted or graded unless an extension is approved in advance. Students who are unable to complete an assignment or exam on time for any reason should notify the instructor by email prior to the deadline, with a brief explanation for why the extension is needed.

Accommodation of Disabilities: Tufts University is committed to providing equal access and support to all students through the provision of reasonable accommodations so that each student may access their curricula and achieve their personal and academic potential. If you have a disability that requires reasonable accommodations, please contact the Friedman School Assistant Dean of Student Affairs at 617-636-6719 to plan for determination of appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeliness a critical aspect for their provision.

Zoom: The zoom link for this class is here. Friedman's on-campus courses may be offered by Zoom on days when the Boston campus is closed due to weather or a temporary cancellation issue. Students should expect to be notified by email if class is cancelled and will be provided with the Zoom link for students to use for any remote class sessions. If the professor needs to quarantine for COVID-19, the class will be held on zoom. Any relevant course slides or materials will be made available on Canvas, and the Zoom will be recorded and posted on Canvas when completed.

Diversity, Equity, and Justice We believe that the diversity of student experiences and perspectives is essential to the deepening of knowledge in this course. We consider it part of our responsibility as instructors to address the learning needs of all of the students in this course. We will present materials that are respectful of diversity: race, color, ethnicity, gender, age, disability, religious beliefs, political preference, sexual orientation, gender identity, socioeconomic status, citizenship, language, or national origin among other personal characteristics.

This course endeavors to follow an antiracist pedagogy, focused on diversity, equity, and justice throughout the material. This includes:

- The authors of assigned readings come from different national and racial backgrounds, including both the Global South and the Global North.
- The topics of study include explicit analysis of equity and justice implications in climate risk assessment and climate change adaptation.
- While the teaching team will provide detailed feedback and instruction on writing style and communication clarity, grammar will not be included in the grading rubric for written assignments. This is to ensure that people with writing styles from diverse backgrounds are not graded differently. Grading will be on content only.
- To ensure a focus on learning rather than ranking of students, grading will include an iterative feedback model, with a student self-reflection required for each assignment.
- Efforts will be made to make everyone feel welcome and comfortable in the class discussions.

Your suggestions on how we can improve are encouraged and appreciated.

Course Topics and Assignment Schedule at a Glance:
This schedule is subject to modification at the instructor's discretion. Courses will be lead by the instructor unless otherwise specified.

Monday	Class Topic	Lab topic	Assignments
12 Sep	**Introduction** Course structure and concepts History of climate change	**Introduction: Lab** C-Roads Negotiation Simulation	
19 Sep	**Introduction** Climate and weather modeling	**Introduction: Lab** Climate data experiments	Climate Risk Assessment assignment posted
26 Sep	**Risk Assessment** Key concepts (guest speaker)	**Risk Assessment: Lab** Crop modeling: AquaCrop	
3 Oct	**Risk Assessment** Global key risks and food systems	**Risk Assessment: Lab** Scenarios and compound events	Draft 1 due of Climate risk assessment Peer review during class
17 Oct	**Risk Assessment** Geoengineering	**Risk Assessment: Lab** Geoengineering game	Draft 2 due of Climate risk assessment
24 Oct	**Risk Assessment** Impact-based Forecasting	**Risk Assessment: Lab** Forewarned and Forearmed scenario exercise	Teaching team returns assignment Draft 2 with feedback
31 Oct	**Risk Perception** Heuristics	**Risk Perception: Lab** Cognitive biases and climate	Final version of Climate risk assessment due
7 Nov	**Risk Communication** Strategies *(recorded for Fletcher students)*	**Risk Communication: Lab** Paying for Predictions Game *(alt. date for Fletcher students)*	Group project assigned
14 Nov	**Risk Management** Adaptation overview, finance National Adaptation planning	**Risk Management: Lab** COP 27 Open space for sharing	Group project outline due
21 Nov	**Risk Management** Unprecedented extremes: simulation, attribution, scenarios	**Risk Management: Lab** Peer review article	
28 Nov	**Risk Management** Health and nutrition	**Risk Management: Lab** Maladaptation	Group project check-in with TAs this week
5 Dec (zoom)	**Risk Management** Farming and agriculture Guest panel	**Risk Management: Lab** Public comment	
12 Dec	**Final projects** Presentations	**Final projects** Presentations	Presentations due
19 Dec	**No class: assignment due**		Written group project due

Detailed Description of Course Topics, Assignment Schedule, and the Learning Goals for Each Class Session:
This schedule is subject to modification at the instructor's discretion.

Date of Class: 12 September

Course Topics: Introduction to course structure and concepts, history of climate change

Lecture Objectives:

1. Become familiar with each other and the teaching team.
2. Define basic concepts of climate change mitigation, adaptation, geoengineering, and their relationship.
3. Articulate fundamental questions about climate.
4. Define learning goals for the semester
5. Relate major historical milestones in climate science and climate policy.
6. Describe the interplay between advancements in climate science, international climate governance, major geopolitical events, and development transitions.
7. Define the purpose and roles of the IPCC and the UNFCCC.
8. Describe the evolution of climate discourse since 1990.

Required Reading:

- Excerpt from "The Future We Choose" by Christiana Figures & Tom Rivett-Carnac
- The Fragile Framework

Christiana Figueres, Costa Rica

"Optimism is not soft, it is gritty."
- The Future We Choose

Lab: C-ROADS climate negotiation simulation

All students are assigned a country; they then proceed in a mock negotiation about emissions and adaptation commitments. Results of the negotiation are fed into a simple climate model, and students are given feedback about how their results affect global climate change.

Lab Objectives:

1. Dissect the variety of international positions on climate change mitigation and adaptation.
2. Experiment with the impact of national-level emissions cuts on global climate change.
3. Assess the solution space for preventing "dangerous" human interference with the climate system.

Required Reading:

Briefing note for your country in the negotiation.

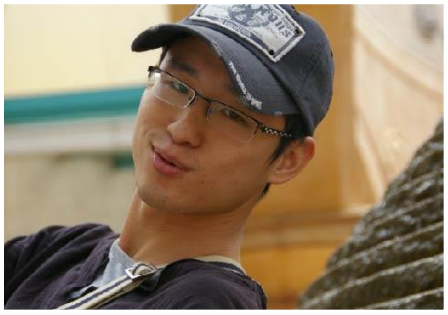
Assignments Due: Lab 1

Date of Class: 19 September

Course Topics: Introduction: Climate and weather modeling

Lecture Objectives:

1. Explain how global climate models work.
2. Recognize biases in model output and misapplications of global climate projections.
3. Identify areas of consensus among global climate models.



Dr. Zhongwang Wei, Japan/China

"Further research on how meteorological drought transforms to agricultural drought is needed for a better understanding of drought risks under climate change."

-Zeng et al. 2022

Required Reading:

How do Climate Models Work? https://www.carbonbrief.org/qa-how-do-climate-models-work#cmip

IPCC Working Group 1 Summary for Policy-Makers: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

Zeng, J., Li, J., Lu, X., Wei, Z., Shangguan, W., Zhang, S., ... & Zhang, S. (2022). Assessment of global meteorological, hydrological and agricultural drought under future warming based on CMIP6. *Atmospheric and Oceanic Science Letters*, *15*(1), 100143. https://www.sciencedirect.com/science/article/pii/S1674283421001227

Lab: Climate data experiments

Students will explore climate data for two different regions, highlighting areas of agreement and disagreement between models and analyzing what kind of trends are projected for the future. Students will then analyze a region of their choice and share their findings.

Lab Objectives:

1. Familiarity with where to find climate data (historical and future projections) and how to make basic plots.
2. Identify climate variables and regions that have more or less consensus and explain why that might be.

Assignments Posted: Climate Risk Assessment

Assignments Due: Lab 2

Date of Class: 26 September

Course Topics: Risk Assessment: Key concepts

Lecture and discussion. Guest speaker for a 30-min discussion is Edmond Totin, Université Nationale d'Agriculture du Benin.

Dr. Cecilia Conde Álvarez, Mexico

"Our vision is to explain the urgency of the climate crisis"

- Dr. Cecilia Conde at the release of the AR6 report

Learning Objectives:

1. Explain how hazards, vulnerability, and exposure combine to create risk.
2. Analyze major trends in the components of risk around the world.
3. Critique the components of vulnerability in different contexts.
4. Extrapolate how risk applies to agricultural contexts

Required Reading:

IPCC AR6 WGII Summary for Policymakers: https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

Otto, F, Coelho C, King A, Coughlan de Perez E, Wada Y, van Oldenborgh GJ, Haarsma R, Haustein K, Uhe P, van Aalst M, Aravequia JA, Almeida W, and Cullen H. 2015. Factors Other than Climate Change, Main Drivers of 2014/15 Water Shortage in Southeast Brazil. *Bulletin of the American Meteorological Society*, no. September. https://doi.org/10.1175/BAMS-D-15-00120.1 .

United States Fourth National Climate Assessment. Please select "Chapters" from the drop-down menu and read the chapter of a region of interest to you. https://nca2018.globalchange.gov/

Lab: Crop modeling

Students will download and run a simple crop model with climate data, logging the yield outcomes based on varying input parameters.

Learning Objectives:

1. Manipulate climate data in a crop model.
2. List the web of factors that can mediate the impact of climate on food production
3. Critique what crop models are and are not able to tell us

Required Reading:

AquaCrop introduction: http://old.belal.by/elib/fao/956.pdf

AquaCrop manual: https://www.fao.org/3/i6052e/i6052e.pdf

Assignments Due: Lab 3

Date of Class: 3 October

Course Topics: Risk Assessment: Global key risks and food systems

Lecture and discussion.

Dr. Sonja Vermeulen, France

"The impacts of global climate change on food systems are expected to be widespread, complex, geographically and temporally variable, and profoundly influenced by preexisting and emerging social and economic conditions."

- Vermeulen et al. 2012

Learning Objectives:

1. Analyze relationships between cascading and compounding climate events.
2. Examine food systems and test for the ways in which climate can cause impacts.
3. Assess pathways by which climate impacts nutrition, migration, and humanitarian work.

Required Reading:

IPCC AR6 WGII Chapter 5: Food, Fibre, and Other Ecosystem Products.
https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Chapter05.pdf

Vermeulen, S. J., Campbell, B. M., & Ingram, J. S. (2012). Climate change and food systems. Annual review of environment and resources, 37, 195-222.

Chapter 4 of Weather as War: Race, Disability, and Environmental Determinism in the Syrian Climate War Thesis, Neel Ahuja

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Lab: Scenarios and compound events in agriculture

Students will work through an online scenario tools for compound and cascading events, showing the interplay between climate events around the world and the effects on global systems.

Learning Objectives:

1. Articulate the ways in which climate events can compound to affect food systems
2. Identify the decisions made by actors in the food system to manage risks

Required Reading:

Assignments Due: Draft 1 of climate risk assessment is due today, and we will do a peer review exercise in class.
Lab 4

Date of Class: 17 October

Course Topics: Geoengineering

We will cover the definition of geoengineering, focusing on solar radiation management (injection of aerosols into the stratosphere to cool the planet). We will discuss possible risks and consequences, and the current political and research landscape.

Dr. Izidine Pinto, Mozambique/South Africa

Add Izidine quote

Learning Objectives:

1. List the possible outcomes of geoengineering
2. Present arguments from different points of view on the pros and cons of researching or deploying geoengineering
3. Consider vulnerability, exposure, hazard for specific locations.

Required Reading:

Coughlan de Perez et al. SPI SPEI and Geoengineering (in review).

Suarez, P., & van Aalst, M. K. (2017). Geoengineering: a humanitarian concern. *Earth's Future*, *5*(2), 183-195.

Open letter from the Saami Council, representing Saami indigenous peoples' organisations in Sweden, Norway, Finland and Russia, to the SCoPEx Advisory Committee.

Lab: Geoengineering game

Students will participate in a "serious game" in which they experience climate outcomes and need to make individual and collective decisions about geoengineering governance.

Learning Objectives:

1. Simulate the emergent dynamics of global governance for geoengineering
2. Articulate the pros and cons of different geoengineering proposals for different stakeholders
3. Understand how the uncertainty in geoengineering affects policy discussions

Assignments Due: Draft 2 of climate risk assessment is due today to the teaching team
Lab 5

Date of Class: 24 October

Course Topics: Risk Assessment: Impact-based Forecasting

Lecture and discussion.

Learning Objectives:

1. Define how early warning systems can be used across sectors/issues.
2. Label the basic components of an impact-based forecasting system.
3. Recognize how the risk analysis in Impact-based Forecasting can contribute to wider adaptations such as Forecast-based Financing.

Required Reading:

The Future of Forecasts: Impact-based Forecasting for Early Action.
https://www.climatecentre.org/downloads/files/Standalone_Impact%20based%20forecasting%20guide%202020.pdf

Coughlan de Perez, E., van den Hurk, B., van Aalst, M. K., Jongman, B., Klose, T., and Suarez, P.: Forecast-based financing: an approach for catalyzing humanitarian action based on extreme weather and climate forecasts, Nat. Hazards Earth Syst. Sci., 15, 895–904, https://doi.org/10.5194/nhess-15-895-2015, 2015.

Haque, D. M. E., Mimi, A., Mazumder, R. K., & Salman, A. M. (2020). Evaluation of natural hazard risk for coastal districts of Bangladesh using the INFORM approach. *International Journal of Disaster Risk Reduction*, 48, 101569. https://doi.org/10.1016/j.ijdrr.2020.101569

Coughlan de Perez et al. Learning from the past in moving to the future: Invest in communication and response to weather early warnings to reduce death and damage. Climate Risk Management (forthcoming).

Lab: Impact-based forecasting lab

Students will participate in an impact-based forecasting scenario called “Forewarned and Forearmed”.

Learning Objectives:

1. Identify who is vulnerable/exposed/potentially impacted by an extreme event.
2. Discover the role of satellite data in assessing risk.
3. Experiment with assigning roles and responsibilities throughout an early warning system

Required Reading:

Assignments Due: Lab 6

The teaching team will return Draft 2 of the Climate Risk Assessment with comments today.

Catalina Jaime, Colombia/UK

"Stakeholders from a range of sectors need to work together to build the resilience of a community and agree priorities for early action."

- Jaime et al. 2018

Date of Class: 31 October

Course Topics: Risk Perception: Heuristics

Lecture and discussion.

Dr. Tony Patt, United States

"This was not the first floodplain resettlement program to have failed."

- Patt et al. 2008

Learning Objectives:

1. Explain why people perceive risk differently.
2. Recall several heuristics that affect risk perception.
3. Theorize the implications of risk perception in terms of people's willingness to manage risk and adapt to climate change.

Required Reading:

Patt, A. G., & Schröter, D. (2008). Perceptions of climate risk in Mozambique: implications for the success of adaptation strategies. *Global Environmental Change*, *18*(3), 458-467. https://doi.org/10.1016/j.gloenvcha.2008.04.002

Meyer, R. J., Baker, J., Broad, K., Czajkowski, J., & Orlove, B. (2014). The dynamics of hurricane risk perception: Real-time evidence from the 2012 Atlantic hurricane season. *Bulletin of the American Meteorological Society*, *95*(9), 1389-1404. https://doi.org/10.1175/BAMS-D-12-00218.1

Lab: Risk Perception

Students will engage in a debate on a topic related to risk perception, and then describe how heuristics affected the debate.

Learning Objectives:

1. Experience how heuristics can impact people's perception of global and/or local risks.
2. List cognitive biases that affect risk perception.
3. Assess how risk perception affects the prioritization of climate-related decisions.

Required Reading:

Cognitive Bias review

AND

Nuclear energy debate group: https://letstalkscience.ca/educational-resources/stem-in-context/what-are-pros-and-cons-nuclear-energy

OR

Geoengineering debate group: Suarez, P., & van Aalst, M. K. (2017). Geoengineering: a humanitarian concern. *Earth's Future*, *5*(2), 183-195. https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2016EF000464

Assignments Due: Final version of Climate Risk Assessment due

Lab 7

Date of Class: 7 November

Course Topics: Risk Communication: Strategies

Lecture and discussion. Introduction to the Green Climate Fund group project and Theory of Change. This lecture will be recorded for Fletcher students, who do not have class on this date.

Learning Objectives:

1. Discuss how communication strategies should differ based on risk perception.
2. Recall a variety of conventional and unconventional strategies used to communicate climate information.
3. Assess communication plans based on their message, method, and target group.

Required Reading:

How the people of Bangladesh live with climate change and what communication can do

Explore this website of art and climate change, either reading some of the posts or exploring the listed organizations. Come prepared to discuss a piece of artwork that you found moving or otherwise memorable.

Lab: Paying for Predictions Game

Students will play the Paying for Predictions game of the Red Cross Red Crescent Climate Centre.

Dr. Jason Wu, United States

"Imagine you have the ability to travel through time and hear voicemail recordings from 100 years into the future."

- Wu et al. 2015

Learning Objectives:

1. Assess experiential techniques to communicate risk or adaptation strategies
2. Visualize how games can be used as a tool to communicate climate information.
3. Critique the use of early warning systems in risk management.

Required Reading:

Wu, J., Lee, J. Climate change games as tools for education and engagement. *Nature Clim Change* **5,** 413–418 (2015). https://doi.org/10.1038/nclimate2566

Moser, S. C. (2014). Communicating adaptation to climate change: the art and science of public engagement when climate change comes home. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(3), 337-358. https://doi.org/10.1002/wcc.276

Assignments Posted: Group project Green Climate Fund proposal

Assignments Due: Lab 8

Date of Class: 14 November

Dr. Benjamin Preston, United States

"We find that the heuristic reasoning employed in adaptation research and practice often fails to reflect the nuances associated with the practical pursuit of adaptation."

- Preston et al. 2015

Lecture and discussion.

Course Topics: Risk Management: Adaptation concepts

Learning Objectives:

1. Recall a list of adaptation options by sector and risk.
2. Theorize barriers to equitable and just adaptation.
3. Summarize global progress on adaptation.
4. List major funds and institutions that invest in adaptation.

Required Reading:

Preston, B.L., Mustelin, J. & Maloney, M.C. Climate adaptation heuristics and the science/policy divide. *Mitig Adapt Strateg Glob Change* **20,** 467–497 (2015). https://doi.org/10.1007/s11027-013-9503-x

Climate Change Adaptation Plan for Akwesasne, Mohawk Nation Territory.

Ziervogel, G., & Ericksen, P. J. (2010). Adapting to climate change to sustain food security. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(4), 525-540. https://doi.org/10.1002/wcc.56

New et al., 2022: Decision Making Options for Managing Risk. In: *Climate Change 2022: Impacts, Adaptation, and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Chapter17.pdf

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Lab: COP26 and Climate Grief

Students will watch part of COP27, and come prepared to share their observations. We will carry out a facilitated exercise on climate grief.

Learning Objectives:

1. Explain to what extent the Paris Agreement and NDCs contain adaptation goals.
2. Follow the progress of the ongoing COP27.
3. Critique preliminary outcomes and discuss expectations for COP2.
4. Share stories of climate grief and what this means for our lives
5. Seventh Generation exercise

Required Reading:

Fujikane, C. Introduction to *Mapping Abundance for a Planetary Future*, https://www.dukeupress.edu/Assets/PubMaterials/978-1-4780-1168-2_601.pdf

Assignments Due: Lab 9, Group project outline due

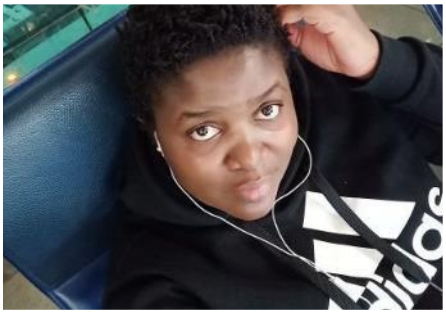
Date of Class: 21 November

Course Topics: Risk Management: Extremes

Lecture and discussion.

Learning Objectives:

1. Discover gaps in adaptation around the world and humanitarian implications.
2. Recall methods to simulate extremes
3. Brainstorm ways in which unprecedented extremes can affect the food system



Asha Sitati, Kenya/Switzerland

"People affected by conflict are unusually vulnerable to climate shocks and climate change, yet little is known about climate change adaptation in fragile contexts."

- Sitati et al. 2021

Required Reading:

Sitati, Asha, E. Joe, B. Pentz, C. Grayson, C. Jaime, E. Gilmore, E. Galappaththi et al. "Climate change adaptation in conflict-affected countries: A systematic assessment of evidence." *Discover Sustainability* 2, no. 1 (2021): 1-15. https://link.springer.com/article/10.1007/s43621-021-00052-9

Coughlan de Perez et al. High potential for surprising heat and drought events in wheat-producing regions of USA and China (forthcoming)

Fanzo, J., Davis, C., McLaren, R., & Choufani, J. (2018). The effect of climate change across food systems: Implications for nutrition outcomes. *Global food security*, *18*, 12-19. https://doi.org/10.1016/j.gfs.2018.06.001

IIED (2022). Addressing Loss and Damage. https://pubs.iied.org/sites/default/files/pdfs/2022-07/21046iied.pdf

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Lab: Risk Management Lab: Peer review

Students will be given an article to read that was recently submitted for publication in a journal with open peer review (e.g. NHESS). They will critique the article in small groups and identify several review comments. These will then be collated and submitted to the journal as part of the open review process.

Learning Objectives:

1. Critique an analysis of risk and adaptation for a specific location.
2. Experiment with writing peer review comments for an academic publication.
3. Justify criticisms of work on risk assessment or adaptation solutions.

Required Reading:

Students will be given an article to read that was recently submitted for publication in a journal with open peer review (e.g. NHESS). It must be read before class.

Assignments Due: Lab 10

Date of Class: 28 November

Course Topics: Risk Management: Health and Nutrition

Lecture and discussion.

Camilo Mora, Colombia/Hawai'i

"Climatic hazards have also diminished human capacity to cope with pathogens by altering body condition; adding stress from exposure to hazardous conditions; forcing people into unsafe conditions; damaging infrastructure, forcing exposure to pathogens and/or reducing access to medical care."

- Mora et al. 2022

Learning Objectives:

1. Evaluate different ways that countries have invested in adaptation at the national level focused on health and nutrition
2. Assess adaptation options for nutrition outcomes in food systems
3. Critique the role of colonialism in shaping climate change outcomes and adaptation plans

Required Reading:

Mora, C., McKenzie, T., Gaw, I. M., Dean, J. M., von Hammerstein, H., Knudson, T. A., ... & Franklin, E. C. (2022). Over half of known human pathogenic diseases can be aggravated by climate change. *Nature Climate Change*, 1-7. https://www.nature.com/articles/s41558-022-01426-1

Romanello, M., McGushin, A., Di Napoli, C., Drummond, P., Hughes, N., Jamart, L., ... & Hamilton, I. (2021). The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future. The Lancet. https://doi.org/10.1016/

Ayanlade, A., Radeny, M. COVID-19 and food security in Sub-Saharan Africa: implications of lockdown during agricultural planting seasons. *npj Sci Food* **4,** 13 (2020). https://doi.org/10.1038/s41538-020-00073-0

Sultana, Farhana. "The unbearable heaviness of climate coloniality." *Political Geography* (2022): 102638. https://doi.org/10.1016/j.polgeo.2022.102638

Lab: Maladaptation

Students will be given project proposals at varying stages of completion, and will be given the opportunity to predict what can/will/did “go wrong”. Students will illustrate possible pathways to maladaptation in each project.

Learning Objectives:

1. Critique adaptation projects around the world.
2. Apply categories of maladaptation to real-world examples.
3. Recognize groups that have been marginalized in adaptation and risk management work around the world.
4. Identify examples of adaptations that have supported marginalized groups.
5. Critique plausible pathways by which marginalized groups could be affected by adaptations.

Assignments due: *Group project check-in with TAs this week*
Lab 11

Date of Class: 5 December

Course Topics: Risk Management: Local and farm-level adaptation

Lecture and discussion. This will include a panel of invited experts in adaptation to climate change in agricultural settings.

THIS CLASS WILL BE HELD OVER ZOOM – remote only

Harini Nagendra, India

"The need to confront pressing problems combined with lack of financial capacity can spur progressively minded city leaders to look for radically disruptive but affordable solutions."

- Nagendra et al. 2018

Learning Objectives:

1. Identify priority adaptation measures for farm-specific case studies.
2. Theorize priorities for adaptation in urban areas.
3. Appreciate the breadth and depth of innovation in adaptation in agriculture

Required Reading:

Mase, Amber Saylor, Benjamin M. Gramig, and Linda Stalker Prokopy. "Climate change beliefs, risk perceptions, and adaptation behavior among Midwestern US crop farmers." Climate Risk Management 15 (2017): 8-17. https://www.sciencedirect.com/science/article/pii/S2212096316301097

Wolfe, David W., Arthur T. DeGaetano, Gregory M. Peck, Mary Carey, Lewis H. Ziska, John Lea-Cox, Armen R. Kemanian, Michael P. Hoffmann, and David Y. Hollinger. "Unique challenges and opportunities for northeastern US crop production in a changing climate." *Climatic change* 146, no. 1 (2018): 231-245. https://link.springer.com/article/10.1007/s10584-017-2109-7

Nagendra, H., Bai, X., Brondizio, E.S. *et al.* The urban south and the predicament of global sustainability. *Nat Sustain* **1,** 341–349 (2018). https://doi.org/10.1038/s41893-018-0101-5

Lab: Public comment

Students will discuss a law or policy that is currently open for public comment, and prepare comments accordingly.

Learning Objectives:

1. Apply class material to real-world policy scenarios
2. Structure constructive criticism for climate change adaptation policies

Required Reading:

Assignments Due: Lab 12

Date of Class: 12 December

Course Topics: Final Presentations

This schedule is subject to modification at the instructor's discretion.